

**Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Project Directorate (ADB)
Kathmandu, Nepal**

**SASEC Roads Improvement Project (SRIP)
(ADB Loan No. 3478 - NEP)**

**Narayanghat – Butwal Road (Section – 2)
From Km 65 + 000 to Km 113 + 535**

Contract No. SRIP/ICB/NB/02

Phase 1: Upgrading Works

(Upgrading of existing road from 2-Lanes to 4 Lanes and Service Lanes, Structures, Bridges, etc. including Defect Notification Period)

Phase 2: Performance Based Maintenance Works

(Maintenance works consisting of all activities to be carried out to achieve and keep the road assets as defined in the PBM Specifications)

Bidding Document

Part I Bidding Procedures

Section 1	Instruction to Bidders
Section 2	Bid Data Sheet
Section 3	Evaluation and Qualification Criteria
Section 4	Bidding Forms incl. Bills of Quantities
Section 5	Eligible Countries

April 2018

Preface

This Bidding Document for the Procurement of Works (Single Stage – Two Envelope) has been prepared by the Government of Nepal, Ministry of Physical Infrastructure and Transport, Department of Roads, Project Directorate (ADB) and is based on the Standard Bidding Document for International Competitive Bidding (ICB) under “Procurement of Works (SBD Works)” issued by the Asian Development Bank dated December 2015.

FOR REFERENCE ONLY

Table of Contents - Summary Description

PART I

BIDDING PROCEDURES

Section 1 - Instructions to Bidders (ITB) ----- 1-1

This Section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Section 2 - Bid Data Sheet (BDS) ----- 2-1

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.

Section 3 - Evaluation and Qualification Criteria (EQC) ----- 3-1

This Section contains the criteria to determine the lowest evaluated bid and the qualifications of the Bidder to perform the contract.

Section 4 - Bidding Forms (BDF) ----- 4-1

This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.

Section 5 - Eligible Countries (ELC) ----- 5-1

This Section contains the list of eligible countries.

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Section 6A – Summary of Description of Works

This Section contains the summary list of main works to be executed under the contract. Specification, Special provisions and, the Drawings, that describe the Works to be procured.

Section 6B – Standard Specifications

This document has been issued under the authority of the Government of Nepal, Ministry of Physical Planning and Works, Department of Roads (July 2001), it can be purchased from the Central Road Laboratory, Kupandole, Lalitpur.

Section 6C – Special Provisions

This section contains amendments, supplements, etc. to the standard specifications to suit the specific requirements of the project, including sections regarding Minor Bridges and PBM works

Section 6D – Drawings

The drawings are presented in a separate volume.

Section 6E – Personnel Requirements

This section provides the information on Personnel Requirements.

Section 6F – Equipment Requirements

This section provides the information on Equipment Requirements.

PART III

CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 - General Conditions of Contract (GCC) ----- 7-1

This Section contains the general clauses that govern the Contract. These General Conditions shall be the Conditions of Contract for Construction, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs-Conseil (FIDIC June 2010 MDB version). These Conditions are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).

Section 8 - Particular Conditions of Contract (PCC) ----- 8-1

This Section contains provisions which are specific to each contract and which modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Section 9 - Contract Forms (COF) ----- 9-1

This Section contains forms, which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

FOR REFERENCE ONLY

Section 1 - Instructions to Bidders

This Section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, evaluation of bids, and on the award of contract.

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FOR REFERENCE ONLY

Section 1 - Instructions to Bidders

A. General

- 1. Scope of Bid**
 - 1.1 In connection with the Invitation for Bids (IFB) indicated in the Bid Data Sheet (BDS), the Employer, as indicated in the BDS, issues this Bidding Document for the procurement of Works as specified in Section 6 (Employer's Requirements). The name, identification, and number of contracts of the international competitive bidding (ICB) are provided in the BDS.
 - 1.2 Throughout this Bidding Document,
 - (a) the term "in writing" means communicated in written form and delivered against receipt;
 - (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
 - (c) "day" means calendar day.
- 2. Source of Funds**
 - 2.1 The Borrower or Recipient (hereinafter called "Borrower") indicated in the BDS has applied for or received financing (hereinafter called "funds") from the Asian Development Bank (hereinafter called "ADB") toward the cost of the project named in the BDS. The Borrower intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.
 - 2.2 Payments by the ADB will be made only at the request of the Borrower and upon approval by ADB in accordance with the terms and conditions of the Financing Agreement between the Borrower and ADB (hereinafter called "Financing Agreement"), and will be subject in all respects to the terms and conditions of that Financing Agreement. No party other than the Borrower shall derive any rights from the Financing Agreement or have any claim to the funds.
- 3. Fraud and Corruption**
 - 3.1 ADB's Anticorruption Policy requires Borrowers (including beneficiaries of ADB-financed activity), as well as Bidders, Suppliers, and Contractors under ADB-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, ADB
 - (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) "corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;
 - (ii) "fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
 - (iii) "coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the

- actions of a party;
- (iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party;
 - (v) "obstructive practice" means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an ADB investigation; (b) making false statements to investigators in order to materially impede an ADB investigation; (c) failing to comply with requests to provide information, documents or records in connection with an Office of Anticorruption and Integrity (OAI) investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (e) materially impeding ADB's contractual rights of audit or access to information; and
 - (vi) "integrity violation" is any act which violates ADB's Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB's Anticorruption Policy, including failure to adhere to the highest ethical standard.
- (b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract;
 - (c) will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation;
 - (d) will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate¹ in ADB-financed, administered, or supported activities or to benefit from an ADB-financed, administered, or supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations; and
 - (e) will have the right to require that a provision be included in bidding documents and in contracts financed by ADB, requiring Bidders, suppliers and contractors to permit ADB or its representative to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them

¹ Whether as a Contractor, Nominated Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document). A Nominated Subcontractor is one that either has been: (i) included by the Bidder in its prequalification application or bid because it brings specific and critical experience and know-how that are accounted for in the evaluation of the bidder's prequalification application or the bid; or (ii) appointed by the Employer.

audited by auditors appointed by ADB.

- 3.2 Furthermore, Bidders shall be aware of the provision stated in Subclause 1.15 and 15.6 of the Conditions of Contract.

4. Eligible Bidders

- 4.1 A Bidder may be a natural person, private entity, or government-owned enterprise subject to ITB 4.5—or any combination of them with a formal intent to enter into an agreement or under an existing agreement in the form of a Joint Venture. In the case of a Joint Venture,

- (a) all partners shall be jointly and severally liable; and
- (b) the Joint Venture shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the Joint Venture during the bidding process and, in the event the Joint Venture is awarded the Contract, during contract execution.

- 4.2 A Bidder, and all parties constituting the Bidder, shall have the nationality of an eligible country, in accordance with Section 5 (Eligible Countries). A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.

- 4.3 A Bidder shall not have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in the bidding process if any of, including but not limited to, the following apply:

- (a) they have controlling shareholders in common; or
- (b) they receive or have received any direct or indirect subsidy from any of them; or
- (c) they have the same legal representative for purposes of this bid; or
- (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to material information about or improperly influence the bid of another Bidder, or influence the decisions of the Employer regarding this bidding process; or
- (e) a Bidder participates in more than one bid in this bidding process, either individually or as a partner in a joint venture, except for alternative offers permitted under ITB 13 of the Bidding Document. This will result in the disqualification of all Bids in which it is involved. However, subject to any finding of a conflict of interest in terms of 4.3(a)-(d) above, this does not limit the participation of a Bidder as a Subcontractor in another Bid or of a firm as a Subcontractor in more than one Bid; or
- (f) a Bidder or any affiliated entity, participated as a Consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or
- (g) a Bidder was affiliated with a firm or entity that has been hired (or

is proposed to be hired) by the Employer or Borrower as Engineer for the contract.

- 4.4 A firm shall not be eligible to participate in any procurement activities under an ADB-financed, administered, or supported project while under temporary suspension or debarment by ADB pursuant to its Anticorruption Policy (see ITB 3), whether such debarment was directly imposed by ADB, or enforced by ADB pursuant to the Agreement for Mutual Enforcement of Debarment Decisions. A bid from a temporary suspended or debarred firm will be rejected.
- 4.5 Government-owned enterprises in the Employer's country shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under commercial law, and (iii) are not a dependent agency of the Employer.
- 4.6 Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.
- 4.7 Firms shall be excluded if by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods or contracting of works or services from that country or any payments to persons or entities in that country.
- 4.8 In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.

5. Eligible Materials, Equipment and Services

- 5.1 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries as defined in ITB 4.2 above and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment, and services.
- 5.2 For purposes of ITB 5.1 above, "origin" means the place where the materials and equipment are mined, grown, produced, or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.

B. Contents of Bidding Document

6. Sections of Bidding Document

- 6.1 The Bidding Document consist of Parts I, II, and III, which include all the sections indicated below, and should be read in conjunction with any addenda issued in accordance with ITB 8.

PART I Bidding Procedures

Section 1 - Instructions to Bidders (ITB)
Section 2 - Bid Data Sheet (BDS)
Section 3 - Evaluation and Qualification Criteria (EQC)
Section 4 - Bidding Forms (BDF)
Section 5 - Eligible Countries (ELC)

PART II Requirements

Section 6 - Employer's Requirements (ERQ)

PART III Conditions of Contract and Contract Forms

Section 7 - General Conditions of Contract (GCC)

Section 8 - Particular Conditions of Contract (PCC)

Section 9 - Contract Forms (COF)

- 6.2 The Invitation for Bids (IFB) issued by the Employer is not part of the Bidding Document.
- 6.3 The Employer is not responsible for the completeness of the Bidding Document and their addenda, if they were not obtained directly from the source stated by the Employer in the IFB.
- 6.4 The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.
- 7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting**
- 7.1 A prospective Bidder requiring any clarification on the Bidding Document shall contact the Employer in writing at the Employer's address indicated in the BDS or raise his inquiries during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received no later than 21 days prior to the deadline for submission of bids. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including a description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8 and ITB 22.2.
- 7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
- 7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for in the BDS. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 The Bidder is requested to submit any questions in writing, to reach the Employer not later than 1 week before the meeting.
- 7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid

meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.

7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.

8. Amendment of Bidding Document

8.1 At any time prior to the deadline for submission of Bids, the Employer may amend the Bidding Document by issuing addenda.

8.2 Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.

8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2

C. Preparation of Bids

9. Cost of Bidding

9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

10. Language of Bid

10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS, in which case, for purposes of interpretation of the Bid, such translation shall govern.

11. Documents Comprising the Bid

11.1 The Bid shall comprise two envelopes submitted simultaneously, one called the Technical Bid containing the documents listed in ITB 11.2 and the other the Price Bid containing the documents listed in ITB 11.3, both envelopes enclosed together in an outer single envelope.

11.2 The Technical Bid shall comprise the following:

- (a) Letter of Technical Bid;
- (b) Bid Security or Bid-Securing Declaration, in accordance with ITB 19;
- (c) alternative Bids, if permissible, in accordance with ITB 13;
- (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.2;
- (e) documentary evidence in accordance with ITB 17, establishing the Bidder's qualifications to perform the contract;
- (f) Technical Proposal in accordance with ITB 16;
- (g) Any other document required in the BDS.

11.3 The Price Bid shall comprise the following:

- (a) Letter of Price Bid;
- (b) completed Price Schedules, in accordance with ITB 12 and ITB 14;
- (c) alternative price Bids, at Bidder's option and if permissible, in accordance with ITB 13;
- (d) Any other document required in the BDS.

11.4 In addition to the requirements under ITB 11.2, Bids submitted by a Joint Venture shall include a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement.

12. Letters of Bid and Schedules

12.1 The Letters of Technical Bid and Price Bid, and the Schedules, including the Bill of Quantities, shall be prepared using the relevant forms furnished in Section 4 (Bidding Forms). The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested and as required in the BDS.

13. Alternative Bids

13.1 Unless otherwise indicated in the BDS, alternative Bids shall not be considered.

13.2 When alternative times for completion are explicitly invited, a statement to that effect will be included in the BDS, as will the method of evaluating different times for completion.

13.3 Except as provided under ITB 13.4 below, Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated Bidder conforming to the basic technical requirements shall be considered by the Employer.

13.4 When specified in the BDS, Bidders are permitted to submit alternative technical solutions for specified parts of the Works. Such parts will be identified in the BDS and described in Section 6 (Employer's Requirements). The method for their evaluation will be stipulated in Section 3 (Evaluation and Qualification Criteria).

14. Bid Prices and Discounts

14.1 The prices and discounts quoted by the Bidder in the Letter of Price Bid and in the Bill of Quantities shall conform to the requirements specified below.

14.2 The Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.

14.3 The price to be quoted in the Letter of Price Bid, in accordance with ITB 12.1, shall be the total price of the Bid, excluding any discounts offered. . Absence of the total bid price in the Letter of Price Bid may

result in the rejection of the Bid.

14.4 The Bidder shall quote any discounts and the methodology for their application in the Letter of Price Bid, in accordance with ITB 12.1.

14.5 Unless otherwise provided in the BDS and the Contract, the rates and prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract. In such a case, the Bidder shall furnish the indexes and weightings for the price adjustment formulas in the Tables of Adjustment Data included in Section 4 (Bidding Forms) and the Employer may require the Bidder to justify its proposed indexes and weightings.

14.6 If so indicated in ITB 1.1, bids are being invited for individual contracts or for any combination of contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 14.4, provided the Bids for all contracts are submitted and opened at the same time.

14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.

**15. Currencies of
Bid and Payment**

15.1 The unit rates and the prices shall be quoted by the Bidder entirely in the currency specified in the BDS.

15.2 Bidders shall indicate the portion of the bid price that corresponds to expenditures incurred in the currency of the Employer's country in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.3 Bidders expecting to incur expenditures in other currencies for inputs to the Works supplied from outside the Employer's country and wishing to be paid accordingly may indicate up to three foreign currencies in the Schedule of Payment Currencies included in Section 4 (Bidding Forms).

15.4 The rates of exchange to be used by the Bidder for currency conversion during bid preparation shall be the selling rates for similar transactions prevailing on the date 28 days prior to the deadline for submission of bids published by the source specified in the BDS. If exchange rates are not so published for certain currencies, the Bidder shall state the rates used and the source. Bidders should note that for the purpose of payments, the exchange rates confirmed by the source specified in the BDS as the selling rates prevailing 28 days prior to the deadline for submission of Bids shall apply for the duration of the Contract so that no currency exchange risk is borne by the Bidder.

15.5 Foreign currency requirements indicated by the Bidders in the Schedule of Payment Currencies shall include but not limited to the specific requirements for

(a) expatriate staff and labor employed directly on the Works;

(b) social, insurance, medical and other charges relating to such

- expatriate staff and labor, and foreign travel expenses;
- (c) imported materials, both temporary and permanent, including fuels, oil and lubricants required for the Works;
 - (d) depreciation and usage of imported Plant and Contractor's Equipment, including spare parts, required for the Works;
 - (e) foreign insurance and freight charges for imported materials, Plant and Contractor's Equipment, including spare parts; and
 - (f) overhead expenses, fees, profit, and financial charges arising outside the Employer's country in connection with the Works.
- 15.6 Bidders may be required by the Employer to clarify their foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Payment Currencies are reasonable and responsive to ITB 15.3 above, in which case a detailed breakdown of its foreign currency requirements shall be provided by the Bidder.
- 15.7 Bidders should note that during the progress of the Works, the foreign currency requirements of the outstanding balance of the Contract Price may be adjusted by agreement between the Employer and the Contractor in order to reflect any changes in foreign currency requirements for the Contract, in accordance with Subclause 14.15 of the Conditions of Contract. Any such adjustment shall be effected by comparing the percentages quoted in the bid with the amounts already used in the Works and the Contractor's future needs for imported items.
- 16. Documents Comprising the Technical Proposal**
- 16.1 The Bidder shall furnish a Technical Proposal including a statement of work methods, equipment, personnel, schedule, and any other information as stipulated in Section 4 (Bidding Forms), in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work requirements and the completion time.
- 17. Documents Establishing the Qualifications of the Bidder**
- 17.1 To establish its qualifications to perform the Contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding information sheets included in Section 4 (Bidding Forms).
- 17.2 Domestic Bidders, individually or in joint ventures, applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility as described in ITB 35.
- 18. Period of Validity of Bids**
- 18.1 Bids shall remain valid for the period specified in the BDS after the bid submission deadline date prescribed by the Employer. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.
- 18.2 In exceptional circumstances, prior to the expiration of the bid validity period, the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 19, it shall also be extended 28 days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its Bid.
- 19. Bid Security/Bid-Securing**
- 19.1 Unless otherwise specified in the BDS, the Bidder shall furnish as part of its Bid, in original form, either a Bid-Securing Declaration or a bid

Declaration

security as specified in the BDS. In the case of a bid security, the amount and currency shall be as specified in the BDS.

19.2 If a Bid-Securing Declaration is required pursuant to ITB 19.1, it shall use the form included in Section 4 (Bidding Forms). The Employer will declare a Bidder ineligible to be awarded a Contract for a specified period of time, as indicated in the BDS, if the Bid-Securing Declaration is executed.

19.3 If a bid security is specified pursuant to ITB 19.1, the bid security shall be, at the Bidder's option, in any of the following forms:

- (a) an unconditional bank guarantee,
- (b) an irrevocable letter of credit, or
- (c) a cashier's or certified check,

all from a reputable source from an eligible country as described in Section 5 (Eligible Countries). In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section 4 (Bidding Forms) or another form acceptable to the Employer. The form must include the complete name of the Bidder. The bid security shall be valid for 28 days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 18.2.

19.4 Unless otherwise specified in the BDS, any Bid not accompanied by a substantially compliant bid security or Bid-Securing Declaration, if one is required in accordance with ITB 19.1, shall be rejected by the Employer as nonresponsive.

19.5 If a bid security is specified pursuant to ITB 19.1, the bid security of unsuccessful Bidders shall be returned as promptly as possible upon the successful Bidder's furnishing of the performance security pursuant to ITB 42.

19.6 If a bid security is specified pursuant to ITB 19.1, the bid security of the successful Bidder shall be returned as promptly as possible once the successful Bidder has signed the Contract and furnished the required performance security.

19.7 The bid security may be forfeited or the Bid Securing Declaration executed,

- (a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid, except as provided in ITB 18.2; or
- (b) if the successful Bidder fails to
 - (i) sign the Contract in accordance with ITB 41;
 - (ii) furnish a performance security in accordance with ITB 42;
 - (iii) accept the arithmetical correction of its Bid in accordance with ITB 33; or
 - (iv) furnish a domestic preference security, if so required.

19.8 The Bid Security or Bid Securing Declaration of a Joint Venture shall be in the name of the Joint Venture that submits the Bid. If the Joint

Venture has not been legally constituted at the time of bidding, the bid security or Bid-Securing Declaration shall be in the names of all future partners as named in the letter of intent mentioned in ITB 4.1.

**20. Format and
Signing of Bid**

- 20.1 The Bidder shall prepare one original set of the Technical Bid and one original set of the Price Bid comprising the Bid as described in ITB 11 and clearly mark it "ORIGINAL - TECHNICAL BID" and "ORIGINAL - PRICE BID." Alternative Bids, if permitted in accordance with ITB 13, shall be clearly marked "ALTERNATIVE." In addition, the Bidder shall submit copies of the Technical and Price Bids, in the number specified in the BDS, and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail.
- 20.2 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid, except for unamended printed literature, shall be signed or initialed by the person signing the Bid. If a Bidder submits a deficient authorization, the Bid shall not be rejected in the first instance. The Employer shall request the Bidder to submit an acceptable authorization within the number of days as specified in the BDS. Failure to provide an acceptable authorization within the prescribed period of receiving such a request shall cause the rejection of the Bid.
- 20.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.

D. Submission and Opening of Bids

**21. Sealing and
Marking of Bids**

- 21.1 Bidders may always submit their Bids by mail or by hand. When so specified in the BDS, Bidders shall have the option of submitting their Bids electronically. Procedures for submission, sealing, and marking are as follows:
- (a) Bidders submitting Bids by mail or by hand shall enclose the original of the Technical Bid, the original of the Price Bid, and each copy of the Technical Bid and each copy of the Price Bid, in separate sealed envelopes, duly marking the envelopes as "ORIGINAL - TECHNICAL BID," "ORIGINAL - PRICE BID," and "COPY NO... - TECHNICAL BID" and "COPY NO.... - PRICE BID." These envelopes, the first containing the originals and the others containing copies, shall then be enclosed in one single envelope per set. If permitted in accordance with ITB 13, alternative Bids shall be similarly sealed, marked and included in the sets. The rest of the procedure shall be in accordance with ITB 21.2 and ITB 21.5.
 - (b) Bidders submitting Bids electronically shall follow the electronic bid submission procedures specified in the BDS.
- 21.2 The inner and outer envelopes shall
- (a) bear the name and address of the Bidder;
 - (b) be addressed to the Employer in accordance with BDS 22.1; and

(c) bear the specific identification of this bidding process indicated in the BDS 1.1.

21.3 The outer envelopes and the inner envelopes containing the Technical Bid shall bear a warning not to open before the time and date for the opening of Technical Bid, in accordance with ITB 25.1.

21.4 The inner envelopes containing the Price Bid shall bear a warning not to open until advised by the Employer in accordance with ITB 25.7.

21.5 If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the Bid.

22. Deadline for Submission of Bids

22.1 Bids must be received by the Employer at the address and no later than the date and time indicated in the BDS.

22.2 The Employer may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.

23. Late Bids

23.1 The Employer shall not consider any Bid that arrives after the deadline for submission of bids, in accordance with ITB 22. Any bid received by the Employer after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.

24. Withdrawal, Substitution, and Modification of Bids

24.1 A Bidder may withdraw, substitute, or modify its Bid – Technical or Price – after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.2, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be

(a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION"; and

(b) received by the Employer no later than the deadline prescribed for submission of Bids, in accordance with ITB 22.

24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.

24.3 No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of bid validity specified by the Bidder on the Letters of Technical Bid and Price Bid or any extension thereof.

25. Bid Opening

25.1 The Employer shall open the Technical Bids in public at the address, on the date and time specified in the BDS in the presence of Bidders' designated representatives and anyone who chooses to attend. Any specific electronic bid opening procedures required if electronic bidding is permitted in accordance with ITB 21.1, shall be as specified in the BDS. The Price Bids will remain unopened and will be held in custody of the Employer until the specified time of their opening. If the

Technical Bid and the Price Bid are submitted together in one envelope, the Employer may reject the entire Bid. Alternatively, the Price Bid may be immediately resealed for later evaluation.

25.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening.

25.3 Second, outer envelopes marked "SUBSTITUTION" shall be opened. The inner envelopes containing the Substitution Technical Bid and/or Substitution Price Bid shall be exchanged for the corresponding envelopes being substituted, which are to be returned to the Bidder unopened. Only the Substitution Technical Bid, if any, shall be opened, read out, and recorded. Substitution Price Bid will remain unopened in accordance with ITB 25.1. No envelope shall be substituted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out and recorded at bid opening.

25.4 Next, outer envelopes marked "MODIFICATION" shall be opened. No Technical Bid and/or Price Bid shall be modified unless the corresponding modification notice contains a valid authorization to request the modification and is read out and recorded at the opening of Technical Bids. Only the Technical Bids, both Original as well as Modification, are to be opened, read out, and recorded at the opening. Price Bids, both Original as well as Modification, will remain unopened in accordance with ITB 25.1.

25.5 All other envelopes holding the Technical Bids shall be opened one at a time, and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the presence of a bid security or Bid-Securing Declaration, if required; and
- (d) any other details as the Employer may consider appropriate.

Only Technical Bids and alternative Technical Bids read out and recorded at bid opening shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Technical Bid are to be initialed by at least three representatives of the Employer attending bid opening. No Bid shall be rejected at the opening of Technical Bids except for late bids, in accordance with ITB 23.1.

25.6 The Employer shall prepare a record of the opening of Technical Bids that shall include, as a minimum, the name of the Bidder and whether there is a withdrawal, substitution, or modification; alternative proposals; and the presence or absence of a bid security or Bid-Securing Declaration, if one was required. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

25.7 At the end of the evaluation of the Technical Bids, the Employer will invite bidders who have submitted substantially responsive Technical

Bids and who have been determined as being qualified for award to attend the opening of the Price Bids. The date, time, and location of the opening of Price Bids will be advised in writing by the Employer. Bidders shall be given reasonable notice of the opening of Price Bids.

25.8 The Employer will notify Bidders in writing who have been rejected on the grounds of their Technical Bids being substantially nonresponsive to the requirements of the Bidding Document and return their Price Bids unopened.

25.9 The Employer shall conduct the opening of Price Bids of all Bidders who submitted substantially responsive Technical Bids, in the presence of Bidders' representatives who choose to attend at the address, on the date, and time specified by the Employer. The Bidder's representatives who are present shall be requested to sign a register evidencing their attendance.

25.10 All envelopes containing Price Bids shall be opened one at a time and the following read out and recorded:

- (a) the name of the Bidder;
- (b) whether there is a modification or substitution;
- (c) the Bid Prices, including any discounts and alternative offers; and
- (d) any other details as the Employer may consider appropriate.

Only Price Bids discounts, and alternative offers read out and recorded during the opening of Price Bids shall be considered for evaluation. Unless otherwise specified in the BDS, all pages of the Letter of Price Bid and Bill of Quantities are to be initialed by at least three representatives of the Employer attending bid opening. No Bid shall be rejected at the opening of Price Bids.

25.11 The Employer shall prepare a record of the opening of Price Bids that shall include, as a minimum, the name of the Bidder, the Bid Price (per lot if applicable), any discounts, and alternative offers. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders who submitted Bids on time, and posted online when electronic bidding is permitted.

E. Evaluation and Comparison of Bids

26. Confidentiality

26.1 Information relating to the examination, evaluation, comparison, and postqualification of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on the Contract award is communicated to all Bidders.

26.2 Any attempt by a Bidder to influence the Employer in the evaluation of the Bids or Contract award decisions may result in the rejection of its Bid.

26.3 Notwithstanding ITB 26.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may do so in writing.

27. Clarification of Bids

- 27.1 To assist in the examination, evaluation, and comparison of the Technical and Price Bids, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the substance of the Technical Bid or prices in the Price Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Price Bids, in accordance with ITB 33.
- 27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification, its Bid may be rejected.

28. Deviations, Reservations, and Omissions

- 28.1 During the evaluation of Bids, the following definitions apply:
- (a) "Deviation" is a departure from the requirements specified in the Bidding Document;
 - (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and
 - (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.

29. Examination of Technical Bids

- 29.1 The Employer shall examine the Technical Bid to confirm that all documents and technical documentation requested in ITB 11.2 have been provided, and to determine the completeness of each document submitted.
- 29.2 The Employer shall confirm that the following documents and information have been provided in the Technical Bid. If any of these documents or information is missing, the offer shall be rejected.
- (a) Letter of Technical Bid;
 - (b) written confirmation of authorization to commit the Bidder;
 - (c) Bid Security or Bid-Securing Declaration, if applicable; and
 - (d) Technical Proposal in accordance with ITB 16.

30. Responsiveness of Technical Bid

- 30.1 The Employer's determination of a Bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB11.
- 30.2 A substantially responsive Technical Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,
- (a) if accepted, would:
 - (i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or
 - (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or
 - (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.

- 30.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, Technical Proposal, in particular, to confirm that all requirements of Section 6 (Employer's Requirements) have been met without any material deviation, reservation, or reservation.
- 30.4 If a Bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.
- 31. Nonmaterial Nonconformities**
- 31.1 Provided that a Bid is substantially responsive, the Employer may waive any nonconformities in the Bid that do not constitute a material deviation, reservation, or omission.
- 31.2 Provided that a Technical Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Technical Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Price Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.
- 31.3 Provided that a Technical Bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the method indicated in Section 3 (Evaluation and Qualification Criteria).
- 32. Qualification of the Bidder**
- 32.1 The Employer shall determine to its satisfaction during the evaluation of Technical Bids whether Bidders meet the qualifying criteria specified in Section 3 (Evaluation and Qualification Criteria).
- 32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17.1.
- 32.3 An affirmative determination shall be a prerequisite for the opening and evaluation of a Bidder's Price Bid. A negative determination shall result into the disqualification of the Bid, in which event the Employer shall return the unopened Price Bid to the Bidder.
- 33. Correction of Arithmetical Errors**
- 33.1 During the evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:
- (a) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.
 - (b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
 - (c) If there is a discrepancy between the bid price in the Summary of Bill of Quantities and the bid amount in item (c) of the Letter of Price Bid, the bid price in the Summary of Bill of Quantities will

prevail and the bid amount in item (c) of the Letter of Price Bid will be corrected.

- (d) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a), (b) and (c) above.

33.2 If the Bidder that submitted the lowest evaluated bid does not accept the correction of errors, its Bid shall be disqualified and its bid security may be forfeited or its Bid-Securing Declaration executed.

34. Conversion to Single Currency

34.1 For evaluation and comparison purposes, the currency(ies) of the Bid shall be converted into a single currency as specified in the BDS.

35. Margin of Preference

35.1 Unless otherwise specified in the BDS, a margin of preference shall not apply.

36. Evaluation of Price Bids

36.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.

36.2 To evaluate the Price Bid, the Employer shall consider the following:

- (a) the bid price, excluding Provisional Sums and the provision, if any, for contingencies in the Summary Bill of Quantities, but including Daywork items, where priced competitively;
- (b) price adjustment for correction of arithmetic errors in accordance with ITB 33.1;
- (c) price adjustment due to discounts offered in accordance with ITB 14.4;
- (d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 34;
- (e) adjustment for nonconformities in accordance with ITB 31.3; and
- (f) application of all the evaluation factors indicated in Section 3 (Evaluation and Qualification Criteria).

36.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.

36.4 If this Bidding Document allows Bidders to quote separate prices for different contracts, and the award to a single Bidder of multiple contracts, the methodology to determine the lowest evaluated price of the contract combinations, including any discounts offered in the Letter of Price Bid, is specified in Section 3 (Evaluation and Qualification Criteria).

36.5 If the Bid, which results in the lowest Evaluated Bid Price, is seriously unbalanced or front loaded in the opinion of the Employer, the Employer may require the Bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security be increased at the expense of the Bidder to a level sufficient to protect

the Employer against financial loss in the event of default of the successful Bidder under the Contract.

- 37. Comparison of Bids** 37.1 The Employer shall compare all substantially responsive Bids to determine the lowest evaluated Bid, in accordance with ITB 36.2.
- 38. Employer's Right to Accept Any Bid, and to Reject Any or All Bids** 38.1 The Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all Bids at any time prior to contract award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.

F. Award of Contract

- 39. Award Criteria** 39.1 The Employer shall award the Contract to the Bidder whose offer has been determined to be the lowest evaluated Bid and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
- 40. Notification of Award** 40.1 Prior to the expiration of the period of bid validity, the Employer shall notify the successful Bidder, in writing, that its Bid has been accepted.
- 40.2 At the same time, the Employer shall also notify all other Bidders of the results of the bidding. The Employer will publish in an English language newspaper or well-known freely accessible website the results identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a Bid; (ii) bid prices as read out at bid opening; (iii) name and evaluated prices of each Bid that was evaluated; (iv) name of bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, and the price it offered, as well as the duration and summary scope of the contract awarded. After publication of the award, unsuccessful Bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their Bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, after publication of contract award, requests a debriefing.
- 40.3 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.
- 41. Signing of Contract** 41.1 Promptly after notification, the Employer shall send the successful Bidder the Contract Agreement.
- 41.2 Within 28 days of receipt of the Contract Agreement, the successful Bidder shall sign, date, and return it to the Employer.
- 42. Performance Security** 42.1 Within 28 days of the receipt of notification of award from the Employer, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, subject to ITB 36.5, using for that purpose the Performance Security Form included in Section 9 (Contract Forms), or another form acceptable to the Employer.
- 42.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security or execution of the Bid-Securing Declaration. In that event the Employer may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive

and is determined by the Employer to be qualified to perform the Contract satisfactorily.

- 42.3 The above provision shall also apply to the furnishing of a domestic preference security if so required.

FOR REFERENCE ONLY

FOR REFERENCE ONLY

Section 2 - Bid Data Sheet

A. General

ITB 1.1	The number of the Invitation for Bids is : SRIP/2018-01
ITB 1.1	The Employer is: Ministry of Physical Infrastructure and Transport, Department of Roads, Project Directorate (ADB), Kathmandu, Nepal The Authorised Representative is: Project Director The Project Directorate (ADB) The Employer's Site Representative is: Project Manager Narayanghat – Butwal Road
ITB 1.1	The name of the international competitive bidding (ICB) is: Upgrading of Narayanghat – Butwal Road (Section – 02) from Km 65+000 to Km 113+535 with two phases viz. Phase 1: Upgrading Works - Upgrading from 2-lanes to 4-lanes and service lanes, structures, Bridges, etc. including Defect Notification Period and Phase 2: Performance Based Maintenance Works - PBM maintenance works consisting of all activities to be carried out to achieve and keep the road assets as defined in the Specifications on that upgraded road section. The identification number of the ICB is: SRIP/ICB/NB/02 The number and identification of lots comprising this ICB are "Two" with the following Contract identification numbers: Contract ID No.: SRIP/ICB/NB/01 Contract ID No.: SRIP/ICB/NB/02
ITB 1.1	The Works under the Contract will consist of: Phase 1: Upgrading Works Upgrading of existing road from 2-Lanes to 4 Lanes and Service Lanes, Structures, Bridges, etc. including Defect Notification Period. Phase 2: Performance Based Maintenance Works 1. Maintenance Works consisting of all activities to be carried out by the Contractor to achieve and keep the road asset as defined in the Performance Based Maintenance Specifications, and all activities related to their management. 2. Emergency Works consisting of activities needed to reinstate any road assets which have been abnormally damaged as a result of natural or manmade phenomena such as storms, flooding, earthquakes, major accidents, etc. and which are not covered under monthly lump sum rates of maintenance works.
ITB 2.1	The Borrower is: Nepal

ITB 2.1	The name of the Project is: SASEC Roads Improvement Project (SRIP)
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B. Contents of Bidding Documents

ITB 7.1	For clarification purposes only, the Employer's address is: Attention: The Project Director Project Directorate (ADB), Department of Roads Bishalnagar, Kathmandu Tel No.: +977 1 4437492/4437493 Fax. No.: +977 1 4437488 E-mail: pdadb@wlink.com.np
ITB 7.4	A Pre-Bid meeting shall take place. It will be at the following date, time and place: Date: 10 May 2018 Time: 13:00 hours (local time) Place: Project Directorate (ADB). Bishalnagar, Kathmandu A site visit conducted by the Employer will not be organized.

C. Preparation of Bids

ITB 10.1	The language of the bid is: English
ITB 11.2 (g)	The Bidder shall submit with its Technical Bid the following additional documents: None
ITB 11.3 (d)	The Bidder shall submit with its Price Bid the following additional documents: None
ITB 12.1	The units and rates in figures entered into the Bill of Quantities and Daywork Schedule should be typewritten or if written by hand, must be in print form. Bill of Quantities and Daywork Schedule not presented accordingly may be considered nonresponsive. Failure to specify the Total Price of the Bid in the Letter of Price Bid or in the Summary of Bill of Quantities may be ground for declaring the bid nonresponsive
ITB 13.1	Alternative bids shall not be permitted.
ITB 13.2	Alternative times for completion shall not be permitted.
ITB 13.4	Alternative technical solutions shall be permitted for the following parts of the Works: Not Applicable

ITB 14.5	The prices quoted by the Bidder shall be adjustable.
ITB 15.1	The unit rates and the prices shall be quoted by the bidder entirely in: Nepalese Rupees (NRs.)
ITB 15.4	The rates of exchange shall be the selling rates 28 days prior to the deadline for submission of bids published by: Nepal Rastra Bank, Kathmandu, Nepal
ITB 18.1	The bid validity period shall be 150 days from the date of deadline for submission of bid.
ITB 19.1	The Bidder shall furnish a bid security in the amount of NRs. 195 Million or its equivalent in freely convertible foreign currency.
ITB 19.2	The ineligibility period will be: Not Applicable
ITB 19.4	Any bid not accompanied by an irrevocable and callable bid security shall be rejected by the Employer as nonresponsive. However, if a bidder submits a bid security that deviates in form, amount, and/or period of validity, the Employer shall request the Bidder to submit a compliant bid security within Fourteen (14) days of receiving such a request. Failure to provide a compliant bid security within the prescribed period of receiving such a request shall cause the rejection of the Bid.
ITB 20.1	In addition to the original of the bid, the number of copies is: One (1)
ITB 20.2	The written confirmation of authorization to sign on behalf of the Bidder shall consist of: An organizational document, board resolution or its equivalent, or power of attorney specifying the representative's authority to sign the Bid on behalf of, and to legally bind, the Bidder. If the Bidder is an intended or an existing joint venture, the power of attorney should be signed by all partners and specify the authority of the named representative of the joint venture to sign on behalf of, and legally bind, the intended or existing joint venture. If the joint venture has not yet been formed, also include evidence from all proposed joint venture partners of their intent to enter into a joint venture in the event of a contract award in accordance with ITB 11.4.
ITB 20.2	The Bidder shall submit an acceptable authorization within Fourteen (14) days .

D. Submission and Opening of Bids

ITB 21.1	Bidders shall not have the option of submitting their bids electronically.
ITB 22.1	For <u>bid submission purposes</u> only, the Employer's address is: Project Directorate (ADB) Department of Roads Bishalnagar, Kathmandu Attention: The Project Director The deadline for bid submission is: Date: 31 May 2018 Time: 12:00 hours (local time)

ITB 25.1	The opening of the Technical Bid shall take place at: Project Directorate (ADB) Department of Roads Bishalnagar, Kathmandu Date: 31 May 2018 Time: Immediately after the deadline for submission of bids
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E. Evaluation and Comparison of Bids

ITB 34.1	The currency that shall be used for bid evaluation and comparison purposes to convert all bid prices expressed in various currencies into a single currency is: Nepalese Rupees The source of the selling exchange rate shall be: Nepal Rastra Bank, Kathmandu, Nepal The date for the selling exchange rate shall be: 28 days prior to the deadline for submission of bids.
ITB 35.1	A margin of preference shall apply. The application methodology shall be as stipulated in Section 3 (Evaluation and Qualification Criteria).
ITB 43	<i>Insert new ITB Clause 43 "Subcontracting" as follows:</i> Bidders may propose Subcontracting up to 40% of the Contract Price. The proposed Subcontractor shall meet, on a pro rate basis, the following criteria as specified in Section 3 Evaluation and Qualification Criteria: (i) Average Annual Construction Turnover; (ii) Financial Resources; (iii) Construction Experience in Contract of Similar Size and Nature that is similar to the proposed subcontract; and (iv) Construction Experience in Key Activities, if the subcontractor is proposed for key activities.

Section 3 - Evaluation and Qualification Criteria

- Without Prequalification -

This Section contains all the criteria that the Employer shall use to evaluate bids and qualify Bidders. In accordance with ITB 32 and ITB 36, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section 4 (Bidding Forms).

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1. Evaluation

In addition to the criteria listed in ITB 36.2 (a) – (e), other relevant factors are as follows:

1.1 Adequacy of Technical Proposal

Evaluation of the Bidder's Technical Proposal will include an assessment of the Bidder's technical capacity to mobilize key equipment and personnel for the contract consistent with its proposal regarding work methods, scheduling, and material sourcing in sufficient detail and fully in accordance with the requirements stipulated in Section 6 (Employer's Requirements).

Non-compliance with equipment and personnel requirements described in Section 6 (Employer's Requirements) shall not normally be a ground for bid rejection and such non-compliance will be subject to clarification during bid evaluation and rectification prior to contract award.

1.2 Completion Time

An alternative Completion Time, if permitted under ITB 13.2, will be evaluated as follows:

Not Applicable

1.3 Technical Alternatives

Technical alternatives, if permitted under ITB 13.4, will be evaluated as follows:

Not Applicable

1.4 Quantifiable Nonconformities and Omissions

Subject to ITB 14.2 and ITB 36.2, the evaluated cost of quantifiable nonconformities including omissions, is determined as follows:

"Pursuant to ITB 31.3, the cost of all quantifiable nonmaterial nonconformities shall be evaluated, including omissions in Daywork where competitively priced but excluding omission of prices in the Bill of Quantities. The Employer will make its own assessment of the cost of any nonmaterial nonconformities and omissions for the purpose of ensuring fair comparison of Bids."

1.5 Domestic Preference

If a margin of preference is provided for under ITB 35.1, the following procedure shall apply:

1.5.1 In comparing domestic bids with foreign bids, a margin of preference will be granted to eligible domestic contractors, as defined below, in accordance with the following provisions:

- (a) For application of domestic preference, all responsive bids will first be classified under the following two categories:
 - (i) Category I: Bids offered by Domestic Contractors and Joint Ventures eligible for the preference in accordance with the criteria set forth in Subclause 1.5.2 below; and
 - (ii) Category II: Bids offered by other Contractors.

The Employer will review each bid to confirm the appropriateness of, or to modify as necessary, the category to which the Bid was assigned by the Bidder in preparing it.

- (b) The lowest evaluated Bid of each category will then be determined by comparing all evaluated Bids in each category among themselves.

- (c) Such lowest evaluated Bids will next be compared with each other and if, as a result of this comparison, a Bid from Category I is found to be the lowest, it will be selected for the award of contract.
- (d) If, however, as a result of the comparison under (c) above, the lowest Bid is found to be from Category II, it will be further compared with the lowest evaluated Bid from Category I. For the purpose of this further comparison only an upward adjustment will be made to the lowest evaluated bid price of Category II by adding an amount equal to seven and one-half per cent (7 ½ %) of the bid price. If, after such comparison, the Category I Bid is determined to be the lowest, it will be selected for the award of contract; if not, the lowest evaluated Bid from Category II will be selected.

1.5.2 Domestic Contractors and Joint Ventures between a Domestic Contractor(s) and its foreign partner(s) shall meet the following minimum criteria for eligibility of the Domestic Preference Scheme:

(a) Domestic Contractor(s):

- (i) firms are registered in Nepal;
- (ii) firms have majority ownership by nationals of Nepal; and
- (iii) firms will not subcontract to foreign contractors more than fifty per cent (50%) of the total value of their work.

(b) A Joint Venture between a Domestic Contractor(s) and its foreign partner(s) will be eligible for the preference only if:

- (i) the Domestic Partner(s) are individually eligible for the preference according to the criteria stated above;
- (ii) the Domestic Partner(s) would not qualify for the Works on technical or financial grounds without the foreign participation; and
- (iii) the Domestic Partner(s) will, under the arrangements proposed, carry out at least fifty per cent (50%) of the Works measured in terms of value.

1.5.3 Bidders applying for the preference shall provide all evidence, including details of ownership, necessary to prove that they are qualified for the preference according to the criteria set forth in paragraph 1.5.2 above.

1.5.4 If the Contract is awarded to a Bidder who has received the preference pursuant to the foregoing provisions, such Contractor shall not subcontract to Foreign Contractors more than forty percent (40%) of the total value of their work.

1.5.5 Comparison of Bids will only be between Bids which conform fully to the specifications. In the event that the alternative Bid does not conform to the specifications, if any, of the Bidder whose main Bid conforms to the specifications and is the lowest evaluated, is considered more advantageous than its main Bid, such alternative Bid may be considered.

1.5.6 A Joint Venture that is awarded the Contract as a result of the application of the above domestic preference provisions, shall furnish the Employer, together with the Performance Security, a "Domestic Preference Security" to guarantee that the profit and loss distribution and work-sharing arrangements with which the joint venture satisfied the criteria of Subclause 1.5.2 (b) above will not be modified throughout the execution of the Contract. The domestic performance security shall be in the form of an unconditional on-demand bank guarantee or standby letter of credit acceptable to the Employer, for an amount in a convertible currency equivalent to the difference between the Joint Venture's bid price and the bid price of the lowest foreign bid. The domestic preference security shall be valid until the Contractor has substantially completed the Works and a Taking-Over Certificate has been issued by the Engineer in accordance with the provisions of GCC 10 and such security shall be returned to the Contractor together with the Taking - Over Certificate.

1.6 Multiple Contracts

Works are grouped in multiple contracts and pursuant to ITB 36.4, the Employer shall evaluate and compare Bids on the basis of a contract, or a combination of contracts, or as a total of contracts in order to arrive at the least-cost combination for the Employer by taking into account discounts offered by Bidders in case of award of multiple contracts.

If a Bidder submits several successful (lowest evaluated substantially responsive) bids, the evaluation will also include an assessment of the Bidder's capacity to meet the following aggregated requirements as presented in the bid:

- Average annual construction turnover,
- Financial resources,
- Equipment to be allocated, and
- Personnel to be fielded.

FOR REFERENCE ONLY

2. Qualification

It is the legal entity or entities comprising the Bidder, and not the Bidder's parent companies, subsidiaries, or affiliates, that must satisfy the qualification criteria described below.

2.1 Eligibility

Criteria	Compliance Requirements			Documents
Requirement	Single Entity	Joint Venture		Submission Requirements
		All Partners Combined	Each Partner	

2.1.1 Nationality

Nationality in accordance with ITB Subclause 4.2.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments
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2.1.2 Conflict of Interest

No conflicts of interest in accordance with ITB Subclause 4.3.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
--	-----------------------	-----------------------	-----------------------	----------------	-------------------------

2.1.3 ADB Eligibility

Not having been declared ineligible by ADB, as described in ITB Subclause 4.4.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
--	-----------------------	-----------------------	-----------------------	----------------	-------------------------

2.1.4 Government-Owned Entity

Bidder required to meet conditions of ITB Subclause 4.5.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments
--	-----------------------	-----------------------	-----------------------	----------------	---

2.1.5 United Nations Eligibility

Not having been excluded by an act of compliance with a UN Security Council resolution in accordance with ITB Subclause 4.7.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
--	-----------------------	-----------------------	-----------------------	----------------	-------------------------

2.2 Pending Litigation

Pending litigation and arbitration criterion **shall not** apply.

2.2.1 Pending Litigation and Arbitration

Not Applicable

FOR REFERENCE ONLY

2.3 Financial Situation

2.3.1 Historical Financial Performance

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Submission of audited financial statements or, if not required by the law of the Bidder's country, other financial statements acceptable to the Employer, for the last Five (5) years to demonstrate the current soundness of the Bidder's financial position. As a minimum, (i) the Bidder's net worth for the last year calculated as the difference between total assets and total liabilities should be positive, and (ii) the Bidder's working capital for the last year calculated as the difference between current assets and current liabilities should be positive.	must meet requirement	not applicable	must meet requirement	not applicable	Form FIN - 1 with attachments

2.3.2 Average Annual Construction Turnover

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Minimum average annual construction turnover of NRS 4917 Million or its equivalent calculated as total certified payments received for contracts in progress or completed, within the last Five (5) years .	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN - 2

2.3.3 Financial Resources

If the bid evaluation process and the decision for the award of the Contract takes more than one (1) year from the date of bid submission, Bidders shall be asked to resubmit their current contract commitments and latest information on financial resources supported by latest audited accounts / audited financial statements, or if not required by the law of the Bidder's country, other financial statements acceptable to the Employer, and the Bidders' financial capacity shall be reassessed on this basis.

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
The Bidder must demonstrate that it has the financial resources to meet					
(a) its current contract commitments, as defined in FIN - 4 (Total Financial Requirements for Current Contract Commitments), plus	must meet requirement	not applicable	must meet requirement for its own contractual commitments	not applicable	Form FIN - 4
(b) the requirements for the Subject Contract of NRs. 820 Million or its equivalent.	must meet requirement	must meet requirement	must meet 25% of the requirement	must meet 40% of the requirement	Form FIN – 3 and Form FIN - 4

2.4 Construction Experience

2.4.1 Contracts of Similar Size and Nature

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Participation in at least Two (2) contracts that have been successfully or substantially completed within the last Five (5) years and that are similar to the proposed works, where the value of the Bidder's participation exceeds NRs 6884 Million or its equivalent. The similarity of the Bidder's participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer's Requirements).	must meet requirement	must meet requirement as follows: Either one partner must meet requirement Or Any two partners must each demonstrate one (1) successfully or substantially completed contract of similar size and nature	Must meet requirement as follows: Participation in at least one contract that has been successfully or substantially completed within the last 5 years and that is similar to the proposed works, where the value of the Bidder's participation exceeds NRs. 2152 Million or its equivalent.	not applicable	Form EXP – 1

2.4.2 Construction Experience in Key Activities

May be complied with by specialist subcontractors. Employer shall require evidence of subcontracting agreement from the bidder. A specialist subcontractor is a specialist enterprise engaged for highly specialized processes, which the main contractor cannot provide.

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
For the above or other contracts executed during the period stipulated in 2.4.1 above, a minimum construction experience in the following key activities:	must meet requirements	must meet requirements	not applicable	not applicable	Form EXP-2
(a) Construction of road with Asphalt concrete works of 64,000 cu m completed within the last Five (5) years.					
(b) Construction of Two (2) bridges having length of at least 50 m with Pre-stressed Concrete (PSC) superstructure completed within the last Five (5) years.					
(c) Construction of Two (2) bridges with cast in-situ pile foundation of minimum pile diameter 750 mm completed within the last Five (5) years.					

Section 4 - Bidding Forms

- Without Prequalification -

This Section contains the forms to be completed by the Bidder and submitted as part of its Bid.

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Letter of Technical Bid

The bidder must accomplish the Letter of Technical Bid on its letterhead clearly showing the bidder's complete name and address.

Date:

ICB No.:

Invitation for Bid No.:

To:

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.

(b) We offer to execute in conformity with the Bidding Documents the following Works:

_____ [.....insert narrative.....] _____

(c) Our Bid consisting of the Technical Bid and the Price Bid shall be valid for a period of [.....insert bid validity period as specified in ITB 18.1 of the BDS.....] days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(d) Our firm, including any Subcontractors or Suppliers for any part of the Contract, have nationalities from eligible countries in accordance with ITB 4.2.

(e) We, including any Subcontractors or Suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 4.3.

(f) We are not participating, as a Bidder in more than one Bid in this bidding process in accordance with ITB 4.3 (e), other than alternative offers submitted in accordance with ITB 13.

(g) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible by ADB, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council.

(h) [We are not a government-owned enterprise] / [We are a government-owned enterprise but meet the requirements of ITB 4.5].¹

- (i) We agree to permit ADB or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by ADB.
- (j) If our Bid is accepted, we commit to mobilizing key equipment and personnel in accordance with the requirements set forth in Section 6 (Employer's Requirements) and our technical proposal, or as otherwise agreed with the Employer.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date.....

1. Use one of the two options as appropriate.

FOR REFERENCE ONLY

Letter of Price Bid

The bidder must accomplish the Letter of Price Bid on its letterhead clearly showing the bidder's complete name and address.

Date:

ICB No.:

Invitation for Bid No.:

To:

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.
- (b) We offer to execute in conformity with the Bidding Documents and the Technical Bid submitted for the following Works.
_____ [.....insert narrative.....] _____
- (c) The total price of our Bid, excluding any discounts offered in item (d) below is or, when left blank, is the Bid Price indicated in the Summary of Bill of Quantities

[amount of foreign currency in words], [amount in figures], and [amount of local currency in words], [amount in figures]

The total bid price from the Summary of Bill of Quantities should be entered by the bidder inside this box. Absence of the total bid price in the Letter of Price Bid or in the Summary of Bill of Quantities may result in the rejection of the bid.

- (d) The discounts offered and the methodology for their application are as follows:

_____ [.....insert discounts and methodology for their application if any.....] _____

- (e) Our Bid shall be valid for a period of [.....insert bid validity period as specified in ITB 18.1 of the BDS....] days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

- (f) If our Bid is accepted, we commit to obtain a performance security in accordance with the Bidding Documents.

- (g) We have paid, or will pay the following commissions, gratuities, or fees with respect to the bidding process or execution of the Contract:¹

Name of Recipient	Address	Reason	Amount
.....			
.....			

- (h) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.
- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.
- (j) We agree to permit ADB or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by ADB.

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

1. If none has been paid or is to be paid, indicate "None."

Bid Security

Bank Guarantee

[Bank's name, and address of issuing branch or office]¹

Beneficiary: Name and address of employer

Date:

Bid Security No.:

We have been informed that name of the bidder. (hereinafter called "the Bidder") has submitted to you its bid dated (hereinafter called "the Bid") for the execution of
... name of contract under Invitation for Bids No. ("the IFB").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we name of bank. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of amount in figures
(..... amount in words) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Letter of Bid; or
- (b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or
- (c) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the performance security, in accordance with the ITB, or (iii) fails or refuses to furnish a domestic preference security, if required.

This guarantee will expire (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the Performance Security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful Bidder, or (ii) 28 days after the expiration of the Bidder's bid.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.²

..... Bank's seal and authorized signature(s)

-- Note --

In case of a joint venture, the bid security must be in the name of all partners to the joint venture that submits the bid.

1. All italicized text is for use in preparing this form and shall be deleted from the final document.

2. Or 758 as applicable

Technical Proposal

The Bidder shall submit Technical Proposal separately for each Phase 1: Upgrading Works and Phase 2: Performance Based Maintenance Works in the forms and sheets as attached in the Bidding Forms in the following pages.

Phase 1: Upgrading Works

Personnel

The bidder shall propose for deployment full complement of staff necessary for the successful execution of the works.

Equipment

The bidder shall provide required construction equipment and ensure their maintenance for efficient and continuous work progress. Bidder will also provide proper work shop and other maintenance facilities at site.

Site Organization

The bidder is required to submit proposed site organization structure (organogram) showing the management, supervisory and quality control units indicating their lines of communication and responsibility shown in an organogram.

Method Statement

The bidder will state all major works, site camp facilities (sanitary, water supply, telecommunication, inspection vehicles etc.), road alignment, earth work, pavement work, drainage structure, bridges & culverts works etc. The bidder is required to describe works how to start and complete different sections of works.

Mobilization Schedule

The bidder will mobilize personnel, equipment, deployment of work force, collection of construction materials and prepare a mobilization bar chart. Likewise, the bidder will provide site camp, stack yard etc. at different working places for efficient supervision of works.

Construction Schedule

The bidder will submit in a bar chart showing sequence of works for all Bill of Quantities (BOQ) together with program and progress of works.

Phase 2: Performance Based Maintenance Works

Personnel

The bidder shall propose for deployment full complement of staff necessary for the successful execution of the performance based maintenance works and services.

Equipment

The bidder shall provide required equipment for the performance based maintenance works and ensure their maintenance for efficient and continuous work progress. Bidder will also provide proper work shop and other maintenance facilities at site.

Site Organization (If different from Phase 1)

The bidder is required to submit proposed site organization structure (organogram) showing the management, supervisory and quality control units indicating their lines of communication and responsibility shown in an organogram.

Method Statement

The bidder will state how he will execute the performance based maintenance works and shall submit a draft Program of Performance and a proposal for the Daily Inspections of Operational Service Levels.

FOR REFERENCE ONLY

Personnel

Form PER – 1: Proposed Personnel

Bidder should provide the details of the proposed personnel and their experience record in the relevant Information Forms below for each candidate:

The Bidder shall provide separately for each Phase 1: Upgrading Works and Phase 2: Performance Based Maintenance Works

1.	Title of position*
	Name
2.	Title of position*
	Name
3.	Title of position*
	Name
4.	Title of position*
	Name
etc.	Title of position*
	Name

-- Note --

* As listed in Section 6 (Employer's Requirements).

The Bidder shall provide all the information requested below. Use one form for each position.

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

4-10

Equipment

Form EQU: Equipment (Bidder shall provide the details of equipment for both Phases 1 and 2)

The Bidder shall provide adequate information and details to demonstrate clearly that it has the capability to meet the equipment requirements indicated in Section 6 (Employer's Requirements), using the Forms below. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

Item of Equipment		
Equipment Information	Name of manufacturer	Model and power rating
	Capacity	Year of manufacture
Current Status	Current location	
	Details of current commitments	
Source	Indicate source of the equipment ☐ Owned ☐ Rented ☒ Leased ☐ Specially manufactured	

Omit the following information for equipment owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

Site Organization

FOR REFERENCE ONLY

Method Statement

FOR REFERENCE ONLY

Mobilization Schedule

FOR REFERENCE ONLY

Construction Schedule

FOR REFERENCE ONLY

Bidders Qualification

To establish its qualifications to perform the contract in accordance with Section 3 (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information Sheets included hereunder.

FOR REFERENCE ONLY

Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of Joint Venture, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following documents. ☐ 1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2. ☐ 2. Authorization to represent the firm or Joint Venture named above, in accordance with ITB 20.2. ☐ 3. In case of Joint Venture, letter of intent to form Joint Venture or Joint Venture agreement, in accordance with ITB 4.1. ☐ 4. In case of a government-owned enterprise, any additional documents not covered under 1 above required to comply with ITB 4.5.	

Form ELI - 2: Joint Venture Information Sheet

Each member of the Joint Venture and Specialist Subcontractor must fill out this form separately.

Joint Venture / Specialist Subcontractor Information	
Bidder's legal name	
Joint Venture Partner's or Specialist Subcontractor's legal name	
Joint Venture Partner's or Specialist Subcontractor's country of constitution	
Joint Venture Partner's or Specialist Subcontractor's year of constitution	
Joint Venture Partner's or Specialist Subcontractor's legal address in country of constitution	
Joint Venture Partner's or Specialist Subcontractor's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following documents. ☐ 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2. ☒ 2. Authorization to represent the firm named above, in accordance with ITB 20.2. ☐ 3. In the case of government-owned enterprise, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.	

Specialist Subcontractor is a specialist enterprise engaged for highly specialized processes that cannot be provided by the main Contractor.

Form LIT – 1: Pending Litigation and Arbitration

Not Applicable

FOR REFERENCE ONLY

Form FIN - 1: Historical Financial Performance

Each Bidder must fill out this form.

In case of joint ventures, each Joint Venture Partner must fill out this form separately, and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Financial Data for Previous Five (5) Years [NRs. Or Its equivalent]					
	Year 1:	Year 2:	Year 3:	Year 4:	Year 5:
Information from Balance Sheet					
Total Assets (TA)					
Total Liabilities (TL)					
Net Worth (TA-TL)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (CA-CL)					
Most Recent Working Capital			To be obtained for most recent year and carried forward to FIN-3 Line 1; in case of Joint Ventures, to the corresponding Joint Venture Partner's FIN-3.		
Information from Income Statement					
Total Revenues					
Profits Before Taxes					
Profits After Taxes					
☐ Attached are copies of financial statements (balance sheets including all related notes, and income statements) for the last Five (5) years , as indicated above, complying with the following conditions. • Unless otherwise requested by Section 3 of the Bidding Documents, all such documents reflect the financial situation of legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries, or affiliates. • Historical financial statements must be audited by a certified accountant. • Historical financial statements must be complete, including all notes to the financial statements. • Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).					

Form FIN - 2: Average Annual Construction Turnover

Each Bidder must fill out this form.

The information supplied should be the Annual Turnover of the Bidder or each member of a Joint Venture in terms of the amounts billed to clients for each year for work in progress or completed, in NRs. or converted to USD at the end of period reported.

In case of joint ventures, each Joint Venture Partner must fill out this form separately, and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Annual Turnover Data for the Last Five (5) Years (Construction only)			
Year	Amount in Currency	Exchange Rate	NRs. or Its Equivalent
Average Annual Construction Turnover			

Form FIN – 3: Availability of Financial Resources

Bidder must demonstrate sufficient financial resources, usually comprising of Working Capital supplemented by credit line statements or overdraft facilities and others to meet the Bidder's financial requirements for

- (a) its current contract commitments, and
- (b) the subject contract.

In case of joint ventures, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Financial Resources		
No.	Source of financing	Amount (NRs. or Its equivalent)
1	Working Capital (to be taken from FIN-1)	
2	Credit Line*	
3	Other Financial Resources	
	Total Available Financial Resources	

** To be substantiated by a letter from the bank issuing the Line of Credit.*

Form FIN- 4: Financial Resources Requirement

Bidders (or each Joint Venture partner) should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

In case of joint ventures, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner name below:

Joint Venture Partner: _____

Current Contract Commitments						
No.	Name of Contract	Employer's Contact (Address, Tel, Fax)	Contract Completion Date	Outstanding Contract Value (X)	Remaining Contract Period in months (Y)	Monthly Financial Resources Requirement (X / Y)
1						
2						
3						
4						
Total Monthly Financial Requirements for Current Contract Commitments (NRs. or its Equivalent)						

FOR REFERENCE

Form FIN - 5: Compliance Check of Financial Resources (Criterion 2.3.3 of Section 3)

This form requires the same information submitted in Forms FIN - 3 and FIN - 4. All conditions of "Available Financial Resources Net of CCC $\geq$ Requirement for the Subject Contract" must be satisfied to qualify.

Form FIN-5A: For Single Entities

For Single Entities: (A)	Total Available Financial Resources from FIN - 3 (B)	Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN - 4 (C)	Available Financial Resources Net of CCC $D = (B - C)$	Requirement for the Subject Contract (E)	Results: Yes or No [D must be greater than or equal to E] (F)
_____ (Name of Bidder)					

Form FIN-5B: For Joint Ventures

For Joint Ventures: (A)	Total Available Financial Resources from FIN - 3 (B)	Total Monthly Financial Requirement for Current Contract Commitments (CCC) from FIN - 4 (C)	Available Financial Resources Net of CCC $D = (B - C)$	Requirement for the Subject Contract (E)	Results: Yes or No [D must be greater than or equal to E] (F)
One Partner:					
_____ (Name of Partner)					
Each Partner:					
_____ (Name of Partner 1)					
_____ (Name of Partner 2)					
_____ (Name of Partner 3)					
All partners combined	ΣD = Sum of available financial resources net of current contract commitments for all partners		$\Sigma D =$ _____		

Form FIN - 5 is made available for use by the bidder as a self-assessment tool, and by the employer as an evaluation work sheet, to determine compliance with the financial resources requirement as stated in 2.3.3. Failure to submit Form FIN - 5 by the Bidder shall not lead to bid rejection.

Form EXP – 1: Contracts of Similar Size and Nature

Fill out one (1) form per contract.

Contract of Similar Size and Nature		
Contract No of	Contract Identification	
Award Date	Completion Date	
Role in Contract	☐ Contractor ☐ Management Contractor ☐ Subcontractor	
Total Contract Amount	NRs. or Its Equivalent	
If partner in a Joint Venture or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's Name Address Telephone/Fax Number E-mail		
Description of the similarity in accordance with Criterion 2.4.1 of Section 3		
(a) Two (2) Contracts with similar nature valued over NRs. 6884 Million or its equivalent within the last Five (5) years. The similarity of the Bidder's participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer's Requirements).		

Form EXP - 2: Construction Experience in Key Activities

May be complied with by specialist subcontractors. Employer shall require evidence of subcontracting agreement from the bidder. A specialist subcontractor is a specialist enterprise engaged for highly specialized processes, which the main contractor cannot provide.

Fill out one (1) form per contract.

Contract with Similar Key Activities		
Contract No of	Contract Identification	
Award Date	Completion Date	
Role in Contract	☐ Contractor ☐ Management Contractor ☐ Subcontractor	
Total Contract Amount	NRs. or Its Equivalent	
If partner in a Joint Venture or subcontractor, specify participation of total contract amount	Percent of Total	Amount
Employer's Name Address Telephone Number Fax Number E-mail		
Description of the key activities in accordance with Criterion 2.4.2 of Section 3		
(a) Construction of road with Asphalt concrete works of 64,000 cu m completed within the last Five (5) years.		
(b) Construction of Two (2) bridges having length of at least 50 m with Pre-stressed Concrete (PSC) superstructure completed within the last Five (5) years.		
(c) Construction of Two (2) bridges with cast in-situ pile foundation of minimum pile diameter 750 mm completed within the last Five (5) years.		

Schedules

Schedule of Payment Currencies

Forinsert name of the Works

	A	B	C	D
Name of Payment Currency	Amount of Currency	Rate of Exchange to Local Currency	Local Currency Equivalent $C = A \times B$	Percentage of Net Bid Price (NBP) $\frac{100 \times C}{NBP}$
Local Currency		1.00		
Foreign Currency #1				
Foreign Currency #2				
Foreign Currency #3				
Net Bid Price				100.00
Provisional Sums Expressed in Local Currency	NRs. 653,273,281.25	1.00	NRs. 653,273,281.25	
BID PRICE				

- Note -

The rates of exchange shall be the selling rates 28 days prior to the deadline for submission of bids published by the source specified in BDS 15.

Tables of Adjustment Data

Table A - Local Currency

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Local Currency Amount	% Range of Weighting	Bidder's Proposed Weighting
A	Nonadjustable	-	-	-	15	0.15
B	Labour	National Salary and Wage Index : Construction Labourer published by Nepal Rastra Bank			10 - 20	
C	Diesel	Nepal Oil Corporation			10 - 20	
D	Bitumen	Nepal Bitumen & Barrel Udyog			10 - 20	
E	Cement	Udayapur Cement Udhog, Nepal			5 - 15	
F	Reinforcement Bar	Ex-factory rate of Steel factory, Nepal			5 - 15	
G	Other	National Wholesale Price Index: Overall Index published by Nepal Rastra Bank			15 - 25	
			Total		100%	1.00

Table B - Foreign Currency

Name of Currency:

If the Bidder wishes to quote in more than one foreign currency, this table should be repeated for each foreign currency.

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Currency in Type/Amount	Equivalent in FC1	Bidder's Proposed Weighting
A	Nonadjustable	--	--	--	--	0.15
B						
C						
D						
E						
F						
G						
				Total		1.00

Note

1. As per GCC 1.1.3.1, "Base Date" means the date 28 days prior to the latest date for submission of the bid.

Bill of Quantities

A. Preamble

1. The Bill of Quantities shall be read in conjunction with the Instruction to Bidders, Bidding Data, General and Particular Conditions of Contract, Standard Specifications and Special Provisions, and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out as measured by the Contractor and verified by the Engineer and valued at the rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
3. The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all constructional equipment, labor, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.
4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor has failed to enter a rate or price shall be deemed covered by other rates and prices entered in the Bill of Quantities. The units and rates in figures entered into the Bill of Quantities should be typewritten or if written by hand, must be in print form. Bill of Quantities not presented accordingly may be considered nonresponsive.
5. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.
6. General directions and descriptions of work and materials are not necessarily repeated or summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.
7. Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Engineer in accordance with the Conditions of Contract.
8. The method of measurement of completed work for payment shall be in accordance with the Specifications (see Part II Employer's Requirement, Section 6B and 6C of these documents).
9. Arithmetic errors will be corrected by the Employer as follows:
 - (a) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.
 - (b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
 - (c) If there is a discrepancy between the bid price in the Summary of Bill of Quantities and the bid amount in item (c) of the Letter of Bid, the bid price in the Summary of Bill of Quantities will prevail and the bid amount in item (c) of the Letter of Bid will be corrected.
 - (d) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a), (b), and (c) above.

10. Bidders shall price the Bill of Quantities in Nepalese Rupees (NRs.) only and shall indicate in the "Schedule of Payment Currencies" the percentage expected for payment in foreign currency or currencies.
11. Payment for Performance Based Maintenance (PBM) Works and Services measured in kilometre-month shall include the cost of all the activities that is required to be carried out by the Contractor as per the Specifications during performance based maintenance period except determined under Emergency Works, subject only to any reduction as provided in the relevant Section of the Specifications.

B. Dayworks Schedule

General

1. Work shall not be executed on a Daywork basis except by written order of the Engineer. Bidders shall enter basic rates for Daywork items in the Schedules, which rates shall apply to any quantity of Daywork ordered by the Engineer. Nominal quantities have been indicated against each item of Daywork, and the extended total for Daywork shall be carried forward as a Provisional Sum to the Summary Total Bid Amount. Unless otherwise adjusted, payments for Daywork shall be subject to price adjustment in accordance with the provisions in the Conditions of Contract.

Daywork Labour

2. In calculating payments due to the Contractor for the execution of Daywork, the hours for labor will be reckoned from the time of arrival of the labor at the job site to execute the particular item of Daywork to the time of return to the original place of departure, but excluding meal breaks and rest periods. Only the time of classes of labor directly doing work ordered by the Engineer and for which they are competent to perform will be measured. The time of gangers (charge hands) actually doing work with the gangs will also be measured but not the time of foremen or other supervisory personnel.
3. The Contractor shall be entitled to payment in respect of the total time that labor is employed on Daywork, calculated at the basis rates entered by him in the **Schedule of Daywork Rates: 1. Labor**. The rates for labor shall be deemed to cover all costs to the Contractor, including (but not limited to) the amount of wages paid to such labor, transportation time, overtime, subsistence allowances, and any sums paid to or on behalf of such labor for social benefits in accordance with (Country of Borrower) law, as well as Contractor's profit; overheads; superintendence; liabilities and insurance and allowance to labor; timekeeping and clerical and office work; the use of consumable stores water, lighting, and power; the use and repair of stagings, scaffolding workshops and stores portable power tools; manual plant and tools; supervision by the Contractor's staff, foremen, and other supervisory personnel; and charges incidental to the foregoing. The rates shall be stated in the Nepalese Rupees (NRs.) but the payments will be made on currency proportions as indicated in the "Schedule of Payment Currencies".

Daywork Material

4. The Contractor shall be entitled to payment in respect of materials used for Daywork (except for materials for which the cost is included in the percentage addition to labor costs as detailed heretofore), at the rates entered by him in the **Schedule of Daywork Rates: 2. Materials** and shall be deemed to include overhead charges and profit as follows:
 - (a) the rates for materials shall be calculated on the basis of the invoiced price, freight, insurance, handling expenses, damage, losses, etc., and shall provide for delivery to store for stockpiling at the Site. The rates shall be stated in the Nepalese Rupees (NRs.) but the payments will be made on currency proportions as indicated in the "Schedule of Payment Currencies".
 - (b) the cost of hauling materials for use on work ordered to be carried out as Daywork from the store or stockpile on the Site to the place where it is to be used shall also be deemed included in the same rate.

Daywork Equipment

5. The Contractor shall be entitled to payments in respect of Contractor's Equipment already on Site and employed on Daywork at the basic rental rates entered by him in the **Schedule of Daywork Rates: 3. Contractor's Equipment**. The said rates shall be deemed to include due and complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricants, and other consumables, and all overhead profit and administrative costs related to the use of such equipment. The cost of drivers, operators, and assistants shall also be included in the rate of the equipment and no separate payment shall be made for it.
6. In calculating the payment due to the Contractor's Equipment employed on Daywork, only the actual number of working hours will be eligible for payment, except that where applicable and agreed with the Engineer, the traveling time from the part of the Site where the Construction Plant was located when ordered by the Engineer to be employed on Daywork and the time for return journey thereto shall be included for payment.
7. The basic rental rates for Contractor's Equipment employed on Daywork shall be stated in Nepalese Rupees (NRs.) but the payments will be made on currency proportions as indicated in the "Schedule of Payment Currencies".

Units of Measurement

The following units of measurement and abbreviations are used:

Unit	Abbreviation	Unit	Abbreviation
a) cubic meter	m ³ or cu m	b) millimeter	mm
c) hectare	ha	d) month	mon
e) hour	h	f) number	nr
g) kilogram	kg	h) square meter	m ² or sq m
i) kilometer	km	j) kilometer month	km-mon
k) lump sum	sum	l) person day	per day
m) meter	m	n) week	wk
o) metric ton (1,000 kg)	t	p) square millimeter	mm ² or sq mm
q) litre	lt	r) person month	per mon
s) vehicle Month	veh - mon	t) provisional sum	ps

C. Work Items (Bill of Quantities)

FOR REFERENCE ONLY

SASEC Roads Improvement Project (SRIP)
Narayanghat - Butwal Road (Section - 2) Km 65+000 to Km 113+535
Contract No:SRIP/ICB/NB/02
SUMMARY OF BILL OF QUANTITIES

Part No. / Bill No.	Description of Works	Amount in Nepali Rupees	Remarks
A	GENERAL		
	SUB-TOTAL OF PART A:		
B	ROAD WORKS		
B1	Site Clearance		
B2	Earthworks		
B3	Pavement Works		
B4	Structures		
B5	Road Furniture and Traffic Safety Measures		
B6	Environmental Mitigation Works and Bioengineering		
	SUB-TOTAL OF PART B:		
C	MAJOR BRIDGE WORKS		
C1	General Items		
C2	Foundation Works		
C3	Sub-structure Works		
C4	Super-structure Works		
C5	River Training and Protection Works		
C6	Pile Tests		
	SUB-TOTAL OF PART C:		

D	MINOR BRIDGE WORKS		
D1	General Items		
D2	Foundation Works		
D3	Sub-structure Works		
D4	Super-structure Works		
D5	River Training and Protection Works		
	SUB-TOTAL OF PART D:		
E	PERFORMANCE BASED WORKS AND SERVICES		
E1.01	Performance based works and services including all activities as per specification except emergency work		
	SUB-TOTAL OF PART E:		
F	SCHEDULE OF DAYWORKS		
	SUB-TOTAL OF PART F:		
G	PROVISIONAL SUM	653,273,281.25	
	SUB-TOTAL OF PART G:	653,273,281.25	
A	Total Bid Price with Provisional Sum [Part A to Part G]		
B	Total Bid Price without Provisional Sum [A - Part G]		
C	Discount, if any		
D	Total Bid Price after Discount without provisional Sum [B-C]		
E	Total Bid Price after Discount with provisional Sum [D + Part G]		
F	Add VAT [13% of E]		
G	Total Bid Price with Provisional Sum and VAT [E+F]		

SASEC Roads Improvement Project

Narayanghat-Butwal Road (Section -2)

Km 65+000 to Km 113+535

Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
PART A: GENERAL							
119	A1.01	Insurance of works, plant, material and contractor's equipment and third party property and persons under CAR policy					
	a.	Insurance cover for works, plant, material and the Contractor's Equipment	sum	1.00			
	b.	Insurance cover for third party property and persons	sum	1.00			
101.01	A1.02	Employer's office at site					
	a.	Construction of office building (Pre-Fab Structure, Single Story) including electrical, plumbing and sanitary works all complete as per the Drawings and the Specifications. The building shall remain the property of the Employer upon completion of the contract.	sum	1.00			
	b.	Maintaining and operating the Employer's office at site, including consumables etc., all complete.	mon	54.00			
	c.	Providing furniture and equipment at the Employer's office at site, etc., all complete. The furniture and equipment shall remain the property of the Employer upon completion of the contract.	sum	1.00			
101.01	A1.03	Employer's accommodation at site					
	a.	Construction of accommodation building (RCC Structure, two stories) including electrical, plumbing and sanitary works all complete as per the Drawings and Specifications. The building shall remain the property of the Employer upon completion of the contract.	sum	1.00			
	b.	Maintaining and operating the Employer's accommodation at site, including consumables etc., all complete.	mon	42.00			
	c.	Providing furniture and equipment at the Employer's accommodation at site, etc., all complete. The furniture and equipment shall remain the property of the Employer upon completion of the contract.	sum	1.00			
101.02	A1.04	Supplying, maintaining and operating the vehicle for the Employer's use at site. The vehicles shall remain the property of the Contractor upon completion of the contract.					
	a.	Type 1 vehicle for the Employer's use at site.	veh- mon	54.00			

SASEC Roads Improvement Project

Narayanghat-Butwal Road (Section -2)

Km 65+000 to Km 113+535

Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
	b.	Type 2 vehicle for the Employer's use at site.	veh- mon	54.00			
	c.	Type 3 vehicle (Motorbike) for the Employer's use at site.	veh- mon	54.00			
101.03	A1.05	Contractor's material testing laboratory at site					
	a.	Providing laboratory space, maintaining and operating, etc of the material testing laboratory at site, all complete.	mon	42.00			
	b.	Providing furniture and equipment at the material testing laboratory at site, all complete. The furniture and equipment of the lab shall remain the property of the Contractor upon completion of the contract.	sum	1.00			
107	A1.06	Maintenance of road					
	a.	Routine and Recurrent Maintenance of road during construction period	km-mon	2,038.00			
	b.	Routine Maintenance of road during defect liability/notification period	km-mon	582.00			
108	A1.07	Provision and installation of project notice board	nr	2.00			
111	A1.08	Prepare and supply video documentary of the site before, during and after the site works.	nr	1.00			
102	A1.09	Compliance with traffic management provisions, including construction and maintenance of temporary road and bridge diversions, access roads to bridge construction sites, etc all complete covering entire construction period.	sum	1.00			
		Total of Part A - Carried to Summary :					
PART B: ROAD WORKS							
BILL B1: Site Clearance							

SASEC Roads Improvement Project

Narayanghat-Butwal Road (Section -2)

Km 65+000 to Km 113+535

Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
201	B1.01	Clearing and grubbing of forest including uprooting, carrying and disposal of vegetation , all complete	sq m	928,510.00			
201	B1.02	Felling trees (the girth measured at a height of 1 m above the ground level) including cutting of trunks and branches, removing the roots, stacking serviceable material, disposal of unserviceable material and back filling the depressions/pits, all complete	-	-			
	a.	Above 300 mm to 600 mm	nr	280.00			
	b.	Above 600 mm to 900 mm	nr	900.00			
	c.	Above 900 mm	nr	1550.00			
202	B1.03	Dismantling the structures including stockpiling of the reusable materials and disposal of unusable materials, all complete					
	a.	Stone masonry in cement sand mortar	cu m	16,828.00			
	b.	Gabion masonry	cu m	3,979.00			
	c.	Brick masonry	cu m	720.00			
	d.	Concrete (plain and reinforced)	cu m	2,347.00			
	e.	Dry stone masonry	cu m	8.00			
	f.	RCC Pipe culverts	m	1,420.00			
201	B1.04	Clearance of Landslides, debris from culverts and side drains including haulage and disposal , all complete.	Cum.	142,500.00			

SASEC Roads Improvement Project

Narayanghat-Butwal Road (Section -2)

Km 65+000 to Km 113+535

Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
		Total of Bill B1 - Carried to Summary :					
Bill B2: Earthwork							
900	B2.01	Roadway excavation including side drain with haulage and disposal up to 1 km distance, in common material including Hard Rock, all complete	cu m	510,402.00			
9,001,003	B2.02	Formation of embankment including haulage, all complete					
	a.	Formation of embankment from excavated material in road-way excavation including watering, compacting in a layer not exceeding of 150mm compacted depth as per the specification, all complete	cu m	255,201.00			
	b.	Formation of embankment from approved borrowing material outside the right of way (RoW) including watering, compacting in a layer not exceeding of 150mm compacted depth as per the specification, all complete	cu m	272,978.00			
900	B2.03	Excavation for structures (Cross drainage, Retaining & off-road structures), in common material including Hard Rock, all complete	cu m	77,322.00			
900	B2.04	Backfilling to structures, foundation pits etc. with suitable material including compaction, all complete.	cu m	32,810.00			
		Total of Bill B2 - Carried to Summary :					
Bill B3: Pavement Works							
	B3.01	Sub-grade					
1003	a.	Scarifying, removing of existing bituminous pavement layer including safe disposal.	sq m	422,340.00			
1003	b.	Preparation of sub-grade to design grade and camber including watering and compaction in all types of soil, all complete.	sq m	1,285,290.00			
	B3.02	Sub-base and Base					
1201	a.	Supply, place and compact granular sub-base as per specification, all complete.	cu m	274,471.00			
1202	b.	Supply, place and compact crushed stone Base (CSB) as per specification, all complete.	cu m	209,850.00			

SASEC Roads Improvement Project

Narayanghat-Butwal Road (Section -2)

Km 65+000 to Km 113+535

Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
	B3.03	Prime Coat					
1302	a.	Provide, prepare and spray bituminous prime coat including cutter, air scrubbing, cleaning the road surface using wire, brushes, broom etc.	lt	1,092,352.00			
1302	b.	Provide and spread sand blinding over newly primed surface, all complete	sq m	109,235.00			
	B3.04	Bituminous Surfacing Works					
1303	a.	Provide, prepare and apply bitumen binder with 80/100 penetration grade bitumen and kerosene including cutting back process for surface dressing, all complete	lt	395,418.00			
1303	b.	Provide, prepare and spread including compaction of 20mm nominal size aggregates for surface dressing, all complete	sq m	164,758.00			
1303	c.	Provide, prepare and spread including compaction of 10mm nominal size aggregates for surface dressing, all complete	sq m	164,758.00			
1303	d.	Provide, prepare and apply adhesion / anti stripping additive, all complete	kg	1,977.00			
	B3.05	Asphalt Concrete Works					
1307, 1308	a.	Provide, prepare including laying, leveling and compaction of Asphalt Concrete (Binder Course) as per the approved design using VG 30 bitumen.	cu m	55,239.00			
1307, 1308	b.	Provide, prepare including laying, leveling and compaction of Asphalt Concrete (Wearing Course) as per the approved design using VG 30 bitumen.	cu m	36,826.00			
1307, 1308	c.	Rate per kilogram for over or under usage of bitumen in Asphalt Concrete, quantity to be in accordance with actual bitumen usage (Job mix formula).	kg	rate only			
		Total of Bill B3 - Carried to Summary :					
Bill B4: Structures							
2000	B4.01	Provide and place M10/40 grade concrete including compaction, curing, testing etc, all complete.	cu m	9,605.00			
2000	B4.02	Provide and place M15/40 grade concrete including compaction, curing, testing etc, all complete.	cu m	692.00			

SASEC Roads Improvement Project

Narayanghat-Butwal Road (Section -2)

Km 65+000 to Km 113+535

Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
2000	B4.03	Provide and place M20/20 grade concrete including compaction, curing, testing etc, all complete.	cu m	10,361.00			
2000	B4.04	Provide and place M25/20 grade concrete including compaction, curing, testing etc, all complete.	cu m	33,448.00			
2019	B4.05	Plum concrete works with M15/20 grade concrete and plum stones for structures including scaffolding, placing, compaction and curing etc, all complete. Class F2 finish form work shall be paid separately.	cu m	7,419.00			
2000	B4.06	Providing and laying Reinforcement bar including cutting, bending, binding, fixing in position, all complete.	t	2,573.00			
2400	B4.07	Supply and assembly of machine made mechanically selvedged gabion and mattresses produced from double twisted heavy coated GI wire, of hexagonal mesh size 100 mm x 120 mm, with mesh wire 3 mm, selvedge wire 3.9 mm, lacing wire 2.4 mm and stone filling in gabion including transport and fixing of gabion in position, all complete.	cu m	7,865.00			
2600	B4.08	Providing and laying random rubble stone masonry in cement sand mortar MM5 for structure work including scaffolding, curing, preparation of mortar, pointing etc., all complete.	cu m	29,004.00			
700	B4.09	Providing and laying RCC pipes (Class NP3) with or without collars, jointed with stiff mixture of cement mortar (1 cement : 2 sand), all complete.					
	a)	600mm diameter (internal)	m	1,425.00			
	b)	900mm diameter (internal)	m	425.00			
3113	B4.10	Providing and laying HDPE Pipe of 160 mm dia (pressure 4 kg/cm ²) for drainage outlet, subsoil drain etc. including perforation and jointing, all complete.	m	10,700.00			
1800	B4.11	Providing, preparing and installing formwork including necessary supports and removing after completion for works in any type of structure (Class F2 Finish).	sq m	107,871.00			
2400/3110	B4.12	Supply and place geotextile as per design drawings.	sq m	13,051.00			

SASEC Roads Improvement Project

Narayanghat-Butwal Road (Section -2)

Km 65+000 to Km 113+535

Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
1407	B4.13	Providing, laying and placing in line and level of precast RCC covered drain as per the drawing and specification, all complete.					
	a.	Type M2	m	39,302.00			
1406	B4.14	Supply and placing of precast RCC cover slab as per the drawing and instruction by the Engineer, all complete.					
	a.	Type A	nr	75.00			
3110	B4.15	Supply and place compacted pervious material.	cu m	9,736.00			
2400	B4.16	Providing and laying of 300 mm thick grouted stone pitching works in protection works with stones and cement sand mortar (1:3) including curing, all complete	sq m	3,559.00			
2400	B4.17	Supply and place dry stone packing/soling, all complete	cu m	3,035.00			
3103	B4.18	Supply and place compressible joint filler.	sq m	500.00			
2700	B4.19	Epoxy bonding of new concrete to old concrete.	sq m	1,000.00			
3109	B4.20	Providing and laying PVC pipe of 90 mm dia (pressure 2.5 kg / cm ²) for weep holes as instructed by the Engineer.	m	21,699.00			
		Total of Bill B4 - Carried to Summary :					
Bill B5: Road Furniture and Traffic Safety Measures							
1501	B5.01	Supply and erect Traffic Signs in place including required size of steel tubes, steel plates, cement concrete, painting, writing and supporting steel angles, nuts and bolts etc. all complete, as per Drawings.					
	a.	Single post	nr	2,449.00			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
	b.	Double or more posts	nr	158.00			
1503	B5.02	Supply and place Road Marker (RCC Kilometer post) including excavation, concrete back filling, painting and writing etc., all complete as per Drawings.					
	a.	Standard Kilometer stone.	nr	80.00			
	b.	Standard 5th Kilometer stone.	nr	16.00			
1504	B5.03	Supply and fix in place precast RCC delineator post with reflective paint including foundation preparation, concrete back filling, painting and erection etc., all complete as per drawings	nr	12,250.00			
1401	B5.04	Supply and fix in place precast concrete Kerb Stone with M20/20 concrete grade including foundation preparation, back filling, painting and erection etc., all complete as per Drawings.	m	102,740.00			
1511	B5.05	Providing and installation of precast RCC New Jersey block with reflective paint in line and level on prepared level surface etc., all complete as per the specification and drawing.	m	23,050.00			
1502	B5.06	Road Marking with hot applied thermoplastic compound with reflectorising glass beads on bituminous surface as specified in Traffic Sign Manual and as per the drawings.	sq m	51,583.00			
1505	B5.07	Provide and erect "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 700 mm above road/ground level, fixed on ISMC series channel vertical post, 150 mm x 75 mm x 5 mm spaced at 2 m c/c, 1.8 m high of which 1.1 m shall be below ground/road level. All steel parts and fitment shall be galvanised by hot dip process	m	7,751.00			
3111	B5.08	Providing and laying 60mm thick interlocking concrete block using stone dust/sand bed on 75mm thick compacted granular sub base in a footpath including stone dust filled in between the blocks etc., all complete as per the drawings and specification	sq m	49,340.00			
3105	B5.09	Providing and installing of 75mm - Ø GI pipe railing with precast RCC posts including foundation excavation and preparation, concrete back filling, painting and erecting etc., all complete as per specification and drawings.	m	23,030.00			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
		Total of Bill B5 - Carried to Summary :					
Bill B6: Environmental Mitigation Works and Bio-engineering							
109	B6.01	Provision of safety clothing and equipment, first aid / medical facilities and other safety measure for labor and Contractor's employees including Consultant's and Employer's personnel and visitors.	Mon	42.00			
3112	B6.02	Supply, fabricate and construct passenger shades according to the drawings, all complete at locations as instructed by the Engineer.	nr.	14.00			
	B6.03	Bio-engineering works					
2800	a.	Slope preparation for bio-engineering works.	sq m	38,100.00			
2800	b.	Supply and planting rooted grass slips at spacing of 100 mm in row and 250 mm spacing between two rows.	sq m	34,290.00			
2800	c.	Planting single node culm cutting of grass on fill slopes < 45 and embankment slopes in plain areas etc. all complete.	m	4,763.00			
2800	d.	Supply and planting tree with tree guards as specified.	nr	3,840.00			
2800	e.	Brush layering.	m	5,763.00			
2800	f.	Supply, preparation and planting of live cuttings of selected species fascines of minimum 1 m length to 0.5 m and pegs spaced at 5 cm centres within rows.	m	3,810.00			
2800	g.	Supply, Preparation and planting of live cuttings of selected species palisade of minimum 1 m length to 0.5 m into and pegs spaced at 5 cm centres within rows, with 5-20 cm between rows.	m	1,905.00			
2800	h.	Supply and broadcasting grass seeds @ 25 gms/m ² .	sq m	38,100.00			
2800	i.	Supply and laying grass turing on the various slope with cutting, watering and transportation etc. including in median	sq m	114,920.00			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
2800	j.	Supply and planting large bamboos.	nr	13.00			
2800	k.	Construct live check-dams	m	416.00			
2800	l.	Provide and Laying of 200 mm thick of dry stone rip rap.	sq m	1,838.00			
2800	m.	Supply and planting Median Shrubs	nr	13,156.00			
		Total of Bill B6 - Carried to Summary :					
		Total of Part B - Carried to Summary:					
PART C: MAJOR BRIDGE WORKS							
Bill C1: General Items							
124	C1.01	Diversion of river flow for excavation and other works including dewatering and construction of coffer dam, all complete in major bridge construction site	nr	9.00			
1501	C1.02	Supplying and placing of bridge name plate with double or more posts in each bridge construction site	nr	9.00			
203	C1.03	Clearing and grubbing , all complete including site clearance after completion of works and preparation of site for casting yard of precast girder for major bridge construction site	nr	9.00			
		Total of Bill C1 - Carried to Summary :					
Bill C2: Foundation Works							
900	C2.01	Excavation for foundation for abutments and piers in all types of soil including dewatering etc. all complete	cu m	7,878.80			
1600	C2.02	Boring for cast-in-situ RCC pile of specified diameter Excluding reinforcing bar and concrete using Bentonite as per specification and drawing etc. all complete.					

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
	a.	For Pile, 1m dia.	m	6,532.00			
2000	C2.03	Providing and placing machine mixed cement concrete M10/20 for leveling course including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	218.80			
2000	C2.04a	Providing and placing machine mixed cement concrete (Batch-Mix) M25/40 for footings/piles/piles caps including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	8550.70			
2000	C2.04b	Providing and placing machine mixed cement concrete (Batch-Mix) M30/40 for footings/piles/piles caps including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	541.90			
2000	C2.05	Providing and laying Reinforcing Steel Bar including cutting, bending, fixing in position etc. all complete as per specification and drawing.	t	878.97			
1800	C2.06	Providing, Preparing and Installing Form Work (F1 Finish) including necessary supports and removing after completion all complete as per specification and drawing	sq m	1,663.40			
3113	C2.07	Providing and Installation of 32mm dia HDPE Pipe (6kg/m2) for pressure grouting in the pile including all necessary fittings, all complete as shown in drawings.	m	6,898.00			
2709	C2.08	Pressure grouting works (6kg/m2 pressure) with cement - admixes material in pile including other set- up as necessary to perform the work as per specification for 0.06m3 of grouting material or 100kg.of cement	nr	366.00			
2709	C2.09	Rate per kg for under or over use of grouting material (cement -admixes) in pile based on actual consumption with respect to that of item C2.08	kg	rate only			
		Total of Bill C2 - Carried to Summary :					
Bill C3: Sub-Structure Works							
2000	C3.01	Providing and placing machine mixed cement concrete (Batch-Mix) M25/40 for the abutment, approach slabs and stoppers etc. including compaction, curing, testing etc. all complete.	cu m	2,078.30			
2000	C3.02	Providing and placing machine mixed cement concrete (Batch-Mix) M30/40 for pier and pier cap etc. including compaction, curing, testing etc. all complete.	cu m	420.00			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
1800	C3.03	Providing, preparing and installation of Formworks (F2 finish) for vertical surface of substructures including necessary supports and removing after completion, all complete.	sq m	5,075.10			
2000	C3.04	Providing and laying reinforcing Steel Bar including cutting, bending, binding, fixing in position etc. all complete as shown in drawing.	t	173.77			
2400, 3110	C3.05	Providing , laying and fixing of geotextile (filter fabrics).	sq m	68.00			
3110	C3.06	Backfilling with graded filter materials in layer with necessary watering and compaction, all complete.	cu m	1,050.90			
3109	C3.07	Provide and installation of Weep Hole with 100mm HDEP pipe in abutment, all complete	m	1,005.00			
		Total of Bill C3 - Carried to Summary :					
Bill C4: Super-Structure Works							
2100	C4.01	Providing and placing machine mixed cement concrete (Batch-Mix) M50/40 for prestressed girder including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	1,722.50			
2000	C4.02	Providing and placing machine mixed cement concrete (Batch-Mix) M25/20 for the superstructure deck slab, etc. including compaction, curing, testing etc. and necessary lead all complete.	cu m	1,802.33			
2000	C4.03	Providing and placing machine mixed cement concrete (Batch-Mix) M25/10 for wearing course in deck slab, etc. including compaction, curing, testing etc. and necessary lead all complete.	cu m	266.53			
2000	C4.04	Providing and placing machine mixed cement concrete (Batch-Mix) M30/20 for cross girders and crash barriers etc. including compaction, curing, testing etc. all complete.	cu m	374.14			
1800	C4.05	Providing, preparing and installing formworks (F3 finish) for precast prestressing girder and removing after completion, all complete.	sq m	9,783.54			
1800	C4.06	Providing, preparing and installation of Formworks (F2 finish) for slab, girders and other super-structures works and removing after completion (false work included), all complete.	sq m	13,340.38			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
2000	C4.07	Providing and laying reinforcement including cutting, bending, binding, fixing in position, all complete.	t	363.66			
2100	C4.08	Providing and installing prestressing tendons including prestressing, anchoring etc. all complete as per specification and drawing.	t	108.81			
2100	C4.09	Providing and installing corrugated HDPE sheaths with necessary supports including removal of extractable ones and grouting of ducts etc. complete as per specification and drawing.	m	13,403.00			
2100	C4.10	Providing and installing anchorage assembly in position etc. complete as per specification and drawing.	nr	780.00			
2100	C4.11	Lifting and Placing in position precast and post tensioned concrete girders with suitable equipment including erection, shifting and removal of the erecting equipment & its accessories, all complete as shown in drawing.	nr	65.00			
1901	C4.12	Providing and installing elastomeric expansion joints as shown in the drawings and specifications including all necessary axillary and incidental works etc. all complete.	m	283.40			
1902	C4.13	Providing and installing elastomeric bearing including design of the bearings with provided data and necessary axillary and incidental works etc. all complete.	nr	170.00			
3105	C4.14	Providing and fixing in position GI pipes for railing including fixing in position in handrail and crash barrier as shown in drawing, all complete					
	a.	50mm dia GI pipes	m	1,678.50			
	b.	75mm dia GI pipes	m	960.38			
	c.	100mm dia GI pipes	m	365.28			
3114	C4.15	Providing and fixing in position Galvanised Steel Base Plate including steel nut bolts, drilling, fixing etc required for pedestrian handrails and crash barriers rails as shown in the drawings, all complete	kg.	1,177.90			
3107	C4.16	Providing and fixing in position GI drainage spout including GI pipe as shown in the drawings, all complete	nr	366.00			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
3108	C4.17	Providing and fixing in position Bracket for Utility facility as shown in the drawings, all complete	nr	183.00			
3115	C4.18	Prepare and apply reflectorized enamel paint Zebra type, black & yellow on Crash barriers in two coats in addition to one base coat as per DoR Traffic Sign Manual	sq m	906.00			
		Total of Bill C4 - Carried to Summary :					
Bill C5: River Training and Protection Works							
900	C5.01	Foundation Excavation in all types of soil including shoring, dewatering, all complete	cu m	4,882.31			
2600	C5.02	Providing and laying Random Rubble Stone Masonry works in cement sand mortar MM5 C/M including scaffolding, curing, preparing cement mortar, pointing etc., all complete.	cu m	2,356.72			
2000	C5.03	Providing and placing machine mixed cement concrete M10 for leveling course in CRRM including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	119.24			
2400	C5.04	Supply and assemble of Machine Made mechanically salvaged Gabion and Mattresses produced from double twisted heavy coated GI wire, of hexagonal mesh size 100 mm x 120 mm, with mesh wire 3mm, selvedge wire 3.9mm, lacing wire 2.4mm and stone filling in gabions including transport and fixing of gabions in position, all complete.	cu m	5,641.00			
2400	C5.05	Providing and laying of 300 mm thick grouted stone pitching works in protection works with stones and cement sand mortar (1:3) including curing, all complete	sq m	675.00			
2400, 3110	C5.06	Providing, laying and fixing of geotextile (filter fabrics), all complete.	sq m	3,459.68			
3110	C5.07	Backfilling with graded filter materials in layer with necessary watering and compaction as shown in drawing, all complete.	cu m	416.11			
3109	C5.08	Provide and laying PVC pipe of 90mm dia/pressure 2.5 kg/cm2) for weep holes as instructed by the Engineer, all complete	m	1,510.00			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
		Total of Bill C5 - Carried to Summary :					
Bill C6: Pile Tests							
1600	C6.01	Boring and cast-in-situ RCC pile for Ultimate Load Test of dia 1m and length 16.50 m including reinforcing bar, concrete of grade M25/40, providing and installation of Anchorage rods, Telltale setup and grouting, using Bentonite as per specification and as shown in drawing etc. all complete.	no.	4.00			
1600	C6.02	Rate per meter for additional or reduction of length of Ultimate Load Test pile including boring, rebar, concrete, GI pipe and telltale rod with respect to the Item C6.01	m	rate only			
1600	C6.03	Conducting PDA test including analysis and reporting all complete as instructed by the Engineer	no.	12.00			
1600	C6.04	Pile Integrity Test, analysis and reporting using low strain waves as per ASTM D5882 or equivalent standard or as directed by Engineer, all complete	no.	23.00			
		Total of Bill C6 - Carried to Summary :					
		Total of Part C - Carried to Summary:					
PART D: MINOR BRIDGE WORKS							
Bill D1: General Items							
1501	D1.01	Supplying and placing of bridge name plate with double or more posts in each bridge construction site	nr	42.00			
3201	D1.02	Review of design of foundation including soil investigation, hydrological study, all complete.	nr	21.00			
3202	D1.03	Dismantling of Existing RCC Bridge of all type including superstructure, substructure, foundation and all ancillary structures of the Bridge, all complete and site clearance for the construction of new bridge elements	nr	21.00			
		Total of Bill D1 - Carried to Summary :					

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
Bill D2: Foundation Works							
900	D2.01	Excavation for foundation for abutments and piers in all types of soil including dewatering etc, all complete	cu m	64,593.18			
2000	D2.02	Providing and placing machine mixed cement concrete M15/40 for leveling course including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	1,283.21			
2000	D2.03	Providing and placing machine mixed cement concrete (Batch Mix) M20/40 for footings for abutment including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	12,362.58			
2000	D2.04	Providing and laying Reinforcing Steel Bar including cutting, bending, fixing in position etc. all complete as per specification and drawing.	t	714.59			
1800	D2.05	Providing, Preparing and Installing Form Work (F1 Finish) including necessary supports and removing after completion all complete as per specification and drawing	sq m	5,124.40			
		Total of Bill D2 - Carried to Summary :					
Bill D3: Sub-Structure Works							
2000	D3.01	Providing and placing machine mixed cement concrete (Batch Mix) M20/40 for the abutment, approach slabs and stoppers etc. including compaction, curing, testing etc. all complete	cu m	12,511.33			
1800	D3.02	Providing, preparing and installation of Formworks (F2 finish) for vertical surface of substructures including necessary supports and removing after completion, all complete	sq m	22,149.24			
2000	D3.03	Providing and laying reinforcing Steel Bar including cutting, bending, binding, fixing in position etc. all complete as shown in drawing.	t	745.11			
2400, 3110	D3.04	Providing , laying and fixing of geotextile (filter fabrics)	sq m	531.00			
3110	D3.05	Backfilling with graded filter materials in layer with necessary watering and compaction, all complete	cu m	5,576.50			
3109	D3.06	Provide and installation of Weep Hole with 100mm HDEP pipe in abutment, all complete	m	8,019.20			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
		Total of Bill D3 - Carried to Summary :					
Bill D4: Super-Structure Works							
2000	D4.01	Providing and placing machine mixed cement concrete (Batch Mix) M25/20 for the superstructure deck slab, etc. including compaction, curing, testing etc. and necessary lead all complete.	cu m	2,955.70			
2000	D4.02	Providing and placing machine mixed cement concrete (Batch Mix) M25/10 for wearing course in deck slab, etc. including compaction, curing, testing etc. and necessary lead all complete	cu m	412.77			
2000	D4.03	Providing and placing machine mixed cement concrete (Batch Mix) M30/20 for slab, girders and crash barriers etc. including compaction, curing, testing etc. all complete	cu m	2,158.95			
1800	D4.04	Providing, preparing and installation of Formworks (F2 finish) for slab, girders and other super-structures works and removing after completion (false work included), all complete.	sq m	21,212.94			
2000	D4.05	Providing and laying reinforcing steel bar including cutting, bending, binding, fixing in position, all complete	t	584.93			
1901	D4.06	Providing and installing the elastomeric expansion joints as shown in the drawings and specifications including all necessary axillary and incidental works etc. all complete	m	586.80			
1902	D4.07	Providing and installing elastomeric bearing including design of the bearings with provided data and necessary axillary and incidental works etc. all complete	nr	272.00			
1903	D4.08	Providing and placing Rubber Strip Bearing (19mm thick) as shown in drawing, all complete	sq m	128.79			
3103	D4.09	Supply and place compressible joint filler.	sq m	10.30			
3109	D4.1	Providing and placing 38mm dia PVC pipe for dowel bar as shown in drawing, all complete	m	184.80			
3105	D4.11	Providing and fixing in position GI pipes for railing including fixing in position in handrail and crash barrier as shown in drawing, all complete					

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
	a.	50mm dia GI pipes	m	1,939.20			
	b.	75mm dia GI pipes	m	1,054.32			
	c.	100mm dia GI pipes	m	258.00			
3114	D4.12	Providing and fixing in position Galvanised Steel Base Plate including steel nut bolts, drilling, fixing etc required for pedestrian handrails and crash barriers rails as shown in the drawings, all complete	kg	917.75			
3107	D4.13	Providing and fixing in position GI drainage spout including GI pipe as shown in the drawings, all complete	nr	438.00			
3108	D4.14	Providing and fixing in position Bracket for Utility facility as shown in the drawings, all complete	nr	198.00			
3115	D4.15	Prepare and apply reflectorized enamel paint Zebra type, black & yellow on Crash barriers in two coats in addition to one base coat as per DoR Traffic Sign Manual	sq m	1,061.65			
		Total of Bill D4 - Carried to Summary :					
Bill D5: River Training and Protection Works							
900	D5.01	Foundation Excavation in all types of soil including shoring, dewatering, all complete	cu m	4,045.29			
2600	D5.02	Providing and laying Random Rubble Stone Masonry works in cement sand mortar MM5 C/M including scaffolding, curing, preparing cement mortar, pointing etc., all complete	cu m	4,200.00			
2000	D5.03	Providing and placing machine mixed cement concrete M10 for leveling course in CRRM including compaction, curing, testing etc. all complete as per specification and drawing.	cu m	304.39			

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Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
2400	D5.04	Supply and assemble of Machine Made mechanically salvaged Gabion and Mattresses produced from double twisted heavy coated GI wire, of hexagonal mesh size 100 mm x 120 mm, with mesh wire 3mm, selvedge wire 3.9mm, lacing wire 2.4mm and stone filling in gabions including transport and fixing of gabions in position, all complete.	cu m	17,472.00			
2400, 3110	D5.05	Providing, laying and fixing of geotextile (filter fabrics), all complete	sq m	10,679.76			
3110	D5.06	Backfilling with graded filter materials in layer with necessary watering and compaction as shown in drawing, all complete	cu m	760.88			
3109	D5.07	Provide and laying PVC pipe of 90mm dia (pressure 2.5 kg/cm2) for weep holes as instructed by the Engineer, all complete	m	3,276.00			
		Total of Bill D5 - Carried to Summary :					
		Total of Part D - Carried to Summary:					
PART E: PERFORMANCE BASED MAINTENANCE WORKS AND SERVICES							
3300	E1.01	Performance based maintenance works and services including all activities as per specification except emergency work.	km-mon	2,380.00			
		Total of Part E - Carried to Summary:					
PART F: SCHEDULE OF DAYWORKS DURING CONSTRUCTION WORKS AND PBM WORKS AND SERVICES							
	F1.01	Labour					
	a)	Skilled labour (Mason, Carpenter, mechanics etc.)	per-day	500.00			
	b)	Unskilled labour (Including Unskilled, helpers, assistant operators etc.)	per-day	1,000.00			

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					In Figure	In Words	
	F1.02	Equipment		-			
	a.	Tipper/truck > 5 Cu m capacity	h	800.00			
	b.	Loader > 1 Cum. Capacity	h	800.00			
	c.	Excavator >0.75 Cum. Capacity	h	800.00			
	d.	Motor grader (> 135 HP)	h	800.00			
	e.	Vibratory roller (> above 10 ton capacity)	h	800.00			
	f.	Plate Vibrator	h	800.00			
	F1.03	Material					
700	a.	Concrete NP3 Pipe 450mm Diameter	m	100.00			
700	b.	Concrete NP3 Pipe 600mm Diameter	m	150.00			
700	c.	Concrete NP3 Pipe 900mm Diameter	m	50.00			
600	d.	Stone	cu m	100.00			
600	e.	Cement	t	10.00			

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Contract No.: SRIP/ICB/NB/02

BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
600	f.	Sand	cu m	100.00			
600	g.	Aggregate	cu m	100.00			
2400	h.	Supply of machine made mechanically selvedged gabion crates of various sizes including binding wire, all complete	sq m	1,000.00			
		Total of Part F - Carried to Summary :					
PART G: PROVISIONAL SUM							
103	G1.01	Relocation of services.	ps	1.00	472,000,000.00	Four hundred seventy two million only	472,000,000.00
	G2.02	Environmental mitigation works as instructed by the Engineer	ps	1.00	1,575,000.00	One million five hundred seventy five thousand only	1,575,000.00
	G3.03	Introduction of Special Slope Stabilization Technique	ps	1.00	50,000,000.00	Fifty million only	50,000,000.00
2800	G4.04	Compensatory Tree Plantation	ps	1.00	3,573,281.25	Three million five hundred seventy three thousand two hundred eighty one and paise twenty five only	3,573,281.25
	G6.05	Social compliance and safe guards as instructed by the Engineer	ps	1.00	2,625,000.00	Two million six hundred twenty five thousand only	2,625,000.00
	G7.06	Additional testing of material or works as required by the Engineer.	ps	1.00	500,000.00	Five hundred thousand only	500,000.00
3300	G8.07	Emergency fund for PBM Works and Services	ps	1.00	73,000,000.00	Seventy three million only	73,000,000.00
	G8.08	Traffic Safety Measures, campaign on Road Safety, Provision of Street Lights etc.	ps	1.00	50,000,000.00	Fifty million only	50,000,000.00
		Total of Part G - Carried to Summary:					653,273,281.25

SASEC Roads Improvement Project
Narayanghat-Butwal Road (Section -2)
Km 65+000 to Km 113+535
Contract No.: SRIP/ICB/NB/02
BILL OF QUANTITIES

Spec. Clause Ref.	Item No.	Item Description	Unit	Quantity	Unit Rate (NRs.)		Total Amount (NRs.)
					In Figure	In Words	
		Total of Part A to Part G:					
		VAT 13%:					
		Grand Total:					

FOR REFERENCE ONLY

Section 5 - Eligible Countries

This Section contains the list of eligible countries.

Regional Members

1.	AFG	Afghanistan	25.	FSM	Micronesia, Federated States of
2.	ARM	Armenia	26.	MON	Mongolia
3.	AUS	Australia	27.	MYA	Myanmar
4.	AZE	Azerbaijan	28.	NAU	Nauru
5.	BAN	Bangladesh	29.	NEP	Nepal
6.	BHU	Bhutan	30.	NZL	New Zealand
7.	BRU	Brunei Darussalam	31.	PAK	Pakistan
8.	CAM	Cambodia	32.	PAL	Palau
9.	PRC	China, People Republic of	33.	PNG	Papua New Guinea
10.	COO	Cook Islands	34.	PHI	Philippines
11.	FIJ	Fiji	35.	SAM	Samoa
12.	GEO	Georgia	36.	SIN	Singapore
13.	HKG	Hong Kong, China	37.	SOL	Solomon Islands
14.	IND	India	38.	SRI	Sri Lanka
15.	INO	Indonesia	39.	TAP	Taipei, China
16.	JPN	Japan	40.	TAJ	Tajikistan
17.	KAZ	Kazakhstan	41.	THA	Thailand
18.	KIR	Kiribati	42.	TIM	Timor-Leste
19.	KOR	Korea, Republic of	43.	TON	Tonga
20.	KGZ	Kyrgyz Republic	44.	TKM	Turkmenistan
21.	LAO	Lao PDR	45.	TUV	Tuvalu
22.	MAL	Malaysia	46.	UZB	Uzbekistan
23.	MLD	Maldives	47.	VAN	Vanuatu
24.	RMI	Marshall Islands	48.	VIE	Viet Nam

Non-regional Members

1.	AUT	Austria	11.	NET	The Netherlands
2.	BEL	Belgium	12.	NOR	Norway
3.	CAN	Canada	13.	POR	Portugal
4.	DEN	Denmark	14.	SPA	Spain
5.	FIN	Finland	15.	SWE	Sweden
6.	FRA	France	16.	SWI	Switzerland
7.	GER	Germany	17.	TUR	Turkey
8.	IRE	Ireland	18.	UKG	United Kingdom
9.	ITA	Italy	19.	USA	United States
10.	LUX	Luxembourg			

**Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Project Directorate (ADB)
Kathmandu, Nepal**

**SASEC Roads Improvement Project (SRIP)
(ADB Loan No. 3478 - NEP)**

**Narayanghat – Butwal Road (Section – 2)
From Km 65 + 000 to Km 113 + 535**

Contract No. SRIP/ICB/NB/02

Phase 1: Upgrading Works

(Upgrading of existing road from 2-Lanes to 4 Lanes and Service Lanes, Structures, Bridges, etc. including Defect Notification Period)

Phase 2: Performance Based Maintenance Works

(Maintenance works consisting of all activities to be carried out to achieve and keep the road assets as defined in the PBM Specifications)

Bidding Document

Part II Employer's Requirements

Section 6A	Summary of Description of Works
Section 6B	Standard Specifications
Section 6C	Special Provisions to Standard Specifications
Section 6D	Drawings (In Separate Volume)
Section 6E	Personnel Requirements
Section 6F	Equipment Requirements

April 2018

Preface

This Bidding Document for the Procurement of Works (Single Stage – Two Envelope) has been prepared by the Government of Nepal, Ministry of Physical Infrastructure and Transport, Department of Roads, Project Directorate (ADB) and is based on the Standard Bidding Document issued by the Asian Development Bank dated December 2015.

FOR REFERENCE ONLY

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PART I BIDDING PROCEDURES

Section 1 - Instructions to Bidders (ITB) ----- 1-1

This Section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Section 2 - Bid Data Sheet (BDS) ----- 2-1

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.

Section 3 - Evaluation and Qualification Criteria (EQC) ----- 3-1

This Section contains the criteria to determine the lowest evaluated bid and the qualifications of the Bidder to perform the contract.

Section 4 - Bidding Forms (BDF) ----- 4-1

This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.

Section 5 - Eligible Countries (ELC) ----- 5-1

This Section contains the list of eligible countries.

PART II EMPLOYERS REQUIREMENTS

SECTION 6

Section 6A – Summary of Description of Works

This Section contains the summary list of main works to be executed under the contract. Specification, Special provisions and, the Drawings, that describe the Works to be procured.

Section 6B – Standard Specifications

This document has been issued under the authority of the Government of Nepal, Ministry of Physical Planning and Works, Department of Roads (July 2001), it can be purchased from the Central Road Laboratory, Kupandole, Lalitpur.

Section 6C – Special Provisions

This section contains amendments, supplements, etc. to the standard specifications to suit the specific requirements of the project, including sections regarding Minor Bridges and PBM works.

Section 6D – Drawings

The drawings are presented in a separate volume.

Section 6E – Personnel Requirements

This section provides the information on Personnel Requirements.

Section 6F – Equipment Requirements

This section provides the information on Equipment Requirements.

PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 - General Conditions of Contract (GCC) ----- 7-1

This Section contains the general clauses that govern the Contract. These General Conditions shall be the Conditions of Contract for Construction, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs-Conseil (FIDIC June 2010 MDB version). These Conditions are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).

Section 8 - Particular Conditions of Contract (PCC) ----- 8-1

This Section contains provisions which are specific to each contract and which modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Section 9 - Contract Forms (COF) ----- 9-1

This Section contains forms, which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

FOR REFERENCE ONLY

Part II - Employers Requirements

This Section contains the Summary of Description of Works, Specifications and Drawings that describe the Works to be procured.

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FOR REFERENCE ONLY

Section 6A: Summary of Description of Works

Narayanghat – Butwal Road is a National Highway (H-01) under strategic road networks of Nepal and lies in Nawalparasi and Rupandehi districts of Lumbini Zone of Western Development Region of the Country.

The road starts from Gaidakot (Km 0+575) of Nawalaparasi district and ends at Rajmarga Chowk, Butwal (Km 113+535) of Rupandehi district. The road has been split into two (2) sections for procurement of works, (i) Section – 1 from Km 0+575 to Km 65+000 and (ii) Section – 2 from Km 65+000 to Km 113+535.

The Works under this Contract consist of Phase 1: Upgrading Works; with Upgrading of existing road from 2-Lanes to 4 Lanes and Service Lanes, Structures and Construction of Bridges, etc. including Defect Notification Period and Phase 2: Performance Based Maintenance Works; with Maintenance works consisting of all activities to be carried out to achieve and keep the road assets as defined in the PBM Specifications on upgraded 4-Lane Narayanghat – Butwal Road.

The Detail Drawings related to the improvement works have been included as Section 6D and provided in a separate volume. The estimated quantities of individual work items are contained in the Bill of Quantities. Description of works, materials, and workmanship, methods of testing and requirement and criteria for acceptance of Works etc. are detailed in the Standard Specifications and Special Provisions to the Standard Specifications in Sections 6B and 6C respectively.

The Summary Description of the main works, however, is as follows:

- i. Traffic management provisions during construction including the construction of diversions roads and bridges;
- ii. Roadway excavation and formation of embankment for widening of road section and for geometric improvement of road;
- iii. Construction of side drains, retaining structures;
- iv. Construction of cross-drainage structures;
- v. Construction of sub-base, base and bituminous pavement;
- vi. Supply, erection and installation of road safety measures;
- vii. Construction of bridges and their elements;
- viii. Dismantling of existing RCC bridges;
- ix. Performance based maintenance works to achieve and keep the road assets as defined in the PBM Specifications, etc.

Section 6B: Standard Specifications

Standard Specifications for this contract shall be the “Standard Specifications for Road and Bridge Works” issued under the authority of the Government of Nepal, Ministry of Physical Planning and Works, Department of Roads (Ashad, 2058 / July, 2001)

The Standard Specifications may be purchased from the Departments of Roads, Central Road Laboratory, Kupondole, Lalitpur.

FOR REFERENCE ONLY

Section 6C: Special Provisions to the Standard Specifications

The Standard Specifications for Road and Bridge Works issued by the Government of Nepal, Ministry of Physical Infrastructure and Transport, Department of Roads together with these Special Provisions shall be used to specify the construction of the Works.

The Special Provisions contained herein shall be read in conjunction with the Standard Specifications and shall supplement, replace or supersede the Standard Specifications as appropriate. Where there is any ambiguity or discrepancy between the Standard Specifications and the Special Provisions; the Special Provisions shall have preference and shall govern.

FOR REFERENCE ONLY

Section 100 - General

Delete Clause 101 in its entirety and substitute with the following:

101 Office, Accommodation, Vehicles, Survey Equipment and Site Laboratory

101.01 Provision of Office and Accommodation with Furnishing/Equipment, Operation and Maintenance

A. General Requirements

The Contractor shall provide office and accommodation with the furniture, furnishing, equipment, consumables, operation and maintenance for the Employer and his staff as described below.

Office shall be with the facilities as shown in Appendix - 2 and the accommodation shall be with the facilities as shown in Appendix - 3. The office and accommodation provisions shall include the construction of new buildings on the land provided by the Employer within the DOR premises at Bardaghat, Nawalaparasi district with the facilities and maintenance. It also includes the clearance of site, access roads, parking facilities and other necessary appurtenances such as power mains connection, water supply mains, drainage systems, fences, utilities, area development etc.

After providing the office and accommodation with the facilities the Contractor shall also maintain.

B. Sole Use of Office and Accommodation

The office and accommodation facilities shall be for the sole use of the Employer.

C. Land for Offices and Accommodation

The Contractor shall construct the office and accommodation buildings on the land provided by the Employer within the DoR premises at Bardaghat, Nawalaparasi district. The office and accommodation buildings, equipment and furniture etc will remain the property of the Employer at completion of the contract.

D. Services

The Contractor shall arrange for the connection of water mains, drainage and sewerage and electricity mains to the office and accommodation which facilities shall be functional at all times. The Contractor shall ensure that these facilities of adequate power, supply of potable water and sewage disposal etc. conform in full to the requirements mentioned in the Conditions of Contract and in this Specification. A standby generator, with fuel, of appropriate capacity shall be provided to each office and accommodation for use during periods of load shedding and power failure.

Telephone services including at least one direct line shall be provided for each office and accommodation.

E. Office and Accommodation Buildings

Office Building Structure:

The Contractor shall construct complete pre-fabricated office building in accordance with the Specifications of the renowned manufacturer and that is acceptable to the Employer. Room requirements for the Office shall be with the plinth area of approximately 150 sq m with four (4) rooms plus meeting hall, pantry and toilet bathroom.

Accommodation Building Structure:

The Accommodation building shall be constructed in RCC framed structure with brick masonry walls. The walls shall be of minimum thickness 230 mm with cement plaster works on inside and outside.

Roofs shall be constructed of RCC slab. The whole structure shall comply with local regulations regarding earthquake resistance and shall in any case incorporate a continuous system of reinforced concrete columns and beams. External wall surfaces shall be finished with two coats of weather resistant paint. Internal wall surfaces shall be finished with two coats of plastic emulsion. The building shall be of two stories. Room requirements for Accommodation shall be with plinth area of approximately 200 sq m total in two stories with the provisions of three (3) rooms plus kitchen, dining and toilet bathroom in each floor.

Ancillary Works:

The buildings shall be constructed on concrete foundations with concrete floor slab. Concrete floor slabs shall have continuous damp-proof course material below the slab. The foundation area shall be built up as necessary to ensure that the level of the underside of the floor slab is at least 300 mm above surrounding ground level and at least 300 mm over the highest recorded flood level.

Internal headroom shall be 3.4 m throughout. The building shall be surrounded with a covered concrete verandah or walkway on all sides having a covered width not less than 1 m and set at a level 100 mm below the interior floor level.

Rooms shall open off a central or main corridor having a width of at least 1.30 m throughout and opening onto front and back doors. All rooms shall have secure lockable doors onto the main corridor and shall have windows opening to the outside secured with burglar proof grills.

Floors shall be covered with linoleum/PVC tiles throughout. All woodwork shall be sanded smooth and finished with one coat primer, two coats of oil based undercoat and one coat of oil based top coat. Door and windows shall be of approved hardwood or else as approved by the Engineer and the Employer.

Other Requirements:

All structural and layout drawings shall be approved by the Engineer before construction commences. All paints and floor finishes shall be approved by the Engineer before painting or flooring work commences.

Covered parking space shall be provided for the Employer's vehicles and this covered area shall be connected to the office building by a covered concrete walkway having a minimum covered width of 1.5 m.

The whole compound shall be fenced and gated with chain link fence at least 1.5 m in height.

Each room shall be provided with sufficient power outlets and light fittings. Additional table lamps shall be provided as required. External lighting shall be provided to give adequate illumination of the whole area surrounding the buildings and covered parking spaces.

Each toilet shall be fitted with a wash basin with running water. All toilets shall be of western type.

The construction and finishing of the office and accommodation buildings including fittings, furnishings and equipment shall be completed within 16 weeks from the date of the Engineer's Notice to Commence the Works.

Typical drawings of the office and accommodation buildings shall be provided to the Contractor. The Contractor shall require preparing and submitting the working drawings for the Engineer's approval before starting the construction works.

Office and Accommodation buildings along with the facilities in accordance with this Clause shall become the property of the Employer on the completion of the Contract.

F. Provision of Temporary Office and Accommodation Facilities

The Contractor shall provide temporary office and accommodation facilities along with the furniture/furnishing, equipment, consumables, operation and maintenance etc for the period from the date of the Notice to Commence the Works until the completion of the permanent office and accommodation facilities.

If the Contractor fails to provide the temporary and permanent office and accommodation facilities within the stipulated time the Employer will arrange suitable office and accommodation for his use and the full costs of doing so will be deducted by the Employer from any monies due to the Contractor.

No separate payment shall be made for the provision of the temporary office and accommodation facilities. The Contractor shall include his cost for the provision of temporary office and accommodation facilities within the price quoted for the permanent office and accommodation facilities in the respective items of the Bill of Quantities.

G. Furnishings and Equipment

The fittings, furnishings and equipment to be provided in office and accommodation are described in the Appendices - 2 and Appendix - 3 respectively, and shall become the property of the Employer on completion of the Works.

H. Maintain and Run Office and Accommodation and Provision of Supplies

The Contractor shall maintain the buildings and the contents thereof supplied under the Contract in good working order. The Contractor shall be responsible for supplying all power, water and telephone services to the office and accommodation, and shall meet all costs for these services, except for the cost of any overseas calls. A standby generator of specified capacity is required at both office and accommodation to provide a continuous supply of power during the period of load shedding and power failure.

The Maintenance of the Employer's office and accommodation shall include daily cleaning to the satisfaction of the Employer and including the manpower and materials required for. The Contractor shall maintain all grounds and gardens that surround the building to the satisfaction of the Employer.

The Contractor shall maintain in good condition, provide services regularly and repair or replace all items of furniture, fittings and equipment supplied and installed in the buildings as required.

The Contractor shall provide adequate security to guard and secure the buildings on a 24 hours per day basis.

The Contractor shall provide stationery for the Employer as required and duly requisitioned by personnel authorized by the Employer. Stationery shall include all consumable office items and shall include paper, writing materials, printing materials (e.g. printer cartridges, printer ribbons, copier toner etc.) and all general office requisites. Likewise the Contractor shall supply all other consumables for office and accommodation as required and provisioned in the Contract.

A wireless internet facility shall be provided at both office and accommodation in order to facilitate the transmission of project data and information.

I. Measurement

Construction of office building (Pre-Fab Structure, Single Story) and accommodation building (RCC Structure, two stories) including electrical, plumbing and sanitary works all complete as per the Drawings and the Specifications and to the satisfaction of the Employer shall be measured as a Lump Sum item as provisioned in the respective items in the Bill of Quantities.

Maintaining and operating the Employer's office and accommodation at site including supply of consumables etc., all complete as per the Specifications and to the satisfaction of the Employer shall be measured on a monthly basis as provisioned in the in the respective items of the Bill of Quantities.

Provision of furniture, furnishings and equipment, etc for the office and accommodation of the Employer as detailed in these Specifications and to the satisfaction of the Employer shall be measured on a Lump Sum basis as provisioned in the respective items of the Bill of Quantities.

The measurement of all the items described above shall commence from the date of the Employer's occupation of the permanent office and accommodation facilities. No separate measurement shall be made for temporary provisions.

J. Payment

Payment of the construction of office building (Pre-Fab Structure, Single Story) and accommodation building (RCC Structure, two stories) including electrical, plumbing and sanitary works all complete shall be made against the respective items of the Bill of Quantities upon the completion of the Works to the satisfaction of the Engineer and the Employer.

Payment for maintaining and operating the Employer's office and accommodation at site including supply of consumables etc., all complete shall be made against the respective items of the Bill of Quantities.

Payment for the provision of furniture, furnishings and equipment, etc for the office and accommodation of the Employer shall be made against the respective items of the Bill of Quantities upon the supply and installation of these facilities to the satisfaction of the Engineer and the Employer.

The payment shall represent full and final payment for the contract items and the Contractor shall not be entitled to any further compensation. The Contractor shall provide such facilities during the extended time period as long as the Employer may require.

In the event the Contractor fails to maintain, repair or replace any defective or inadequate office, or equipment item, the Employer shall effect such maintenance, repairs or replacement and shall deduct the cost from any monies due to the Contractor.

The rate quoted by the Contractor for the lump sum pay items shall deem to cover the full contract period including any Extensions of Time (EOT). No additional payment shall be made for the period of any Extension of Time (EoT) for such items.

101.02 Vehicles for the Employer

A. General Requirements

The Contractor shall provide new plain-coloured motor vehicle as described in the Appendix - 4 for the exclusive use of the Employer, for any purpose in connection with the Works. The Contractor shall obtain approval from the Employer before supplying the vehicle. The vehicle shall be licensed and insured for use on the public highway with comprehensive insurance cover for any qualified driver, together with any authorised passengers and the carriage of goods or samples.

The Contractor shall provide a competent and qualified driver holding a valid driver's license having an experience of minimum 5 years as a driver of similar vehicle types. The Contractor shall provide fuel, oil and maintenance in conformity with the vehicle manufacture's recommendations.

The Contractor shall provide a suitable replacement for any vehicle that is out of service for more than 24 hours. Vehicles shall be provided and maintained in accordance with the above for as long as they are required by the Employer. Vehicles shall be reverted to the Contractor when no longer required by the Employer.

B. Measurement

Provisions of the vehicles for the Employer shall be measured as the number of months the vehicles are provided and maintained. Measurement shall be made during the total period the vehicle is in use

by the Employer. Vehicle not provided for the full 24 hour day will be measured for payment on pro-rata basis of the actual hours available out of the 24 hour day.

C. Payment

Payment for vehicles shall be made at the unit price per vehicle month for each vehicle as contained in the Bill of Quantities. Payment shall include the supply of the vehicle and driver, fuel, oil, insurance, license, maintenance, spares, repairs and all other running and maintenance costs.

101.03 Provision of Site Laboratory

A. General Requirements

The Contractor shall provide, operate and maintain an adequately equipped site Laboratory complete with all utilities, services apparatus and fittings as set out in Appendix - 6 and Appendix - 7 to undertake the required testing to ensure the quality of the materials and the works. The Contractor shall also supply and provide, at the laboratory the standards listed and set out in Appendix - 1. The laboratory space including lab office and lab arrangement shall be with plinth area of approximately 120 sq m with two (2) rooms plus one additional large hall, outside covered veranda and toilet bathroom.

The Site Laboratory shall be located within 500 m of the site and the lab building may be located at the rented building or newly constructed on rented land. The laboratory shall be available up to the end of the project.

The complete laboratory facilities shall include the provision of land, site grading, access roads, covered parking facilities for vehicles, construction of building and all necessary appurtenance such as electricity, drainage systems, fences and utilities etc.

The contractor shall supply furniture, fittings, equipment, vehicle, manpower and materials to provide fully functional site laboratory.

The site laboratory shall be ready to use within 10 weeks from the date of the Engineer's notice to commence the Works. Alternative arrangement for testing shall be made by the date of commencement of works.

The Contractor shall be fully responsible for the equipment including:-

- Maintaining, calibrating and servicing equipment as required.
- Repairing all defects including accidental damage as required.
- Replacing any lost or stolen items.
- Effecting insurance of the equipment against damage or loss.
- The tests which cannot be performed at site shall be carried out off the site at renowned laboratory acceptable to the Engineer.

The site lab shall be made available for testing as long as it is required including any period after the Completion of construction during which it is required for final measurement purposes.

At the completion of the project, the furniture and equipment shall be the property of the Contractor.

B. Measurement

Providing laboratory space, maintaining and operating the material testing laboratory at site, etc., all complete, shall be measured on monthly basis as provided in the Bill of Quantities. It includes establishing the site laboratory which includes construction/renting of lab building, required consumables, maintenance and operation of the site laboratory and supply of laboratory personnel and staff at laboratory for day to day works and testing etc.

Providing furniture and equipment etc., all complete for the material testing laboratory at site shall be measured on Lump Sum basis as provided in the Bill of Quantities. It includes supply and fixing of a complete set of equipment, furniture and other requisite items, etc, detailed in the Appendices.

C. Payment

Payment for providing laboratory space, maintaining and operating the material testing laboratory at site, etc. all complete shall be made against the respective item of the Bill of Quantities.

Payment for providing furniture and equipment etc., all complete for the material testing laboratory at site shall be made in the respective Lump Sum item as provisioned in the Bill of Quantities. The Lump sum payment shall be made in two installments. First installment of 70% of item rate shall be made upon the completion of supply and installation of the equipment and furniture to the satisfaction of the Engineer. The remaining second 30% of the item rate shall be made upon the completion of 75% of the Works.

Payment shall represent full and final payment for the Contract Items and the Contractor shall not be entitled to any further compensation. The Contractor shall provide such facilities during the extended time period as long as the Employer may require.

In the event the Contractor fails to maintain, repair or replace any equipment item, the Employer shall carryout such maintenance, repairs or replacement and the Employer shall deduct the cost from any monies due to the Contractor.

The rate quoted by the Contractor for the lump sum pay items shall deem to cover the full contract period including any Extensions of Time (EOT). No additional payment shall be made for the period of any Extension of Time (EoT) for such items.

101.04 Survey Equipment

A. General Requirements

The Contractor shall be equipped with the minimum survey equipment as detailed in Appendix - 5.

These equipment shall be in the possession of the Contractor at Site within 10 weeks from the date of Engineer's notice to commence the Works. The Contractor shall at all-times be responsible for:

- Maintaining, calibrating and servicing equipment as required.
- Repairing all defects including accidental damage as required.
- Replacing any lost or stolen items.
- Effecting insurance of the equipment against damage or loss.

The Contractor shall maintain the survey equipment at site for as long as it is required including any period after the Completion of Works during which it is required for final measurement purposes.

The Contractor shall ensure that the Engineer and his staff have full access to this equipment at all times during the course of the execution of works.

B. Measurement and Payment

No separate measurement and payment shall be made for the provision of survey equipment and the costs associated with the provision of the survey equipment shall be considered to be included in the rates for other items of the works.

102 Accommodation of Traffic

Delete Clause 102 in its entirety and substitute with the following:

Change heading of Clause 102 Accommodation of Traffic to Clause 102 Traffic Management Provisions as follows:

102 Traffic Management Provisions

(1) Scope

This Clause covers the requirements to be met by the Contractor in relation to traffic management provisions at construction sites which include management of regular traffic on existing road or proposed temporary works (diversions), management of construction traffic and traffic control and guidance schemes in order to ensure safe and reasonably efficient operation of vehicular and pedestrian traffic along the subject road corridors.

The passage over or through the Works shall be used by the public or the agents of the Employer or by public traffic or by vehicles of the Employer, whether connected with the Contract or not and that shall not constitute use or occupation by the Employer. So the Contractor shall make proper traffic management provisions at construction sites to open the traffic during construction and provide the alternate route for traffic in case of closure of a particular section.

(2) Preparation of Traffic Management Plan

The Contractor shall prepare Traffic Management Plan (TMP) based on the guidelines provided by the Engineer and submit it to the Engineer for approval prior to the commencement of construction. The Plan shall show the means and methods of operation and control of existing as well as its construction traffic during the construction works. The means and methods of managing traffic shall be suitable and adequate for ensuring safety of all road users as well as Contractor's own workers and to the satisfaction of the Engineer. The Traffic Management Plan shall include but not be limited to the following.

- i. Traffic control equipment the Contractor proposes to use for the Works;
- ii. Traffic control signage including location and sign descriptions;
- iii. How and when the Contractor proposes to use traffic control flagmen;
- iv. Traffic control means during non-working periods; and
- v. Traffic control means and devices for night and off-peak periods.
- vi. Lane closure plan, where the Contractor intends to close the road partially;
- vii. Traffic diversion plan, where the Contractor proposes to close the road fully.

The general traffic management requirements will be as given below.

(3) General Traffic Management Requirements

The following conditions shall apply in regard to traffic management:

- a) The Contractor shall keep existing roads open to traffic during the performance of the Works, provided that when approved by the Engineer the Contractor may bypass traffic over a detour. The Contractor shall at all times keep roads and footpaths, affected by his operations, free from soil and material spillage.
- b) In order to facilitate better traffic management as well as least convenience to road users, the construction works shall be divided in to stretches of less than 5 Km each and the contractor shall prepare work schedule for construction works on each stretch such that no major construction works shall be carries out in adjoining stretches and submit it for engineer's approval. Construction works shall not be carried out in adjoining stretches without prior written instruction of the engineer.
- c) The Contractor shall keep the length of the construction areas in such condition that traffic will be accommodated safely. Traffic control devices and services shall be provided and maintained both inside and outside the Project limits as needed to facilitate traffic guidance should this be necessary.
- d) Prior to the start of construction operations, the Contractor shall erect such signs, barricades, and other traffic control devices as may be required by the plans, specifications or as directed by the Engineer. Traffic control devices shall be operated only when they are needed and only those devices that apply to conditions actually in existence shall be operable. The

Contractor shall obtain prior approval from the competent authority (Traffic Police) of the plans and specification of the proposed traffic management works before the commencement of work

- e) Temporary fences shall be placed to provide a visual barrier between the work area and adjacent traffic or buildings and at locations directed by the Engineer.
- f) Any devices provided under this Clause that are lost, stolen, destroyed, or deemed unacceptable while their use is required on the Project shall be replaced by the Contractor without additional compensation.
- g) During non-working hours and following completion of a particular construction operation, all warning signs, except those necessary for the safety of the public, shall be removed or entirely covered with either metal or plywood sheeting so that the sign panel will not be visible.
- h) The contractor shall keep retro-reflective sheeting on signs, barricades, and other devices. The Contractor shall also promptly correct stretches, rips, and tears in the sheeting. Retro-reflective sheeting shall have a maintained retro-reflection.
- i) Night time operations, if any approved by the Engineer, shall be illuminated by a lighting system approved by the Engineer. The lighting system shall be positioned and operated to preclude glare. Incandescent lights will not be permitted.
- j) The Contractor shall take necessary care at all times during the execution of the works to ensure the existing convenience and safety of residents along and adjacent to the road, and any public highway or other facility that may be affected by the Works. Street lighting shall be relocated as necessary to maintain the same standard of lighting during the course of the works until new lighting facilities are brought into operation.
- k) The Contractor shall thoroughly acquaint himself with existing traffic conditions and understand the importance of maintaining traffic safety and the avoidance of excessive traffic delay. The Contractor shall co-operate with the pertinent agencies regarding traffic control and all details will be subject to the Engineer's approval.
- l) The Contractor shall be responsible for investigating and establishing the requirements for traffic control and safety in all work areas and shall submit all details to the Engineer.
- m) The Contractor's requirements shall include, but not be limited to, construction of detours, diversion roads, temporary bridges and approach roads, of traffic control devices and services for the control and protection of traffic through areas of construction.
- n) Any failure of the Contractor to meet these requirements will entitle the Employer to carry out such works as he deems to be necessary and to charge the Contractor with the full cost thereof plus ten percent of such cost, which sum will be deducted from any money due or which may become due to the Contractor under the Contract.
- o) Road Damage: Contractor will be responsible for all road damage that may occur from the transporting of his materials and equipment to and from the Works and will be responsible for coordinating with all concerned agencies for implementing all necessary repairs and/or restorations. The Contractor shall be required to repair to the satisfaction of the Engineer and at no cost to the Employer any damage that he causes to the road.
- p) When construction under traffic is permitted, the Contractor shall arrange its construction program so that traffic flow is maintained through the Works in accordance with the requirements as laid out by Traffic Police or as approved by the Engineer.
- q) Vehicular access points to and from the site shall be in accordance with the requirements of the best practice design standards, guides and manuals approved by the Engineer. Acceleration and deceleration lanes and tapers shall comply with the traffic volume, speed and sight distance warrants specified in the standards and guides or as approved by the Engineer. Cross section widths for acceleration and deceleration lanes shall be a minimum of 3.2m. The contractor shall provide traffic controllers at all entry and exit points.

(4) Temporary Road Works Requirements for Traffic Management

The following conditions shall apply in regard to temporary works:

- a) The Contractor shall furnish, maintain, and remove on completion of the work for which they are required, all temporary roads and road works such as sleeper tracks and staging over roads, access and service roads, temporary crossings of bridges over streams or unstable ground, and shall make them suitable in every respect for carrying materials for the work, for providing access for traffic for himself or others, or for any other purpose. Such temporary road works shall be constructed to the satisfaction of the Engineer, but the Contractor shall

nevertheless be responsible for any damage done to or caused by such temporary road works.

- b) Before constructing temporary road works, the Contractor shall make all necessary arrangements, including payment if required, with the public authorities or landowners concerned, for the use of the land and shall obtain the approval of the Engineer. Such approval will be dependent on the Engineer being satisfied with the Contractor's proposals for items such as signing, lighting and riding quality of the temporary road together with the proposed maintenance arrangements. Such approval will not, however, relieve the Contractor of his responsibilities under the Contract. Upon completion of the works the Contractor shall clean up and restore the land to the satisfaction of the Engineer.
- c) The Contractor, when required by the Engineer, shall submit for the Engineer's approval drawings giving full details of temporary roads. Such details shall include alignment, profile, pavement construction, signing, lighting and the duration of the temporary road.
- d) The Contractor shall make all arrangements necessary to permit the passage of materials and employees.
- e) In cases where it is necessary or required by the Engineer, the Contractor shall construct and maintain temporary traffic ramps, and furnish all labour and materials required.

(5) Scope of Traffic Management Plan

The Traffic Management Plan submitted by the contractor shall

- a) Provide details of the consultative process proposed to ensure consultation with and notification to the community, business, road users and other stakeholders in advance of alterations to existing traffic conditions. The Contractor's proposed inputs into the communication process shall ensure the timely notification of the Traffic Police, relevant departments, travelling public, emergency services, adjacent landowners and businesses of impending changes to traffic conditions. This process shall take cognizance of any Department's requirements with respect to public notifications
- b) Describe traffic arrangements which provide for any necessary sequencing of the work under the Contract while minimising disruption and confusion to road users, local traffic, emergency vehicles, pedestrians and cyclists;
- c) Where required, describe how the construction work area shall be physically and visually isolated from road users;
- d) Provide details of how local access to communities and adjacent private properties and businesses will be maintained;
- e) Provide details of arrangements to be made for detouring traffic;
- f) Provide details of all road closures and/or restrictions required to undertake the work under the Contract;
- g) Detail provisions to maintain the specified number of traffic lanes in each direction at the minimum nominated operating speed between the hours stated elsewhere in the contract or as approved by the Engineer.
- h) Provide for participation of a senior member of the Contractor's site personnel on any traffic coordination committee convened by the Department or its designated representative;
- i) Include the names and contact details of the representatives nominated by the Contractor and notified to the Engineer. The Contractor shall nominate a minimum of two representatives with the authority to address traffic management issues one of whom shall be available at all times outside of the Contractor's normal working hours. The Contractor shall notify the Engineer and Department or its designated representative of the name, address and telephone number of the nominated persons. Such persons, when requested by the Engineer shall coordinate and expedite immediate repairs to and maintenance of such part of the work under the Contract as may be considered necessary by the Engineer and shall carry out such work to the satisfaction of the Engineer.
- j) If a nominated person leaves the employment of the Contractor during the period of the Contract, the Contractor shall immediately nominate another person and provide the full details of that person.
- k) Include the name of the Nominated Traffic Officer;
- l) Include a schedule of Traffic Guidance Schemes giving a general description of the relevant traffic arrangements and the date when the Traffic Guidance Scheme will be submitted.
- m) Provide details of the Contractor's organisational structure for traffic management issues including a list of the duties and responsibilities of each position nominated in that structure.

(6) Traffic Control

The following conditions shall apply in regard to traffic control:

- a) In order to facilitate traffic through or around the Works, or wherever ordered by the Engineer, the Contractor shall erect and maintain at prescribed points on the work and at the approaches to the work, traffic signs, lights, flares, barricades, rubber cones with traffic lamps and other facilities as necessary or required by the Engineer for the proper direction and control of traffic.
- b) As necessary for proper control of traffic or when/where directed by the Engineer, the Contractor shall furnish and station competent flagmen whose sole duties shall consist of directing the movement of traffic through or around the work.
- c) The Contractor shall furnish and erect, within or in the vicinity of the project area, such warning and guide signs as may be necessary or ordered by the Engineer.
- d) In order to minimize disruption to traffic flows the Contractor shall enclose the Site with temporary fence to provide a visual barrier between his work and adjacent traffic. The temporary fence shall be two meters high and the movement of men, materials and plant into and out of the barrier area shall be controlled by flagmen (traffic controller).

(7) Number of Lanes for Traffic Control

In so far as possible, the existing number of traffic lanes shall be maintained insofar as possible during the work and if diversions are provided these must be of the same traffic capacity as the original road. Notwithstanding the above, the Engineer may give approval to reductions in traffic capacity if the Contractor can show that these will not cause excessive delay to traffic. If such approval is given, the Engineer may specify the hours during the day when the reduction in capacity may be applied and it should be anticipated that these hours may not include the peak period for the traffic movement under consideration.

The Contractor shall cooperate with the pertinent agencies regarding traffic control and all details will be subject to the Engineer's approval.

(8) Half-Width Construction

The following conditions shall apply to half-width construction:

- a) Where, in the opinion of the Engineer, a detour is not feasible, construction on existing public roads shall be undertaken only over half of the full width of the roadway. The length of such half-width construction shall be kept as short as possible.
- b) Where half-width construction is necessary, work on culverts commenced in the dry season must be completed and the embankments adjacent to them must be reinstated so that at least half the full width shall be available for use by the public throughout the next rainy season.
- c) Where single-lane traffic becomes necessary over a particular length of the works or over the approaches thereto, the Contractor, in maintaining through traffic, shall provide a single lane at least three and a half meters wide on the roadway or embankment to be kept open to traffic.

The Contractor shall so conduct his operations as to offer the least possible obstruction, inconvenience, and delay to traffic and shall be responsible for the adequate control of the traffic using such lengths of single lane.

(9) Extraordinary Traffic

The Contractor shall be responsible for carrying out any necessary investigations and the obtaining of approvals, licenses, escorts and any other necessary facilities in order to enable his extraordinary traffic to be moved on the roads in the Project Area.

(10) Vertical Clearance

In general any temporary works placed over roads or diversions used by public traffic should maintain a vertical clearance of at least 4.5 meters. Where required by the Engineer the Contractor shall erect

and maintain suitable approved check-gates, fitted with warning signs indicating the vertical clearance.

(11) Materials for Traffic Control Devices

Materials for traffic control devices shall conform to the requirements set forth below:

- a) Unless otherwise specified in the contract, sign panels, barricades, cones, vertical panels, and flagger paddles shall have retro-reflective sheeting meeting requirements for retro-reflective material as specified by the Engineer.
- b) Sign Panels shall be orange with black legend unless otherwise required.
- c) Sign Posts shall be fabricated from untreated softwood, metal, or other materials acceptable to the Engineer. Signs shall be capable of remaining in position during normal traffic flow and wind conditions.
- d) Barricades shall be constructed of wood, metal or plastic.
- e) Cones shall be a minimum of 75 centimeters in height with a broadened base and shall be capable of withstanding impact without damage to the cones or vehicles. All cones shall be orange/white colored and highly visible both in daylight and darkness. Cones shall be capable of remaining bright and in position during normal traffic flow and adverse weather conditions in the area where they are used. Lamps for cones shall be suitable for purpose.
- f) Temporary fencing shall be fabricated in panels with timber framework and galvanized metal panels. The panel face towards the traffic shall be painted.
- g) Vertical panels shall be constructed of wood, metal or plastic
- h) Warning lights shall be Type A (low intensity flashing), Type B (high intensity flashing), or Type C (steady burn) as approved by the Engineer.

(12) Preparation of Traffic Guidance Scheme

The Traffic Guidance Scheme shall be prepared by suitably qualified and experienced persons and shall be submitted by the Nominated Traffic Officer to the Engineer for a direction as to its suitability, at least 21 days prior to the date of the proposed traffic rearrangement.

Where any change to existing traffic arrangements is proposed or where construction conflicts with normal traffic movements, the Contractor shall prepare a Traffic Guidance Scheme which clearly details the revised traffic arrangements at all locations affected by the change or conflict. Planning of Traffic Guidance Schemes shall be undertaken in accordance with best practice road works traffic management manual or guide as approved by the Engineer.

The Traffic Guidance Scheme shall show proposed temporary signing and other traffic control device layouts (including temporary barriers, temporary pavement marking and temporary islands) to a suitable scale and be fully dimensioned and shall generally agree with the construction sequence and other requirements shown elsewhere in the Contract. The Traffic Guidance Scheme shall also state the period for which these are to be in place (time and date) and the person who is responsible for installing, maintaining and removing them. Site access arrangements shall form part of the Traffic Guidance Scheme.

Where the Traffic Guidance Scheme includes changes to regulatory signs or devices, the Contractor shall seek prior approval from the Engineer of such regulatory signs certified by the Nominated Traffic Officer with the Traffic Guidance Scheme.

The Contractor and the Engineer shall cooperate to ensure that the Traffic Guidance Scheme receives the Department's direction with respect to suitability at least 14 days prior to the proposed traffic rearrangement. Failure to comply with this requirement may result in deferring the date for traffic rearrangement so as to ensure sufficient time for public notification is maintained. Such deferment shall not be a cause for an extension of time under the Contract.

No traffic rearrangements shall be carried out until 14 days after the Engineer has advised the Contractor that the relevant Traffic Guidance Scheme has been deemed suitable by the Engineer. Engineer may direct the Contractor to consult with Area Traffic Police Officer and seek approval of the traffic guidance scheme from the officer.

(13) Implementation of Traffic Management Plan

The Contractor shall implement the Traffic Management Plan in accordance with the schedule included in the Plan. The Contractor shall provide details of the Traffic Management Plan or any changes to that Plan to any bodies nominated by the Engineer. The Contractor shall monitor the continued effectiveness of the Traffic Management Plan during the Contract and shall revise and update the Plan where necessary.

The contractor shall carryout construction works on the stretches of less than 5 Km as approved by the engineer and works in adjoining stretches shall be started only after completion of these stretches to the satisfaction of the engineer.

Work zone safety, road safety and inspection of other issues shall be carries out in a pre-specified frequency as agreed with the engineer and safety inspection patrol shall be carried out jointly in presence of engineer's representative, contractor's representatives and invitee representatives of related stakeholders in a frequencies as agreed.

(14) Implementation of Traffic Guidance Scheme

The Contractor shall implement only those traffic management arrangements that have been deemed suitable by the Engineer. Should the Contractor wish to depart from such arrangements, an amended Traffic Guidance Scheme shall be submitted to the Engineer for determination of suitability prior to implementation of any new arrangements.

Prior to any change to existing traffic arrangements, the Contractor shall ensure that the traffic management arrangements conform to the Traffic Guidance Scheme.

In a daily basis, the Contractor shall ensure that all applicable traffic redirection and/or warning measures and safety requirements are implemented prior to proceeding with any relevant work under the Contract.

The Contractor shall monitor the effectiveness of the Traffic Guidance Scheme and revise it in response to incidents and/or traffic disruptions. Details of a Traffic Guidance Scheme shall be provided on request to any other body nominated by the Engineer.

(15) Measurement and Payment

Compliance with Traffic Management Provisions (preparation and implementation of traffic management plan, traffic guidance schemes and traffic control scheme, traffic Marshals etc), including construction and maintenance of temporary road diversion works either in full new land length or using existing roads, irrespective of the length and extent of traffic control measures in such diversions; construction and maintenance of temporary bridge diversions; construction of access roads to bridge construction site; etc. shall be measured and paid on Lump Sum basis as provided in the Bill of Quantities. The contract lump sum rate shall be the full and final compensation for the activities to be carried out by the Contractor as per Clause 112.

The payment of this lump sum item shall be made in four (4) installments. The first installment of 25% of the item rate shall be paid after the completion of 25% of the Contract Works, the second installment of 25% of the item rate shall be paid after the completion of 50% of the Contract Works, the third installment of 25% of the item rate shall be paid after the completion of 75% of the Contract Works and the final installment of 25% of the item rate shall be paid after the completion of the Contract Works.

The rate quoted by the Contractor for this lump sum item shall deem to cover the full contract period including any Extensions of Time (EOT). No additional payment shall be made for the period of Extension of Time (EoT).

104 Survey and Setting Out

Add the following to Sub-clause (6)

"If at any time the Contractor believes that there exists a discrepancy between the location of the works as defined by the setting out and the apparent location of the works as shown in the plans he shall immediately inform the Engineer and request clarification."

Delete Sub-clause (7) and substitute the following:

"Some survey data of the project site is held by the Engineer and this survey data will be made available to the Contractor in digital format. But the existing profile and cross sections shall be checked against the survey data by the Contractor and, should any changes be found necessary in the Survey Traverse Points and Bench Marks, after the procedures required in Sub-clauses (1) & (2) above, the existing data set shall be amended accordingly. Should the Engineer consider that design modifications of the centreline and/or gradient are required or if the Contractor find that the existing survey data set is inadequate or inaccurate in any area of the Works, the Engineer shall issue detailed instructions to the Contractor and the Contractor shall perform the necessary modifications in the field, as required, and modify the cross sections accordingly.

The final survey data set so obtained in combination with the final horizontal and vertical alignment of the road shall form the basis for the measurements and payments. Measurement shall be based on a Digital Terrain Model generated from the agreed survey data set with the final designed road horizontal and vertical alignment and road cross-section, including any widening and super-elevation, applied. The model will be used to generate cross-sections complete with cut and fill data at intervals not exceeding 10 metres in hill areas and 20 metres in Terai areas and other alignment change points as instructed by the Engineer. Measurement of volumes and areas of earthworks and pavement related items, with the Engineer's approval, shall be derived from these cross-sections.

The software currently used for the preparation of survey and design data is SW-Roads developed by Softwel (P) Ltd. of Kathmandu Nepal. Should the Contractor wish to use alternative software he may propose this to the Engineer. He will be required to demonstrate that his proposed alternative is at least as accurate as and is functionally equivalent in all respects to SW-Roads. Should the Engineer agree to the use of alternative software, the Contractor shall be entirely responsible for the adaptation, under the supervision of the Engineer, of all input data to the alternative software requirements and for the training of the Engineer's personnel in the use of the alternative software. In the event that alternative software is approved the Contractor shall supply the Engineer with two, fully licensed, copies of the alternative for the exclusive use of the Engineer."

If required a complete set of Software shall be provided by the Contractor at his own cost for the use of the Engineer in carrying out the checking and approval of the cross sections and quantities.

Delete paragraph (c) of Sub-clause (9) in its entirety.

Add the following at the end of the Clause 104

"The joint survey, including the preparation of the drawings, calculation of the quantities and obtaining the approval from the Engineer shall be carried out by the Contractor within sixty (60) days from the commencement Date."

106 Diversion Bridges

Delete Clause 106 in its entirety and substitute with the following:

Change heading of Clause 106 Diversion Bridges to Clause 106 Construction and Maintenance of Temporary Diversion Bridges as follows:

106 Construction and Maintenance of Temporary Diversion Bridges

Temporary diversion bridges shall be provided by the Contractor at the location of the construction of minor bridges, where the existing bridges are dismantled and new bridges are required to be constructed as shown on the Drawings or instructed by the Engineer. The Contractor is required to prepare Design, Drawing and Specifications of the temporary diversion bridges. He shall submit his

proposal accompanied with sufficient ground and hydraulic information to enable the Engineer to decide on the stability of the structures. The temporary diversion bridge shall be double lane crossing with the all provisions of safety arrangements facilitating free flow of two way traffic during day and night throughout the period till the new constructed bridge is opened for the use. The diversion bridge may consist of series of pipe culvert, Bailey Bridge, slab culvert etc. as per the site conditions and acceptable to the Engineer.

The Contractor shall maintain the temporary bridges in a condition satisfactory to the Engineer so long as required until the completion of the construction of bridges at the river location.

On completion of the construction of bridges, the Contractor shall obtain the approval of the Engineer before removing the temporary bridges. The materials arising from the removal of the temporary diversion bridges shall become the property of the Contractor.

No separate payment shall be made for the construction and maintenance of diversion bridges for the required period. The cost shall deem to be included in the item of compliance with traffic management provisions.

107 Maintenance of the Road

Delete the fourth paragraph of Sub-clause Clause 107 (1) and substitute:

The Contractor shall perform the maintenance works as often as required to keep the carriageway, shoulders, adjoining structures and roadside slopes stable all in proper working order to the satisfaction of the Engineer. The Contractor shall strictly adhere to the stipulations of the latest publication of the document “**Road Maintenance Manual**” published by the Department of Roads.

In the Road stretches where works supervisors and length workers are being engaged by the Department of Roads for the routine maintenance of the Road, the Contractor shall have to engage them under the same terms and conditions regarding the wages and other facilities. However, if their performance of the works is not to the satisfaction, the Contractor will have the option to replace them.

(2) Measurement and Payment

Delete the wording of Sub-clause (2) in its entirety and substitute:

“Maintenance of the existing road during both the construction period and Defect Notification Period shall be paid at the contract unit rate per km-month commencing on the date for the commencement of the works and terminating at the end of the Defect Notification period including any extension of time granted pursuant to the relevant Clause of the Conditions of Contract.

In the event the Contractor fails to perform such maintenance, the Employer shall effect such maintenance works and cost incurred shall be deducted from any payment due under this Contract Item or from any other monies due to the Contractor.

108 Notice Board

Delete the first sentence and replace with the following:

The Contractor shall erect where directed by the Engineer signboards in accordance with Appendix - 8: Project Signboard which shall be protected and maintained up to the end of Defect Notification Period.

Add the following:

Project signboards shall be measured as the number of signboards, satisfactorily provided, installed, maintained throughout the Contract period and subsequently removed.

Payment shall be made at the stated unit rate per signboard. The price shall be full compensation for all materials and labour required to perform the work described.

109 Environmental Protection Works

Delete the second paragraph and substitute:

The Contractor shall take all precautions for safeguarding the environment during the course of construction of the works. He shall abide by all prevailing laws, rules and regulations governing pollution and environmental protection. In particular, the Contractor shall fully comply with the environmental protection mitigation measures specified in the latest version of the project's specific Initial Environmental Examination or Environmental Management Action Plan, as provided by the Engineer. If any activity of the Contractor may cause damage to the environment in ways not envisaged under project-specific documents, then he shall comply with the measures specified in the latest publication of **"Environmental Management Guidelines"** published by the Department of Roads.

Delete the third paragraph and substitute:

The Contractor shall prohibit employees from any use of explosives, poaching of wildlife and cutting of trees or branches. The Contractor shall be responsible for the action of his employees.

(1) Borrow/Quarry Sites

In the first set of bullet points, delete the words "they may be environmentally unsuitable" in point (iii) and substitute:

"they may lead to general environmental or instability problems or may be environmentally unsuitable in any other way"

At the end of Sub-clause (1) add the following:

"Twenty percent (20%) of all payments due to the Contractor in respect of the construction of embankment using borrow material or which are due under any other item of the Bills of Quantities in respect of material won from borrow pits, gravel pits or quarries shall be withheld until the sites of the borrow pits, gravel pits or quarries to which such payments relate have been completely reinstated to the full satisfaction of the Engineer and in accordance with the Specification provisions."

(2) Disposal of Spoil and Construction Waste

Insert additional paragraph to Sub-clause 109 (2) Disposal of Spoil and Construction Waste, between existing first and second paragraphs

Under no circumstances whatsoever shall the Contractor allow spoil from any excavation or cut to fall or be pushed down the slope below. In any situation where this occurs by accident or on purpose, the Contractor shall, at his own cost, remove the debris to a location approved by the Engineer and make good the affected area through appropriate structures and re-vegetation as specified by the Engineer and following guidelines published in the Department of Roads' manual **"Roadside Bio-Engineering"**. Failure in compliance with the Engineer's instruction in respect of spoil disposal will lead to a reduction or with-holding of payment.

Add an additional paragraph after the existing second paragraph

Any construction waste that includes bitumen products, unused cement, fuel, oil or plastics shall be disposed of in a Government-approved or municipal landfill site. If this is not practical then it may be disposed of by burial in a specially excavated pit at a site approved by the Engineer. Land compensation shall be paid by the Contractor for the area occupied by the pit as if for permanent construction. If the land is owned by the Government, then the Contractor must obtain written permission from the appropriate authority for its use in this manner, and must pay any royalties due. The pit shall be located at least 100 metres from any seasonal or permanent water course or spring.

A hole shall be excavated below ground level so that, when the original surface profile is regained through backfilling, the disposed waste is covered by at least two metres of soil. Following the closure of the waste disposal site, the Contractor shall provide any structures necessary to prevent erosion and shall re-vegetate the topsoil with appropriate plants.

(3) Provision and Maintenance of Camps, Offices, Stores, Equipment Yards and Workshops

Replace the first paragraph of the Sub-clause 109 (3) with the following:

The Contractor shall provide and maintain such accommodation and amenities as necessary for all his staff and labour, employed for the purposes of or in connection with the Contract, including all fencing, water supply (both for drinking and other purposes), electricity supply, sanitation, cookhouses and other requirements in connection with such accommodation or amenities. On completion of the Contract, unless otherwise agreed with the Employer, all the temporary camps/housing provided by the Contractor shall be removed and the site(s) reinstated to its (their) original condition, all to the approval of the Engineer.

All accommodation facilities of whatsoever nature provided by the Contractor shall be provided with adequate sewage and wastewater collection and treatment facilities to a design and of a capacity approved by the Engineer. Under no circumstances shall untreated sewage or wastewater be discharged to the natural environment.

(6) Provision of Safety Clothing and Equipment

Insert new Sub-clause 109 (6)

The Contractor shall provide all labourers, supervisors and site staff with suitable basic safety clothing manufactured to an appropriate ISO standard. This shall include but not necessarily be limited to safety helmets and boots. Gloves shall be issued when any form of hazardous material such as cement and bitumen is being handled, and when there is a risk of hand injury, for example when using hammers and chisels. Eye goggles shall be issued when there is a risk of eye injury, such as when using hammers. Breathing masks shall be issued when there are dusty or smoky conditions.

Additional safety equipment is to be provided by the Contractor to all workers and supervising staff in certain sites. In sites with moving traffic or machinery, fluorescent or brightly coloured waistcoats shall be issued. Where workers are required to venture on to slopes steeper than 40 degrees, safety belt, safety clamps, harnesses and safety ropes shall be provided.

All workers and supervisory staff when on any site shall wear the basic safety clothing specified. Where additional safety equipment is required by nature of the site, then all workers and supervisory staff when on any part of that site shall use the additional equipment in addition to the basic safety clothing specified.

The Contractor shall provide a set of safety clothing to all members of the Consultant's supervising staff and keep adequate stock for personnel visiting the project.

In hot weather the Contractor shall provide appropriate lightweight safety equipment, such as cotton gloves in place of rubber gloves and canvas boots in place of rubber boots.

The Contractor shall be responsible for ensuring that all his employees and the employees of any Subcontractor and any visitor to the site comply with the Engineer's requirement to use safety clothing and equipment at all times. Failure in compliance with the Engineer's instruction in respect of safety clothing and equipment may lead to a suspension of works and a reduction or with-holding of payment until the Contractor complies.

(7) Provision of First Aid/Medical Facilities

Renumber existing Sub-clause 109 (6) to 109 (7)

Add the following after last paragraph

The Contractor shall provide information to his workers on methods of avoiding sexually transmitted diseases and infection by HIV/AIDS.

(8) Crushing Plants

Renumber existing Sub-clause 109 (7) to 109 (8)

(9) Hot Mix Plants and Batching Plants

Renumber existing Sub-clause 109 (8) to 109 (9)

(10) Hazardous Materials

Delete entire existing Sub-clause 109 (9) Hazardous Materials (all three paragraphs) and substitute Sub-clause 109 (10) Hazardous Materials

Hazardous materials are defined as cement, lime, bitumen and emulsion, paint, fuels, oils, acid of the battery, pesticides and herbicides. The Contractor may not store hazardous materials within 100 metres of seasonal or permanent water courses or springs. They must be housed in secure weather-proof buildings and protected against attacks by vermin and accidental contact by children. Contaminated runoff from storage areas shall be captured in ditches or ponds with an oil trap at the outlet. Water Quality monitoring shall be carried out as per EMP.

Any worker handling hazardous materials must be appropriately equipped as described in Sub-clause 109 (6) above.

Any hazardous material requiring disposal must be handled as described in Sub-clause 109 (2) above.

Explosives, detonators, blasting powder and fuses are also classed as hazardous materials. The Contractor may only bring explosives on to the site with the specific written permission of the Engineer. In this event, the Contractor is responsible for alerting the appropriate security forces and ensuring that all Government regulations are fully met concerning the transport, storage and use of explosives and associated equipment.

If the Engineer instructs the use of explosives, only controlled methods shall be used as described in Clause 904 Explosives and Blasting.

(11) Air Pollution

Insert new Clause 109 (11)

The Contractor shall avoid creating any high concentration of airborne dust or smoke within 100 metres of a house or other occupied building, or in situations likely to affect people, animals, crops or natural vegetation.

Dust from moving construction plant and road traffic shall be controlled by the regular spraying of water on to road surfaces in Terai and valley bottom sites. In the hill sites, dust control may also be carried out, in addition to regular spraying of water, by the use of speed bumps to restrict traffic speeds to 30 km/h in open ground and 15 km/h within 100 metres of any occupied building. The Contractor is responsible for all water spraying and the erection and maintenance of adequate speed bumps. The Engineer may instruct additional measures at his discretion.

Where earthwork excavations cause dust to blow into areas where it causes a nuisance, the Contractor is responsible for altering the schedule of works to minimise the nuisance. This may involve restricting the timing of work to certain hours of the day or completing works and restoring a dust-free surface as rapidly as possible. The Engineer may instruct additional measures at his discretion. Air quality monitoring shall be carried out as per EMP.

(12) Noise Pollution

Insert new Clause 109 (12)

The Contractor shall take every precaution to control excessive noise resulting in disruption to the local population and to wildlife. All static plant shall be located at least 100 metres from occupied buildings and at least 800 metres from sites deemed by the Engineer to have sensitive wildlife. The Engineer may require the construction of baffles or bunds around noisy plant in order to reduce the pollution caused.

The Contractor shall ensure that no employee plays loud music in any residential camp at any time. Noise level monitoring shall be carried out as per EMP.

(13) Special Provisions for Sensitive Ecology

Add new Clause 109 (13)

In addition to the provisions of other Clauses, the Engineer may require the Contractor to undertake special provisions to protect any plant or animal deemed to be environmentally sensitive or otherwise worthy of unusual protection.

(14) Reinstatement of Environment

Renumber existing Clause 109 (10) to 109 (14)

Add between existing two paragraphs:

The Contractor shall reinstate the environment of areas polluted by the use or spillage of hazardous materials as defined in Sub-clause 109 (10). All such materials and polluted soil will be removed to a safe disposal site as described in Sub-clause 109 (2) Disposal of Spoil and Construction Waste. The site will then be restored and re-vegetated as described above. This provision applies in particular to all areas affected by bitumen.

(15) Measurement and Payment

Renumber existing Clause 109 (11) to 109 (15) Measurement and Payment

Delete the paragraph and substitute with the following:

No separate measurement and payment shall be made for the works described in this Clause except for (a) provision of safety clothing & equipment and first aid/medical facilities and (b) disposal of surplus cut material at environmentally safe tipping sites.

The payment for the provision of safety clothing and equipment and first aid/medical facilities shall be in the unit of month as quoted in BOQ upon providing and maintaining those facilities to the satisfaction of the Engineer. In the event that the Contractor fails to enforce these provisions then monthly payment will not be made for such period until the requirements are met. If the Contractor does not provide them in time as per the Specifications, the Employer may procure by quotation from other sources and deduct from the Contractor's payment as per the quoted price including logistics and transportation costs, if any, for supply at site.

The payment for the disposal of surplus cut material at tipping sites shall be in the unit of cu.m.- km for haulage beyond 1 km to the environmentally safe tipping sites approved by the Engineer and satisfying the provisions of 109 (2). The payment for disposal of spoil shall be made in two instalments. First instalment 70% of the unit rate quoted in the BOQ shall be made after disposal to the site approved by the Engineer. The second instalment of remaining 30% of the unit rate quoted in BOQ shall be made after making good the affected area through appropriate minor structures and re-vegetation as per 109 (2) and to the satisfaction of the Engineer.

The above mentioned payments shall be the full and the final compensation to the contractor as per Clause 112 to complete the works in accordance with these specifications. In the event of failure to implement the above the Engineer may withhold an appropriate sum (as estimated by him) from the Contractor's payment until such time as the work has been carried out to the satisfaction of the Engineer.

111 Supply of Video Cassettes

Add the following at the end of Sub-Clause 111(1)

The video films shall be taken at the locations as instructed by the Engineer and they shall be taken prior to the actual construction, during construction and after the completion of the construction works. The films shall be to the full satisfaction of the Engineer.

112 Notes about Measurement and Payment

In Sub-clause (1) Measurement, delete the whole of the second paragraph and substitute:

The tolerances given in these Specifications are for the evaluation of the accuracy to which work shall be constructed and for determining whether work should be accepted or rejected. The measurement of work done shall be based on the actual measured quantity of acceptable work executed except that, where the actual quantity is greater than the quantity which would have resulted from adherence to the precise designed or instructed dimensions and/or levels then the payable quantity shall be limited to the quantity determined on the basis of calculation using the designed or instructed dimensions and/or levels.

113 National Standards

Add the following:

The Contractor shall provide and/or make available the Standards as shown in the Appendices as and when requested. There shall be no separate payment for the provision of such standards and payment shall be deemed to be included in the Contractor's rates for the provision of the Laboratory. In the event of the failure of the Contractor to provide documents for the required standards the Engineer may purchase the document and deduct the cost from the payment due to the Contractor for the provision of the Laboratory.

Add the following New Clauses after Clause 116 "Programme":

117 Contractor's Establishment on Site

Office, Equipment Yard, workshops, stores etc.

It is the Contractor's responsibility to acquire land for the siting of all his offices, accommodation, stores, testing facilities, equipment yards and workshops and for all temporary works and for the reinstatement of such land on completion of the Contract to the satisfaction of the owners and of the Engineer. The Contractor shall obtain the approval of the Engineer for the siting of offices, accommodation, stores, testing facilities, equipment yards and workshops before such land is acquired and he shall indemnify the Employer against all claims and charges in respect of the occupation, use and reinstatement of the land.

The Contractor is solely responsible for the satisfactory accommodation of all his employees and for complying with all regulations and requirements in this respect.

118 Legal Relations and Responsibility to the Public

The Contractor shall take the steps necessary to comply with the terms of the Conditions of Contract, particularly in respect of the insurances and indemnities required, and he shall comply with all regulations of statutory authorities.

119 Provision of Insurances and Securities

The Contractor shall provide all necessary Insurances, Guarantees and Securities as are required and detailed in the Conditions of Contract, Bill of Quantities or this Specification.

Measurement and payment for Insurances under the Contractor's All Risks (CAR) policy shall be made on Lump Sum basis as provided in the Bill of Quantities in the following sub-headings of the Bill of Quantities:

- (a) Insurance cover for Works, Plant and Materials and the Contractor's Equipment
- (b) Insurance cover for third party property and persons.

The lump sum price for Insurance under the Contractor's All Risks (CAR) policy includes all expenditures expected in providing and maintaining from Date of Commencement until the end of the Defect Notification Period an insurance of Works, Plant and Materials, the Contractor's Equipment, third party properties and personal injury or death as prescribed in the Contract document, including expenditures resulting from administration work, dealing with and reporting of claims, stamps duties, taxes, etc.

The Contractor shall also require providing insurance of his personnel, employees and labours as prescribed in the Contract document. No separate payment shall be made for the insurance of his personnel, employees and labours and are deemed included in other items of the Bill of Quantities.

No separate payment shall be made for Bank Guarantees and Securities that are required as per the Contract. The costing of such Guarantees and Securities are deemed included in other items of the Bill of Quantities.

In case of any damages to the works for which payment has been made by the Employer, it is the Contractor's obligation to reconstruct the same and claim for the payment from the insurance companies. No payment for the reconstruction of the damaged works shall be made by the Employer.

Measurement of the lump sum payment for item of the Insurance for Contractors All Risk Policy (CAR) shall be made to the Contractor under the relevant items in the Bill of Quantities upon the submission of the acceptable Performance Bond and the insurance policies with the proof of payment of insurance premiums to the insurance company from the date of commencement to the end of Defect Notification Period and after approval by the Engineer.

The payment of the quoted lump sum amount for the provision of insurance shall be made after the Contractor submits and obtains approval from the Engineer of the required insurance policies for the period covering from the date of Commencement to the end of Defect Notification Period and the submission of the proof of the payment of premiums for that period.

The payment shall be made in two installments. First installment 70% of the unit rate quoted in the BOQ shall be made after the approval of the insurance policies by the Engineer. The second installment of remaining 30% of the unit rate quoted in BOQ shall be made at the Completion of the Contract.

The rate quoted by the Contractor for these lump sum items shall deem to cover the full contract period including any Extensions of Time (EOT) as well as Defect Notification Period. No additional payment shall be made for the period of any Extension of Time (EoT).

120 Extension of Time due to Abnormal Rainfall

Extension of time due to exceptionally adverse climatic conditions as referred to in the relevant Clause of the General Conditions of Contract shall be considered only in respect of the number of days lost during each month which are in excess of the number of working days on which delays might reasonably be expected having due regard to the time of year. The Contractor shall, therefore, make due allowance in his rates for the loss of the following number of working days for each month due to the effects of rainfall as detailed below:

Month	Number of Days	Remarks
January	4	
February	4	
March	4	
April	6	
May	12	
June	20	
July	25	
August	25	
September	15	
October	5	
November	4	
December	4	

The number of days considered for Extension of Time shall be based on the full number of "rain days" occurring during the month less the number of days required to be allowed for the month as detailed above. "Rain days" shall be defined as those days on which the rainfall during the full 24 hour day exceeds 10mm and on which the Contractor is prevented from working on site for the furtherance of the major Works due solely to conditions caused by inclement weather.

The total number of days for extension of time shall be calculated on a month by month basis. Carrying over of days "not used" from one month to the next is not permitted.

For the proper application of this Clause the Contractor shall establish rain gauging stations to a design and using automatic equipment approved by the Engineer. Such stations shall be spaced along the site at intervals not exceeding 10kilometres. In the event of failure to establish such approved rain gauging stations no "rain days" will be measured and no requests for Extension of Time on the basis of inclement weather will be considered.

121 Labour Standards

The Contractor shall abide by international standards in his treatment of workers. There shall be no discrimination between individuals on the basis of race, sex, caste or belief.

(1) Rates of Wages

The Contractor shall pay rates of wages not less favourable than those approved by the Government for the various classes of labour engaged in the same district. All payments shall be in cash unless employees request, in writing, payment by cheque or other negotiable financial instrument. Payment in kind or through trade goods of any sort is prohibited. Food rations, accommodation, or any other allowances will be over and above cash wages complying with the minimum levels described. Men and women shall receive equal rates of pay for the particular grade of work, trade or skill for which they are employed.

(2) Payment of Wages

The Contractor shall pay his employees promptly and regularly at intervals of no more than two weeks, and all employees shall be paid in full and up to date before the issue of the Engineer's Maintenance Certificate.

(3) Records

The Contractor shall keep proper records of the days, dates and hours worked by every employee engaged on the contract, their gender, the class of work in which employed, whether as a casual or permanent employee, and the wages (and allowances if any), paid. These records shall be made available at any time for inspection by the Engineer or the Engineer's representative or any authorised representative of the Government.

(4) Default of Payment of Wages

In the event of default in payment of wages to petty contractors, local labour groups or any worker employed on the contract, by the Contractor or his Subcontractor, and, if a claim with satisfactory proof thereof is received by the Engineer, then the Employer may make the payment upon recommendation by the Engineer of such a claim out of the monies at any time payable under the contract, and the amount so paid shall be deemed payments to the Contractor under the Contract.

122 Safety Provisions

(1) Scope

This Clause covers the requirements to be met by the Contractor in relation to the safety provisions at construction sites which include workplace health and safety of the workers, all road users (drivers, passengers, pedestrians) and members of the community along the road corridors.

(2) Emergency Response Plan

An emergency response plan to deal with accidents and emergencies, including environmental/public health emergencies associated with hazardous material spills and similar events, shall be prepared for the approval of the Engineer.

(3) First Aid Base

A fully equipped first aid base shall be climatically controlled to maintain the temperature of the inside of the building at 20 degrees Celsius. Arrangements for emergency medical services shall be made to the satisfaction of the Engineer.

(4) On-Site Safety Publicity

The Contractor shall ensure that safety, rescue and industrial health matters are given a high degree of publicity to all persons regularly or occasionally on the site. Posters, in Nepali and English, drawing attention to site safety, rescue and industrial health regulations shall be made or obtained from the appropriate sources and shall be displayed prominently in relevant areas of the site.

(5) Safety Training Program

A Safety Training Program is required and shall consist of:

- (a) Initial Safety Induction Courses: All workmen shall be required to attend a safety induction course within their first week on site.
- (b) Periodic Safety Training Courses: Periodic safety course shall be conducted not less than once every six months. All Contractor employees will be required to participate in relevant training courses appropriate to the nature, scale and duration of the contract works. Training courses for all workmen on the Site and at all levels of supervision and management.
- (c) Safety Meetings: Regular Safety meetings will be conducted on a monthly basis and shall require attendance by the Engineer and safety representatives of Contractors unless otherwise agreed

by the Engineer. The minutes of all safety meetings will be taken and sent to the Engineer within seven (7) days of the meeting.

- (d) Safety Inspections: The Contractor shall regularly inspect, test and maintain all safety equipment, scaffolds, guardrails, working platforms, hoists, ladders and other means of access, lifting, lighting, signing and guarding equipment. Lights and signs shall be kept clear of obstructions and legible to read. Equipment which is damaged, dirty, incorrectly positioned or not in working order, shall be repaired or replaced immediately.

(6) Safety Equipment and Clothing

Safety equipment, materials and protective clothing are required to be available on the site at all times and measures for the effective enforcement of proper utilization and necessary replacement of such equipment and clothing, and all construction plant and equipment used on or around the site shall be fitted with appropriate safety devices. These shall include but not be limited to:

- Effective safety catches for crane hooks and other lifting devices;
- Functioning automatic warning devices and, where applicable, an up-to-date test certificate, for cranes and hoists;
- Functioning beeping devices in all trucks and other equipment while reversing as well as operating flashing lights attached to all equipment while in motion.

(7) Requirements for Contractors' Safety Plans

The Contractor will be supplied with copies of the Environmental Management Plan (EMP) prepared by the Engineer. Provisions shall be incorporated by the contractor into all sub-contracts to ensure the compliance with the EMP at all tiers of the sub-contracting. All subcontractors shall be required to appoint a safety representative who shall be available on the site throughout the operational period of the respective sub-contract unless the Engineer's approval to the contrary is given in writing. In the event of the Engineer's approval being given, the safety representative, without prejudice to his other duties and responsibilities, shall ensure, as far as is practically possible, that employees of subcontractors are conversant with appropriate parts of the EMP.

(8) Temporary Evacuations

In the event that temporary evacuations are required due to safety or other considerations appropriate compensation will be provided to all workers.

(9) Measurement and Payment

Unless specified in the contract, no separate payment shall be made for compliance with these Safety Provisions and the costs for compliance shall be deemed to be included in the rates of the relevant Bill of Quantity items.

123 Shop Drawings of Intersections

(1) Scope

This Section covers the requirements to be met by the Contractor in relation to the survey, design, detailed layout of civil works, traffic signs and road marking of the intersections along the contract road corridors. The scope also includes the preparation of construction works traffic management plans which include management of regular traffic on existing main and side roads and management of construction traffic and traffic control and guidance schemes in order to ensure safe and acceptable level of vehicular and pedestrian traffic operation around the subject intersection and adjoin sections of roads.

A set of typical layout plans of various types of intersections are included in the drawings. The scope of this Section is to customize these typical designs to each site and produce shop drawings (plans, profile, cross sections, details, layout of traffic signs, road markings) and submit it to the Engineer for approval prior to the construction of intersection related works commence.

(2) Land Survey

The contractor shall carry out detailed topographical survey of the intersection sites showing all manmade and physical features. The survey will cover enough area required to determine all necessary elements that may have effect in the design of intersections. The survey map will also show all overhead, at grade and underground utility services and both permanent and temporary roads/ walkways.

The survey plan shall be produced at 1:500 scale with contour interval of 0.5 m or as instructed by the Engineer. Where manmade drains exist, invert levels will be shown and drainage line shown clearly on the plan.

(3) Traffic Survey

Before the commencement of construction, Contractor shall undertake 12 hours (commencing 06:00 hrs and ending 18:00 hrs) turning movement traffic counts at all intersections identified in the plans in the manner prescribed by the Engineer. Traffic counts shall be done by pedestrians, cycles/rickshaws, motorcycles, three wheeler, cars (sedan, jeep, microbus), buses (mini and conventional) and all kinds of trucks (mini tippers, conventional trucks) and reported for the period ending each 15 min.

Turning movement diagrams shall be plotted by the contractor separately for the AM and PM peak hours. Where peak hours are not distinct, contractor shall seek advice from the Engineer and turning movement diagrams for hours ending specified period shall be presented together with the tabular data of turning movements. Engineer may supply to the contractor samples of the Traffic Count Table and Diagrams for guidance. Two sets of tables and diagrams (one with type of vehicles and other with Equivalent Passenger Car Units (for vehicles) shall be produced and submitted to the Engineer for reference, record and approval.

(4) Drawings

Using the type designs of the intersections (three way median open, three way median closed, four way median open, four way median closed at sections with and without service roads for four laning sections), the contractor shall prepare shop drawings of each intersection and submit to the Engineer for review and approval. Shop drawings of four way or three way intersections with Basic Right (BAR) Turn or Basic Left (BAL) Turn or both treatments to be constructed along two lane sections of road without service roads shall also be prepared by the contractor and submitted to the Engineer for review and approval.

Shop drawings shall be prepared using appropriate CAD software. Hand sketches shall not be accepted. Four colour copies shall be submitted to the Engineer for review and approval at least 21 days prior to the date the contractor wish to commence work at the intersection site. The contractor shall not be allowed to execute any works at intersections without getting approval from the Engineer.

Shop drawings shall include but are not limited to

- Layout Plans (1:500 or larger as directed) showing all lines and levels as required to enable lay out of the intersection at site accurately
- At least nine cross sections (for three way intersections) and twelve cross sections (for four way intersections);
- Traffic Signs and road marking layout plans (separate to the lay out plans showing civil works/ electrical works);
- Profile / Longitudinal section of each leg (for a length of 40 m for each leg of side roads and 200 m along each leg from the centre of intersections);
- Any other details requested by the Engineer; and
- Traffic Management Plan as per the provision of Section 102

A set of drawings together with the traffic count tables and turning movement diagrams shall be signed and sent back to the Contractor for use in the construction site within one week of the receipt of the same from the contractor. All shop drawings shall be to the satisfaction of Engineer.

(5) Measurement and Payment

No separate measurement and payment for the activities required and the preparation of shop drawings at intersections shall be made. The cost for the required activities and preparation of shop drawings of intersections shall be deemed to be completely covered by the respective items of work relevant to the construction of intersections.

124 Diversion of River Flow at Major Bridge Construction Site

This Clause covers the diversion of river flow, pumping of water and construction of coffer dams and other activities including the machines and accessories necessary only at those sites where the major bridges are constructed. It shall also include the reinstatement of the original flow of the river after the completion of the bridge construction works.

The diversion of river flow at major bridge construction site shall be measured in number (nr) as a lump sum item for each construction site of major bridge. The quantity measured in number (nr) as a lump sum item shall cover all the activities required for the diversion of river flow, pumping of water and construction of coffer dams, reinstatement of the original flow of the river after the completion of the bridge construction works and other activities including the machines and accessories necessary only at those sites where the major bridges are constructed.

The diversion of river flow at major bridge construction site shall be paid at its respective contract unit rate which shall be full and the final compensation to the Contractor as per Clause 112 and for the cost of all activities involved for satisfactory completion of this item.

FOR REFERENCE ONLY

Section 200 – Site Clearance

201 Clearing and Grubbing

(3) Execution of Work

(c) Cutting of Trees

Delete the last line of third paragraph and replace with the following:

Cutting of such trees shall be carried out by the Contractor and the timber and woods stored at designated locations as instructed by the Engineer. The Contractor shall make all necessary measures to prevent theft/loss of the timber or woods as directed by the Engineer.

(5) Payment

At the end of this Sub-clause add the following:

No payment shall be made for clearing and grubbing carried out at the sites for quarries or borrows pits, Contractor's facilities, Employer's facilities or any other area other than those areas specifically directed to be cleared and grubbed by the Engineer for the execution of the permanent works.

At the end of Clause 201 add the following additional Sub-clause:

(6) Clearing of Landslides and Debris

When instructed by the Engineer, the Contractor shall remove all debris from landslides as soon as possible after receiving instruction. The first priority will be the removal of material to maintain safe vehicular access for the public and the second to remove material in order to continue construction of the Works. The Engineer shall determine the amount of material to be removed and/or any further work which may be required to stabilise the landslide.

Where a landslide has occurred in an area where the Contractor has commenced but not completed excavation works of any nature and such excavation works have, in the opinion of the Engineer, been the direct or indirect cause of the landslide, then the responsibility for clearing and stabilising the landslide shall rest entirely with the Contractor. Elsewhere the volume of material directed to be removed shall be measured in cubic meter.

The Contractor shall remove all debris from causeways, culverts and side drains as per the instruction of Engineer.

Landslides and debris removed as per this Specification shall be measured in cubic meter. Debris clearance from causeways, culverts and side drains shall be measured for one time only at the starting of the Contract. Afterwards, debris clearance shall be covered by the Routine Maintenance.

Payment for clearing of landslides and debris shall be paid at their respective contract unit rates which shall be full and final compensation to the Contractor as per Clause 112. No payment shall be made for the clearing of landslides and debris of less than 20 cubic metres nor for the first 20 cubic metres in any one occurrence.

202 Dismantling Culverts, Bridges, Other Structures and Pavements

(1) Scope

At the end of this Sub-clause add:

The Engineer shall designate all materials arising from dismantling as:

- (a) Scrap to be disposed of by the Contractor, or
- (b) Salvageable material to be reused in the Works, or
- (c) Salvageable material to be retained by the Employer

(2) General Para (d)

In the third line after the Words “reconstructed work” delete the comma and insert the words “and which”

(6) Measurement

Delete “(i) Dismantling brick/stone masonry/concrete (plain and reinforced)” and substitute:

(i) Dismantling brick and stone masonry

Add

(x) Dismantling concrete (plain and reinforced) cu.m

Delete “(iv) Dismantling timber structures cu.m” and substitute:

(iv) Dismantling timber structures lump sum

Delete “(viii) Dismantling pipe culverts no.” and substitute:

(viii) Dismantling pipe culverts m.

(7) Payment

At the end of this paragraph add the following words:

This payment shall include for all costs of disposing of scrap materials, for all costs of reusing salvageable materials designated for reuse in the works and for all costs of transporting and stacking salvageable materials to be retained by the Employer in locations directed by the Engineer.

All scrap materials shall be disposed of in an environmentally sound manner approved by the Engineer which shall ensure that the existing environment is maintained free of all forms of contamination, including visual contamination, arising from the disposal of such materials.

Add New Sub-clause (8) as follows:

(8) Use of Construction Material from Dismantling of Existing Structures

It is envisaged that some reusable construction materials might be obtained from the dismantling of the existing structures in the project road. The Contractor shall be permitted using those construction materials if they meet the standards provisioned in these Specifications. The Contractor is advised to assess the suitability and quote his price accordingly taking into consideration of using those reusable materials from the dismantled structures.

Add New Clause 203 “Clearing and Grubbing at Major Bridge Construction Site” as follows:

203 Clearing and Grubbing at Major Bridge Construction Site

This Clause covers the clearing and grubbing necessary for the sites where the elements of major bridges are constructed and/or fabricated. This shall be as per the Clause 201.

The clearing and grubbing at major bridge construction site shall be measured in number (nr) as a lump sum item for each construction site of major bridge. The quantity measured in number (nr) as a lump sum item shall cover all the activities required in clearing and grubbing the construction and/or

fabrication sites either in the river or outside river for all the required elements of the bridge, except for the cutting and related activities of the trees of girth above 300 mm. It shall also include the clearance and reinstatement of the site to the original condition after the completion of bridge construction works.

The clearing and grubbing at major bridge construction site shall be paid at its respective contract unit rate which shall be full and the final compensation to the Contractor as per Clause 112 and for the cost of all activities involved for satisfactory completion of this item.

FOR REFERENCE ONLY

Section 500 – Quality Control

502 Contractor Responsible for the Quality of the Works

Delete the final two sentences of the second paragraph and substitute with the following:

This laboratory shall be for the use of the Engineer and his staff as well as for that of the Contractor. The Engineer shall at all times have free access to the laboratory, the equipment and all records of testing carried out and shall have the use of the Contractor's laboratory staff as he may require for carrying out of additional testing for the purposes of control, verification and acceptance. The laboratory facilities to be provided and the list of equipment to be purchased shall be approved by the Engineer. In designing the facilities and compiling the list of equipment the Contractor shall have due regard to the details of facilities and list of equipment given in the Appendices to these Special provisions. The details given in the Appendices are indicative of minimum requirements. In equipping the laboratory the Contractor shall make assure in meeting the need of conducting all tests required by the Specifications in regard of the works or materials itemised or implied in the drawings and the Bills of Quantities. Notwithstanding the list of equipment, furniture and other requirements in the Appendices, the Contractor shall remain responsible for the supply of all equipment of whatsoever nature and in whatsoever quantity required for carrying out all types of tests in the frequencies specified in the Specifications.

505 Testing Procedure and Set of Tests

Delete the final words of the second paragraph commencing "as per the prevalent accepted" and substitute with:

"In accordance with National Specifications stipulated by the Engineer. If no National Specifications acceptable to the Engineer exist then tests shall be carried out in accordance with the directions of the Engineer."

507 Site Trials or Trials Sections

(3) Production of Materials and Crushing Plant

In the second line of the first paragraph of this Sub-clause; after the words "to be processed using...." Insert the following:

"the initial material collection procedures,"

510 Recapitulative Schedule of Tests

Add the following after the second paragraph of the Sub-clause ending with the words "main types of works".

"The testing frequencies set forth are desirable minimums and the Engineer shall have the full authority to carry out additional tests as frequently as he may deem necessary to satisfy himself that the material and works comply with these Specifications".

511 Laboratory

*Delete this Clause and refer to **Clause 101.03** above.*

Section 600 – Materials and Testing of Materials

603 Sources of Materials

Add the following at the end of the last paragraph of this Clause:

“These provisions regarding delivery and haulage shall not apply to any material salvaged from the site of the works and the Contractor shall be entirely responsible for all haulage and costs of haulage of such salvaged material.”

604 Inspection and Acceptance of Materials

Delete the second and third paragraphs of this Clause and substitute with the following:

“A preliminary inspection of the materials may be made at the source for the convenience and accommodation of the Contractor, but neither the presence of the Engineer nor the subsequent testing of work or materials by the Engineer shall relieve the Contractor of his responsibility for furnishing work and materials complying with these Specifications.

The representative of the Engineer shall have free entry at all times to those parts of any plant which concern production of any materials for incorporation into the Works and the Contractor shall ensure that any order for materials which he places includes the necessary provisions to ensure that such free entry is available.”

613 Stone, Aggregate, Sand and Fillers

Amend Table 6.5: Tests Procedures Applicable to Stone Aggregate and Fillers as follows:

Renumber iii) Flakiness Index to read iii) a. Flakiness Test

Add iii) b. Flat and Elongated Particles for AC ASTM D4791

Add
xxi) Fine Aggregate Angularity AASHTO T 304 Method A

xxii) Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregates (CAFF) ASTM D 5823

618 Bituminous Binders

(1) Sampling and Samples

Change heading (1) Sampling and Samples to (1) Sampling, Samples and Bitumen Grade

(1) Sampling, Samples and Bitumen Grade

Add after the first line of the first paragraph to read:

Sampling of Viscosity Grade Bitumen VG 10, 20, 30 or 40 as applicable shall be in accordance to IS 1201.

Add at the end of second paragraph the following:

The bitumen grade for preparing cut backs for priming, tack coat and surface dressing works shall be with 80/100 penetration grade. Similarly, the bitumen for all Asphalt Concrete works shall be with 60/70 penetration grade or VG 30 or VG 40 as indicated in the Bill of Quantities or as instructed by the Engineer.

(2) Standard Methods of Testing

(a) Straight-run Bitumen

Add the following words after the end of the opening sentence:

“and any other tests required to confirm compliance with the requirements of Table 6.14.”

(3) Requirements

(a) Straight-run Bitumen

Delete Table 6.14 and replace with the Table and notes below:

Table 6.14: Specification for Straight run Bitumen

Grade			60-70	80-100	180-200
Mandatory Properties		Test Method			
1	Penetration at 25 deg C in mm/10 range	AASHTO T49	60-70	80-100	180-200
2a	Softening Point deg C range	AASHTO T53	49-53.5	46-52.5	38-42.5
2b	Softening Point deg C range	ASTM D36	44-54	41-51	33-42
3a	Either Wax Content (DIN Method)	prEN12606	<2.2%	<2.2%	<2.2%
3b	or Dynamic Viscosity at 60 deg C Pa.s minimum		145	90	30
4	Flash Point (Cleveland) deg C	AASHTO T48	>230	>230	>220
5	Solubility in trichloroethylene % minimum	AASHTO T44	99%	99%	99%
Retained Properties after RTFOT		AASHTO T240			
6	Penetration minimum % of original	AASHTO T49	50%	46%	37%
7	Softening point deg C	AASHTO T53	44-54	41-51	33-42
Optional Properties					
1a	Either Dynamic Viscosity at 135 deg C Pa.s minimum		0.295	0.23	0.135
	or Kinematic Viscosity at 135 deg C mm ² /s minimum		295	230	135
1b					
2	Ductility at 25deg C (5 cm/minute) minimum cm.	AASHTO T 51	100	100	100
Retained Properties after RTFOT					
4	Increase in Softening Point deg C maximum	AASHTO T53	9	9	11
5	Ductility at 25deg C (5 cm/minute) minimum cm.	AASHTO T 51	50	70	100
6	Change of mass % maximum +/-		0.50%	0.80%	0.80%

- Notes:
1. Softening Point is specified using the AASHTO method. This does not stir the heating medium during the test and results in softening point temperatures approximately 1.5 deg C higher than would result from using IP, EN or BS tests where stirring takes place
 2. No test method is given for viscosity. Kinematic viscosity at 60 and 135 deg C can, in theory, be measured using Capillary viscometers, AASHTO test method T201. However, in practice only T 202 (dynamic viscosity by vacuum capillary) is suitable for penetration grade bitumen at 60 deg C.
 3. More conveniently, dynamic viscosity can be measured using a rotating spindle type mechanical viscometer; e.g. Brookfield viscometer.
 4. Note that for bitumen acceptance purposes dynamic and kinematic viscosity may be equated. 1Pa.s = 1000 mm²/s

Add the Table 6.14 (a) after Table 6.14 and its notes for Viscosity Grade (VG) paving bitumen:

Table 6.14(b): Specification for Viscosity Grade Paving Bitumen

S No.	Characteristics	Paving Grades				Method of Test
		VG 10	VG 20	VG 30	VG 40	Ref to
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Penetration at 25°C, 100 g, 5 s, 0.1 mm, Min	80	60	45	35	NS: 221:2047 (Part III)/ IS: 1203
ii)	Absolute viscosity at 60°C, Poises	800-1200	1600-2400	2400-3600	3200-4800	NS: 237:2050 (Part VIII)/ IS: 1206 -2
iii)	Kinematic viscosity at 135°C, cSt, Min	250	300	350	400	NS: 237:2050 (Part VIII)/ IS: 1206-3
iv)	Flash point (Cleveland open cup), °C, Min	220	220	220	220	NS: 237:2049 (Part VII)/ IS: 1448-69
v)	Solubility in trichloroethylene, percent, Min	99	99	99	99	NS: 221:2047 (Part IV)/IS: 1216
vi)	Softening point (R&B), °C, Min	40	45	47	50	NS / IS: 1205.
vii)	Tests on residue from rolling thin film oven test:	Mass loss less than 1%	Mass loss less than 1%	Mass loss less than 1%	Mass loss less than 1%	AASHTO T 51
a)	Viscosity ratio at 60°C, Max	4	4	4	4	NS: 221:2046 (Part II)/ IS: 1206-2
b)	Ductility at 25°C, cm, Min	75	50	40	25	NS: 221:2046 (Part I)/ IS: 1208

Section 700 – Pipe Drains, Pipe Culverts and Concrete Channels

702 Concrete Channeling

In the heading of this Clause after the word "Concrete" add the words "and Stone Masonry"

In Sub-clause (1) Scope after the word "concrete" add the words "and stone masonry"

At the end of Sub-clause (2) Materials add the following additional paragraph:

"Channels may also be constructed of masonry where directed or shown on the drawings. Masonry channels shall be fitted with precast concrete cover slabs where directed or shown on the drawings."

In Sub-clause (3) Construction (a) Excavation and Bedding after the word "concrete" in the penultimate line add the words "or stone masonry".

At the end of Sub-clause (3) Construction add the following additional item:

(d) Stone Masonry Channels

"Stone masonry channels shall be constructed in accordance with the lines levels and dimensions for the various types of channel shown on the drawings.

They shall be constructed throughout of Random Rubble Stone Masonry set in sand cement mortar having a minimum strength of 5.0 MPa and the stone/mortar matrix shall be complete and solid throughout the whole of the structure.

The joints in the exposed faces of the channels shall be carefully pointed up to provide a neat, well-sealed surface.

Where the channel type requires the provision of a reinforced concrete cover slab these shall be manufactured in an approved casting yard in accordance with the details in the drawings or as directed by the Engineer. The upper surfaces of the channel walls where these are required to carry cover slabs shall be carefully dressed and mortared to provide a smooth, strong, accurate bearing surface."

At the end of Sub-clause (5) Measurement add the following sentence:

"Excavation for channels at or near the road edge shall be classified as general roadway excavation and shall be paid as either excavation to spoil or as formation of embankment as appropriate. In the event that channels are directed to be constructed more than 5 meters from the back of the shoulder, excavation for channels shall be paid as excavation for structures."

Section 900 – Earthworks

902 Definitions and General Requirements

Delete the final sentence of Sub-clause (8). At the end of the first sentence of Sub-clause (8) add the following:

“The surveyed points thus obtained shall be used to correct or augment the existing survey data referred to in Clause 104 above.”

903 Classification of Excavated Materials

This Clause shall be read as follows:

The classification of the excavated material shall be made in three categories and they are:

- Common Material:- The materials described in Clause 903(1), 903(2) and 903(3) shall be considered as Common Materials
- Hard Rock;- Material as described in Clause 903(4)
- Hard Rock (Blasting Prohibited): Material as described in Clause 903(5).

907 Excavation for Foundation

The title can be read as to “Excavation for Structure”

Add at the end of Sub-Clause (1):

The materials are classified as follows to excavation for structures:

- i. Common Material

Common material shall comprise all excavation that is not classified as Hard Rock.

- ii Hard Rock

Hard Rock material shall consist of excavation of material that in the opinion of the Engineer requires drilling and blasting with explosives for its removal or continuous chipping with pneumatic tools. The removal of any existing structures above existing ground level whose stone sizes are greater than one quarter of a cubic meter or are constructed of plain or reinforced concrete shall be considered as Hard Rock and paid for as such.

909 Forming of Embankment and Other Areas of Fill

Add the following additional Sub-clause:

“(11) All materials which are deposited in place prior to compaction shall be evenly spread over the whole of the designated area for the layer concerned and in such quantity that the thickness of any one layer, when measured after compaction, shall comply with the requirements specified.

Any new layer less than 75 mm in compacted thickness shall be bonded to the previous layer by scarifying the previous layer to a depth not less than 25 mm or to such greater depth so that the total compacted thickness of the new layer plus the scarified portion of the previous layer will not be less than 100 mm.”

917 Measurement

Delete the first, second and third sentences of first paragraph of Sub-clause (4) and substitute the following:

"Lead and lift of excavated materials for disposal within 1 km length and any lift shall not be measured for payment. They are deemed to be included in the quoted rates for earthworks operations, but lead beyond 1 km shall be measured and paid at quoted rate for haul of cubic meter irrespective of haulage distance."

Delete the Second and third paragraphs of Sub-clause 4.

918 Payment

At the end of Sub-clause (1) add the following:

The payment for earthwork excavation shall be made in two (2) instalments. First instalment 60% of the unit rate quoted in the Bill of Quantities shall be made after carrying out excavation works. The second instalment of remaining 40% of the unit rate quoted in the Bill of Quantities shall be made after haulage of the material at the locations approved by the Engineer.

Add new Clause 919 "Catchwater Drains" as follows:

919 Catchwater Drains

"Where directed by the Engineer the Contractor shall excavate catchwater drains to intercept water flowing towards the road alignment and divert it to the nearest watercourse or culvert. Catchwater drains shall be of the size directed.

Unless directed to the contrary catchwater drains shall be unlined.

Where instructed by the engineer catchwater drains shall be lined with dry stone masonry or with mortared stone masonry as directed.

Where catchwater drains fall outside the limits of the general works of cut and fill i.e. beyond 5 m from the back of shoulders they shall be paid for as excavation for structure at the unit rate per cu.m. of including the volume required to be excavated for any lining, under the relevant item in the Bill of Quantities.

Where catchwater drains are directed to be lined the lining shall be paid for as dry stone masonry or mortared stone masonry as appropriate under the items for such work in the bills of quantities."

Add new Clause 920 "Excavation of Existing Road" as follows:

920 Excavation of Existing Road

"Excavation of existing road shall be carried out in accordance with these Specifications. Payment shall be for the volume excavated paid under a single item and shall include all costs of setting aside re-useable material and of disposing of surplus material. Costs of reusing material set aside as sub-base or capping layer shall be deemed to be included in the rates for those items."

Section 1000 – Subgrades

1002 Definitions

(3) Capping Layer

Delete the definition and replace with:

Capping layers (also known as selected fill or selected or improved subgrade) are layers of specified materials laid and compacted generally over weaker materials either to aid the passage of construction traffic or to improve the condition of the layer immediately below the subbase or base layer. Such improvements may be made through the addition of imported material or by the mechanical or chemical stabilisation of the existing material.

1003 Preparation and Surface Treatment of Formation

In the opening paragraph delete the words of the first sentence following “the sub-base or....” to the end of the sentence and replace with “any embankment or pavement layer”.

Add the following immediately after the opening paragraph:

“Preparation of formation shall also apply to the preparation of the base of embankment and shall include scarification, spreading and compaction of material across the full width of the layer or area. Such preparation shall not be measured twice at any one location.

If instructed by the Engineer, any processing of in-situ material that meets the Specification for subgrade will include scarification to a depth not less than 150 mm or to a depth as agreed with the Engineer, watering, shaping and compaction of the material. Measurement and payment for this processing shall be for the cubic metre of material so processed in accordance with the provisions in this sub-section. In this case the measurement for preparation of formation shall be deemed to be included in the rate for the provision of the layer concerned and no separate payment for preparation of formation will be made.”

(1) Formation of Loose Untreated Materials

In the first sentence delete the words “particles larger than 60 mm” and replace with “particles larger than 75 mm”.

Add the following after the first paragraph:

The Contractor shall arrange the provision of materials for embankment construction such that out of the suitable material, better quality materials are reserved for the subgrade and lesser quality materials are used in other embankment layers.

In the second paragraph delete the words “in the layers of 150 mm compacted depth” and replace with

“in layers not exceeding 150 mm compacted depth. Greater thicknesses of layer may be compacted provided the contractor can demonstrate that the required compaction throughout the whole layer may be obtained with the proposed equipment.

Add after first sentence in the second paragraph ending with words “150 mm compacted depth” the following:

Where the new formation is to abut an existing embankment as part of road widening, the Contractor shall ensure that any new layer of fill shall be benched into the old embankment for formation in a manner that comply with Clause 912 of these Specifications.

At the end of Clause 1003 add the following additional Sub-clauses:

(7) Widening to Embankment and Use of Existing Pavement Material

Widening of the road embankment, where required, shall proceed from the formation in the following manner:

- a) Scarify the existing sub-grade up to a depth of 300 mm and recompact it as described in Sub-clause 1003 (1).
- b) If the sub-grade is very weak, the sub-grade shall be strengthened by capping layer (Clause 1004) or by blending the scarified sub-grade material with granular material pursuant to Clause 1002 (5) Mechanical Stabilization as per the instruction of the Engineer.
- c) The mechanical stabilization with granular material shall be to ensure a minimum CBR of 5.

No separate payment shall be made for works carried out under Sub-clause 1003 (7) (a). Measurement for the subgrade layer shall be in accordance with the relevant Clauses of the Specification. Providing and laying of capping layer shall be measured and paid as per Clause 1004.

Providing, blending and laying of granular material for mechanical stabilization of sub-grade pursuant to Sub-clause 1003 (7) (b) and (c) will be measured in cubic meter and paid for granular material only.

The contractor may use existing pavement material for the construction of the road pavement layers providing the material so used meets the required Specification for the layer in which the material is used. When this material is used it shall be spread across the full width of the layer. No separate measurement or payment shall be made for this operation.

(8) Scarifying Existing Pavement Surface, Adding Sub-base Material, Re-profiling and Compacting

The Contractor shall scarify the existing pavement surface with appropriate equipment and re-profile and compact it pursuant to preceding Sub-clause (7) using scarified sub-base and base material. The compacted layer shall meet the standard of Clause 1201 and brought up it to the line and level of the Sub-base surface as shown in the Drawings or as instructed by the Engineer. The resulting surface shall then be watered if required to bring the moisture content close to the optimum and thoroughly compacted to achieve the density specified in Clause 1201.

Scarification of the existing pavement surface shall be measured and paid in square meters. The supply and addition of new material of sub-base standard including re-profiling and compaction shall be measured separately in cubic meters of material and paid under the respective BoQ item of sub-base course.

The work shall be paid at the unit rate entered in the contract which shall be full and final compensation for making arrangements for traffic, carrying out the work in only a part of the roadway width, leaving the rest of the width for the passage of traffic whenever directed and all labours, equipment and incidentals required to complete the work as per the Specifications.

1004 Capping Layer

Delete the first sentence and replace with:

Where shown on the drawings a Capping (Selected Sub Grade - SSG) Layer (either type 1 or type 2) shall be placed at, or on, the top of the subgrade to a thickness as indicated on the drawings. The materials for this layer may be either from cut or from borrow pits or may be in-situ material if this material meets the Specification, or may be in-situ material mechanically stabilised to meet the Specification. The Contractor shall demonstrate that in-situ materials, treated or otherwise, are suitable for the purpose. Any use of in-situ material shall be subject to the Engineer's approval.

If instructed by the Engineer any processing of in-situ material that meets the Specification for the capping layer will include scarification to a depth not less than the specified thickness of capping layer or to a depth as agreed with the Engineer, watering, shaping and compaction of the material.

Measurement and payment for this processing shall be for the cubic metre of material so processed in accordance with the provisions in this sub-section. In this case no separate payment for preparation of formation will be made.

(2) Material Requirements

Delete the contents and replace with the following requirements:

Material and Testing Requirements for Capping Layers

Test No.	Parameter	Capping Layer	
		Type 1	Type 2
1	Maximum Size of Particles	75 mm	100 mm
2	% Passing 0.075mm sieve	≤ 15%	≤ 15%
3	Plasticity Index	≤ 12%	≤ 6%
4	Uniformity Coefficient	-	≥ 5
5	CBR at 95% MDD (4 day soaked)	≥ 15%	≥ 30%
6	Swell	≤ 1%	≤ 1%
7	In-situ CBR measured by DCP	≥ 16%	≥ 32%
8	Field Dry Density	≥ 70% of Rel. Density	≥ 70% of Rel. Density

The minimum frequency of testing shall be as follows:

- For test numbers 1 to 6 every change of source and every 2000 m² of each pavement layer constructed
- For test numbers 7 & 8 every 500 m² of each layer constructed.

1005 Mechanical Stabilisation

(1) General

Delete the first and second paragraphs and replace with:

The extent of mechanical stabilisation shall be at the Contractor's discretion

(2) Material Requirement

(a) Stabiliser

Delete and replace with:

The Contractor is at liberty to mechanically stabilise any material, whether in-situ or imported, to provide any pavement layer material, provided that the resulting material is in conformity with the Specification.

The type and amount of stabiliser used shall be such that when mixed with the in-situ or imported material the specified requirements for the layer material are achieved.

(b) Stabilised Material Requirements

Delete this sub-section:

(3) Amount of Stabiliser to be added

Delete this sub-section

1007 Measurement

In Sub-clause (1) in the second line delete the words “taking cross sections at intervals of 10 metres” and substitute:

“generating cross sections from the original and augmented survey data and digital terrain model at intervals of 20 metres in Terai roads and 10 metres in hill roads and other alignment change points as instructed by the Engineer.”

In the same sentence delete the words “in the original position before the work starts and after its completion”

Delete the whole of Sub-clause (4) after the opening sentence.

In the opening sentence replace the word “exclusive” and replace with “inclusive”

FOR REFERENCE ONLY

Section 1100 – Road Works Overall Requirements

1101 Horizontal Alignments, Surface Levels and Surface regularity of Pavement Courses

Add the following:

(3) (e) Remedial Work

When upon examination by the Engineer any part of the Works or any plant fails to conform to the Specification requirements, or is at any stage before final acceptance damaged so that it no longer conforms to the requirements of the Specifications, the Engineer shall instruct its complete removal and replacement, at the Contractor's expense, with satisfactory work, plant or material. In special cases the Engineer may instruct the Contractor to apply remedial measures in order to make good any such defects or damage.

The actual remedial measures taken shall be entirely at the Contractor's own cost but subject to the Engineer's approval regarding the details thereof.

In particular remedial measures shall ensure that the final product is in full compliance with the Specifications, shall not endanger or damage any other part of the Works and shall be carefully controlled and submitted to the Engineer for examination when completed or at any intermediate stage as may be required.

For the guidance of the Contractor an indication about what may be required in the more common cases of defects or damage is given below, but the Engineer will in no way be bound to approve of or adhere to the measures indicated, as the actual remedial measures will be dictated by the circumstances of each particular case.

Earthworks

- i) Where a cut slope has been over-excavated, reinstatement by backfilling will not normally be permitted and the entire slope may need to be re-trimmed to obtain a uniform slope
- ii) Where the floor of a cutting has been over excavated it will normally require backfilling and re-compaction with approved material of higher quality than the cut material. All necessary measures shall be taken to drain ground water that may accumulate in backfilled sections.
- iii) Excess widths of fills will need to be trimmed to the design profile.
- iv) Where erosion has occurred on the surface of cuts or fills, the damage shall be made good by backfilling with suitable material and re-trimming. In more serious cases the slope may have to be cut back and backfilled after benching and compacted to the required standard of compaction with suitable small equipment followed by re-trimming.

Local Defects in Pavement Layers

- i) Where remedial measures are taken to make good localised defects the length and width of the area to be repaired by equipment shall be such as to accommodate the full width of the equipment used and of a reasonable length to ensure effective repair.
- ii) The depth to which material will have to be removed will depend on the defect and the type of material. Gravel layers will need to be broken up to a depth of at least 75mm and crushed stone will usually need breaking up over its full depth. Asphalt material will normally require removal for its full depth.

1104 Care of Works

Add the following at the end:

- (4) The provision of temporary drainage works such as drains, open channels, banks etc. and the furnishing and operation of temporary pumps and such other equipment as may be necessary to

adequately drain, protect and de-water the Works and Temporary Works. This will be in addition to any permanent drainage works specified and installed, and in addition to any temporary drainage works specifically paid for separately.

- (5) Care shall be exercised not to allow material in borrow pits to become excessively wet, to keep all completed layers properly drained, to avoid dumps of material on completed layer work that shall inhibit surface drainage or form wet spots under and around dumps, and to protect all parts of the Works against erosion by floods and rain.
- (6) Fill and cut slopes shall be promptly repaired whenever damaged by surface water.
- (7) Excavations for pipe drains, culverts, service ducts and similar structures shall be adequately protected against possible ingress of water during rainstorms.
- (8) The Contractor shall inform the Engineer of damage or defects to any work before repair or maintenance and the Engineer shall instruct the extent and method of repair. The previously constructed layer shall be thoroughly cleaned of all foreign material and the Contractor shall request its inspection by the Engineer before construction of the following layer or application of a prime coat, surfacing or surface treatment. In the case of all bituminous work in particular the existing layer shall be thoroughly broomed and all dung, clay, and other deleterious material completely removed. Where necessary the surface shall be sprayed with water before, during and after brooming to remove all foreign material.

FOR REFERENCE

Section 1200 – Subbase, Base, Hard Shoulder and Gravel Wearing Course

1201 Mechanically Stable Subbase

(1) Scope

Add at the end "crushed or otherwise".

Add an additional paragraph at the end as follows:

The scope of works includes:

- (a) construction of new sub base in one or two layers as instructed by the Engineer over carriageway and shoulder in accordance with the stipulations laid down in Clause 1003 and relevant Sub Clauses
- (b) construction of sub base layer over shoulders or as shown in the drawing or as instructed by the Engineer utilizing the sub base and base material from the existing pavement in accordance with the stipulations laid down in Clause 1003 and relevant Sub Clauses.

(3) Material Requirement

(a) Gravel

Add to the first paragraph:

"The specific grading requirement shall be controlled before and after the material has been transported, stockpiled, mixed, spread and compacted".

(5) Laying and Compacting

Add the following at the beginning:

The sub-base shall be constructed after checking that the underlying layer conforms to the specified requirements and has been approved by the Engineer. Immediately before placing the material, the underlying layer shall be checked by the Contractor for any damage or deficiencies, which shall be made good as instructed by the Engineer.

Add the following at the end:

The Contractor shall protect and maintain the subbase at his own expense. Maintenance shall include the immediate repair of any damage or defects which may occur and shall be repeated as often as is necessary to keep the subbase continuously intact. Repairs shall be done in such a manner that will ensure restoration to an even and uniform surface and may involve scarifying, watering and re-compacting.

(9) Testing

Replace the title with;

(9) Quality Control Testing

Replace Table 12.2 with:

Table 12.2: Frequency of Testing and Requirements for Mechanically Stable Subbase

Test No.	Parameter/ Test	Materials	
		Gravel	Sands
1	Gradation	As Table 12.1	As 1201 (3) (b)
2	Plasticity Index (PI)	$\leq 6\%$	$> 5\% \leq 12\%$
3	MDD & OMC	As per ASTM D1557-70 or its IS equivalent	
4	CBR @ (Field) Dry Density (4 day soak)	$\geq 30\%$	$\geq 30\%$
5	(Field) Dry Density and Field OMC	$\geq 95\%$ MDD $\geq 75\%$ of Rel. Density Field OMC within $\pm 10\%$ of OMC as per Test No.3	$\geq 95\%$ MDD $\geq 75\%$ of Rel. Density
Construction Tolerances			
Surface Levels		One test (full width) every 20 metres	
Thickness		One test (full width) every 20 metres	
Width		One Test every 200 metres	

The minimum frequency of testing shall be as follows;

- For Test Nos. 1 to 3 every change of source and every 1,000 m² of constructed pavement layer
- For Test Nos. 4 every change of source and every 2,000 m² of constructed pavement layer
- For Test No. 5 every 500 m² of constructed pavement layer

1202 Graded Crushed Stone Base and Subbase

(1) Scope and Definition

Delete the third paragraph "The class ofBill of Quantities" entirely.

(3) Material Requirement

Amend Table 12.3 to read as follows:

Table 12.3: Physical Requirement of Graded Crushed Stone

Tests	Base
LAA Max%	≤ 35%
AIV%	≤ 25%
FI% Max.	25%
CBR Min. %	80% at 98% of IS 2720
CR%	≥80%
PI Max	NP

Amend Table 12.4 to read as follows:

Table 12.4: Grading Envelope for Graded Crushed Stone

Sieve Size (mm) or equivalent	Percentage Passing by Weight
37.5	100
28	84 - 94
20	72 - 84
10	51 - 67
4.75	36 - 53
1.18	18 - 33
0.30	11 - 21
0.075	8 - 12

(7) Laying and Compacting

Add the following at the beginning:

Where the base course is laid over the prepared subbase, the surface shall be brushed free of dust and extraneous matter and, when instructed by the Engineer, watered before laying the base course.

Where the base course is laid over an existing bituminous pavement, the surface shall be lightly scarified and/or punctured to permit drainage through the surface where the surface shape is not adequately crowned in the opinion of the Engineer, and cleaned of any scarified material before laying the base course. During this operation the Contractor shall not damage the underlying pavement layer. Any damage to the existing underlying layer which results due to careless scarification shall be rectified forthwith by the Contractor to the approval of the Engineer at the Contractor's own cost.

Delete the third paragraph and replace with:

The aggregate shall be spread uniformly and without segregation over the prepared surface of an underlying layer which complies with the specified requirements for the layer concerned, or over the surfacing of an existing pavement, and in quantities sufficient to ensure that after compaction the completed layer will comply with all requirements of layer thickness, levels, cross section and density.

Aggregate shall be spread such that the minimum thickness of each layer after compaction shall be not less than 100 mm. The maximum thickness will depend on the type of compaction equipment used and on the specified layer thickness but shall not normally exceed 200 mm compacted thickness unless otherwise agreed or instructed by the Engineer.

In order to minimise segregation, the material shall be kept wet during transport and spreading. The dumps of material shall be spread out to a flat-surfaced layer with a thickness suitable for mixing. Thereafter the required amount of water shall be added and the material thoroughly mixed with a motor grader or other suitable approved means until a uniform homogeneous mixture is achieved. The required amount of water and moisture content shall be determined by carrying out field trials but shall normally be within 2% of the predetermined optimum moisture content at the time of compaction. The material deposited on the prepared existing surface may be spread and shaped by any method which will not cause the segregation of coarse and fine particles. The Contractor shall ensure that joints in consecutive pavement layers do not coincide. All areas of segregated coarse and fine material shall be corrected by re-mixing or removing and replacing with well graded material to the approval of the Engineer. The base material shall be compacted using approved vibratory compaction equipment whose vibrators shall function correctly in accordance with the manufacturer's instructions.

After mixing the material shall be graded to achieve the specified thickness with due allowance made for decrease in thickness due to compaction such that after compaction the surface of the aggregate base is within the specified level tolerance. The material shall then be thoroughly compacted by means of approved equipment so that the specified density is obtained throughout the whole layer.

The rolling shall be carried out by a series of over lapping longitudinal passes working from the edge towards the centre, except on super elevated sections where the rolling shall proceed from the lower edge to the higher edge.

The finally compacted layer shall be firm and stable with a closely knit mosaic like surface texture of exposed aggregate free from surface laminations, portions exhibiting segregation of the fine and coarse aggregates, corrugations or other defects that may be detrimental to the performance of the layer. The surface shall be brushed to ensure a surface free from excess fines and loose aggregate.

Where, in the opinion of the Engineer, the completed surface of the base is unacceptable, the surface shall be rectified in a manner approved by the Engineer.

The Contractor shall protect and maintain the completed base layer at his own expense until the surfacing is applied. Maintenance shall include the immediate repair of any damage or defects which may occur and shall be repeated as often as is necessary to keep the layer continuously intact and in good condition. Repairs shall be done in such a manner that will ensure restoration to an even and uniform surface. Traffic shall not be allowed directly on any unprimed base layer unless instructed or authorized by the Engineer.

The completed base shall be primed as soon as possible after approval from the Engineer.

Replace:

(10) Testing

with:

(10) Quality Control Testing

Replace Table 12.5 with:

Table 12.5: Frequency of Testing and Requirements for Crushed Stone Base

Test No.	Parameter/ Test	Materials
		Crushed Stone Base
1	Gradation	As Table 12.4
2	Plasticity Index (PI)	NP
3	MDD and OMC	
4	Flakiness Index	< 25%

5	Aggregate Impact Value	$\leq 25\%$
6	Los Angeles Abrasion	$< 35\%$
7	CBR @ (Field) Dry Density (4 day soak)	$\geq 80\%$
8	Sodium Sulphate Soundness	$\leq 12\%$
9	(Field) Dry Density	$\geq 98\%$ MDD $> 82\%$ of Rel. Density
Construction Tolerances As per Clause 1100		
Surface Levels		One test (full width) every 20 metres
Thickness		One test every 20 metres
Width		One test every 20 metres
Smoothness		One test every 80 m2

The minimum frequency of testing shall be as follows:

- For test Nos. 1 to 6 every change of source and every 1,000 m² of completed pavement layer
- For test Nos. 7 to 8 every change of source and every 5,000 m² of completed pavement layer
- For test No. 9 every 500 m² of completed pavement layer

(11) Measurement

Delete the paragraph and replace with:

The graded crushed stone base shall be measured by the cubic meters of material placed, compacted and accepted. Measurement shall be based on the cross section of the base shown in the drawings and the actual length measured horizontally along the centreline of the surface of the road, or in case of edge widening, along the centreline of the widened section.

Section 1300 – Bituminous Surface and Base Course

1301 General Requirements

(6) Cutting back of Bitumen

Add the following at the end:

In general the preparation of cutback bitumen for prime coat shall be carried out in accordance with Transport Research Laboratory TRRL Research Report RR140 "Preparation of Cutback Bitumens" (by Hitch and Steward) or relevant IS referred to in the Specifications.

(7) Adhesion Agent

Read (7) Adhesion Agent as Adhesion/Anti-Stripping Additive

Delete the existing paragraph and replace with the following:

Under normal circumstances anti stripping additive will not be required and shall not be used to correct poor aggregate/binder adhesion arising from the Contractor's failure to meet the requirements of the Specification. However, prior to the commencement of the surface dressing, the Contractor shall carry out tests under the supervision of the Engineer to determine the adhesion qualities of the aggregate and binder to be used. These tests will include, but not be limited to, the Immersion Tray Test described in Appendix 3 of TRRL-ORN 3. If, in the opinion, of the Engineer, the tests and trials indicate the need, the Engineer may instruct the use of a proprietary adhesion / anti stripping additive as admixture to the binder or to be applied to the binder film. Its rate of application shall be in accordance to the manufacturer specifications unless otherwise instructed by the Engineer and is generally prescribed as a percentage by weight of binder content added to the cut back prior to spraying.

The additive used shall be INDOSTRIP-NR-60, Addibit L101 or equivalent. Manufacturer's certificate for each batch/lot shall be submitted to the Engineer for his information. The Engineer may prescribe some additional periodic tests such as "under water coating tests", "stripping value for passive adhesive", "thermal stability" or "solubility in high speed diesel", etc. to confirm that the Adhesive additive being used performs as claimed by the manufacturer.

The anti stripping additive shall meet the following requirements:

Description	Test Method	Requirements
Appearance	Visual	Dark Brown Liquid
Specific Gravity at 27° C	IS:1448	0.85 ± 0.1
Pour Point	IS:1448	Max 42
Flash Point	IS:1448	> 150° C
Moisture Content	IS:1448	1.0% Max
Solubility in Diesel Oil in the Ratio 2:98 at 50° C	IS:6241	Completely soluble
Stripping Value with Bitumen Containing 1% Agent 40° C for 24 Hours	IS:6241	No Stripping
Under Water Coating Test	IS:6241	95% Min

Thermal Stability at 163 ^o C	IS:6241	Stable
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(10) Measurement and Payment

Add the following at the end of the first sentence:

“unless specified in the Bill of Quantities”.

1302 Prime Coat and Tack Coat

(2) Materials

Delete the first paragraph and replace with:

The prime coat shall consist of medium curing cutback bitumen (25% to 45% cutback) from a source approved by the Engineer. Medium curing cutback bitumen MC-30, MC-70 or MC-250 shall comply with the documents referred to in Clause 1301 (6). Cutback binder shall comprise 80/100 penetration grade bitumen blended with kerosene.

The application rate of cutback bitumen and the net bitumen content of cut back shall be established and approved by the Engineer after field trials. These field trials shall be carried out by the Contractor as instructed by and under the supervision of the Engineer and the cost thereof shall be deemed to be included in the prime coat rates. The object of the trials is to achieve the optimum penetration of prime coat and the minimum rate of spread at which this penetration can be achieved.

Pending field trials, the rate of application for surface priming shall be one liter per square meter (1 lit/ m²).

Delete the fourth paragraph and replace with:

The blinding layer, if any, shall be crushed rock or river sand having a grading within the limits of the table below. The aggregate shall be clean, hard and free from excessive dust. It shall contain no clay, loam or other deleterious material.

Grading Envelope for Blinding Material/Sand for Prime Coat:

Sieve size (mm)	Percentage Passing (by mass)
4.75	100
2.36	80 - 100
1.18	60 - 95
0.6	30 - 80
0.3	20 - 55
0.075	10 - 30

When, in the opinion of the Engineer, blinding to the primed surface is required, blinding aggregate shall be spread evenly over the full width of the primed surface such that no bituminous prime material will be picked up by passing traffic. No traffic shall be allowed to pass until the primed surface has been adequately covered to prevent pick-up from vehicles. Any removal of prime caused by traffic passing shall be remedied to the satisfaction of the Engineer. In general, priming shall be carried out in half widths and the Contractor shall ensure that traffic is kept off the prime until it has adequately cured, after which it shall, where practicable, be trafficked as described below. Blinding for uncured prime coat will only be used where the Engineer agrees that this is a necessary or unavoidable measure.

Payment for blinding material shall be for the square metre of blinding applied as agreed and/or instructed by the Engineer.

Tack Coat application shall be with either 80/100 penetration grade bitumen or with MC-30 or MC 70 cut back bitumen. Kerosene shall be added to bitumen to make the cut back. Pending field trials, the rate of application of tack coat shall be 0.5 lit/m².

(4) Spraying of Prime Coat and Tack Coat

Add the following:

Spray record sheets containing details of ambient temperature, spraying temperature, areas sprayed and quantities of materials used shall be submitted by the Contractor on a daily basis for approval by the Engineer.

Following the prime coat application, the primed, un-blinded surface shall be allowed to cure for a minimum 24 hours, or for a time as agreed with the Engineer, without being disturbed so as to allow the prime coat to fully penetrate the surface unless full penetration and curing has taken place in the opinion of the Engineer in a shorter period. If after this period the prime coat has not sufficiently cured to permit trafficking without being picked up, and the Contractor wishes to open the section to traffic, the Engineer shall either instruct that the area be left for a further period until the prime coat has fully penetrated and aired to allow traffic to pass or shall permit the Contractor to place mineral aggregate for blinding, at his own cost, applied at a rate and in the places instructed to blot up the excess bitumen. Where the Engineer agrees that blinding is necessary in limited areas to permit the unavoidable movement of traffic, at locations such as road junctions, the Contractor shall place mineral aggregate for blinding applied at a rate and in the places agreed and shall be paid for this work at the rate in the Bills of Quantities.

As soon as the primed surface has cured sufficiently or sufficient mineral aggregate for blinding has been applied to allow traffic to pass over the road without the prime coat being picked up, the road shall, where practicable, be opened to public traffic for a period of 14 days or less if agreed by the Engineer. During this period the primed area under traffic shall be maintained and all damage caused by traffic shall be repaired as instructed by the Engineer at no extra cost. Thereafter the contractor shall maintain the primed surface and shall protect the surface until the application of surfacing by taking suitable precautions including for example supplying and spreading a protective layer of sand at no extra cost.

(7) Testing

Add the following at the beginning:

Samples of the bituminous material that the Contractor proposes to use, together with a statement as to their source and character shall be submitted and approved before use of such material. The Contractor shall require the manufacturer or producer of the material to furnish material subject to this and all other pertinent requirements. Only satisfactory materials, so demonstrated by service tests, shall be acceptable.

The Contractor shall furnish vendor's certified test reports for each consignment of bituminous material supplied. The reports shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's reports shall not be interpreted as basis for final acceptance. All such test reports shall be subject to verification by testing samples of materials received.

1303 Surface Dressing

(1) Scope and Definitions

Add the following:

Surface Dressing shall be the process of spraying the surface to be dressed with bituminous binder, covering the binder with natural or crushed stone cover aggregate and rolling the resulting surface. The Contractor shall familiarise himself with the contents of the UK Transport & Road Research Laboratory Overseas Road Note 3 - "A Guide to Surface Dressing in Tropical and Sub-Tropical Countries" - hereinafter referred to as TRRL-ORN 3. Much of the Specification for Seal Coat Treatment is based on TRRL-ORN 3, including the design of the surface dressing and knowledge of the principles of the Surface Dressing Process is essential to the Contractor.

The requirement for a single or double surface dressing shall be specified on the Drawings or as instructed by the Engineer.

(2) Materials

(a) Binder

Add the following:

The bitumen binder shall consist of 80/100 Penetration grade bitumen or MC 3000 or MC 800 cutback bitumen with or without additives such as INDOSTRIP-NR-60, Addibit L101 or as specified in the relevant item of the Bill of Quantities.

Cutback bitumen binder shall comprise penetration grade 80/100 bitumen and cutter which shall be kerosene prepared on Site. The type and proportion of cutter if required shall be instructed by the Engineer on Site, in the range 1% to 10% after design of the surface dressing in accordance with the procedures set out in Chapter 5 of TRRL-ORN 3. The preparation of cutback bitumen shall be carried out in accordance with TRRL Research Report RR104 "Preparation of Cutback Bitumen" (Hitch and Stewart).

Approval of the source of supply of bitumen shall be obtained from the Engineer prior to delivery of the material. The Engineer will require test certificates to confirm compliance with the specified requirements and may require samples for independent testing prior to issue of such approval. No bituminous material other than that represented by samples and test certificates submitted shall be used by the Contractor except with the written consent of the Engineer and the material shall comply in all respects with the requirements herein. Blending of bituminous materials from different refineries shall not be permitted without the knowledge and approval of the Engineer.

Problems have been experienced with bitumen in some parts of Asia that relate to bitumen chemistry, in particular to undesirably high paraffin wax contents. Some penetration grade bitumens may comply with standard Specification requirements but perform badly in service due to high paraffin wax content or some other compositional factor. Bitumen proposed for use shall be tested at source to establish the following:

- Viscosity characteristics at 60 and 135 degrees centigrade
- Rolling Thin Film Oven Test (RTFOT results indicate the resistance of bitumen to hardening under the influence of heat and air)
- Paraffin wax content (DIN test procedure)

(b) Chippings

(i) Hardness, Soundness and Cleanliness

Delete the first and second paragraph and replace with:

Cover aggregate specified in the relevant items of the Bill of Quantities shall be obtained from a source approved by the Engineer and shall be natural screened gravel clean and free from adhering dust, achieved by washing and drying, or any other detrimental substance that could impair the adhesion of bitumen and shall conform to the requirements of Table 13.5 as follows.

Table 13.5: Physical Requirement of Chippings

Properties of Chipping	Acceptable Range or Criteria
LAA. Max	35
AIV Max	25
Flakiness Index Max	25

(ii) Grading

Delete Table 13.6: Grading Requirements of Chippings and replace with the table below.

Table 13.6: Grading Requirements of Chippings

Sieve Size mm	Percentage Passing by Weight			
	Nominal size			
	20 mm	14 mm	10 mm	6 mm
25	100			
20	85 - 100	100		
14	0 - 25	85 - 100	100	
10	0 - 7	0 - 25	85 - 100	100
6.3		0 - 7	0 - 20	85 - 100
4.75			0 - 10	
4.0				0 - 20
2.80	0 - 2	0 - 2	0 - 2	0 - 10
0.075	0 - 1.0	0 - 1.0	0 - 1.0	0 - 1.0

The nominal size of the chippings shall be as specified in the relevant item in the Bill of Quantities.

(4) Crushing, Screening, Washing and Stockpiling Chippings

Add the following:

Stockpiling of aggregates will be permitted only at locations approved by the Engineer. A separate stockpile shall be made for each nominal size of aggregate at each location.

The site of the stockpile shall be cleared of all vegetation and debris, graded and drained, and where the Engineer deems it necessary, the area shall be surfaced with a 100 mm compacted layer of approved material to prevent contamination of the lower layer of cover aggregate.

Unless otherwise approved by the Engineer each stockpile shall be built at least two metres high by tipping in layers not more than one metre deep over the whole area of the stockpile. The Contractor shall supply planking or other material required in connection with movement of vehicles over and about the stockpiles.

The bottom 50 mm layer of cover aggregate or any contaminated aggregate shall not be used in the work.

Stockpiles shall be kept dry from rainfall or ingress of water by covering with approved waterproof membranes and maintaining ground drainage to avoid seepage of ground water into stockpile.

(6) Construction Equipment for Pavement Works

(a) Bitumen Distributors

Delete this sub-section and replace with:

Operation

Distributors shall be of constant volume or preferably constant pressure type, self-propelled, equipped with pneumatic tyres and have a minimum binder capacity of 4,000 litres and each machine shall require the approval in writing of the Engineer for use in constructing the Works.

Approval will depend on fulfilling the following requirements:

Distributors shall be equipped with low range speedometer (fifth wheel) in good working condition, so located to be visible to the driver to enable him to maintain accurately the constant speed for spraying binder at the uniform specified rate. They shall be fitted with either a calibrated pressure gauge which accurately records the pressure of the bitumen at the spray bar for constant pressure distributors, or a binder pump delivery meter for constant volume distributors. Binder pumps shall be capable of maintaining constant pressure or constant volume during spray runs.

Distributors shall be fitted with burners in combination with a circulating pump capable of maintaining the bitumen without overheating within the specified temperature range and an accurately calibrated thermometer for indicating the spraying temperature of the bitumen.

The spray bar shall be capable of applying bitumen binder to a minimum width of 2.30 meters with provision for application of lesser widths by closing jets. The spray bar shall have the capability of being raised and lowered to specified heights above the road and of being adjusted so that it is parallel with the road surface. The distributors shall be so designed to allow the circulation of hot binder through the spray bar when not spraying.

Spray bars shall be fitted with either slotted spray jets or preferably whirling spray jets, whose essential features are the ability to spray binder uniformly at the specified rate of spray, such that the speed of the distributor can be matched by the following chipping spreader during its normal chip spreading operation. If whirling spray jets are fitted the spray bar shall be protected by a hood to reduce wind interference. Distributors shall be fitted with hand-lances with nozzle spray attachments for spraying small, inaccessible areas and to correct deficiencies in the spray rate.

Prior to surface dressing operations, distributors shall be checked for leakages from spray jets and any other sources and these shall be eliminated. Distributors shall then be calibrated by a method approved by the Engineer and under his supervision, to establish uniformity of lateral spray of bitumen to within $\pm 10\%$ permitted variation at any point on the surface from the mean spray rate. This calibration includes setting the spray bar height above the surface to be sprayed, in accordance with the manufacturer's instructions, so as to ensure that the designed overlap of jets is achieved. All spray jets shall be functioning so that each jet requirement has been achieved. Calibration shall be undertaken in accordance with the manufacturer's instructions or in accordance with TRRL-ORN 3 - Section 6.3 Distributor Speed Control and Calibration - to establish the relationship between spray rate and road speed for constant pressure distributors and in addition, bitumen pump delivery rate and spray bar width for constant volume distributors. The distributors shall be capable of achieving a mean spray rate measured by the TRRL-ORN 3 Method B, which shall not vary by more than $\pm 5\%$ from the specified spray rate.

Safety and Maintenance

Bitumen heating, pumping and spraying operations shall be entrusted only to personnel who have been adequately trained and who are competent in the use of the equipment. Unauthorised personnel shall not be allowed to remain in the vicinity during the above operations. Authorised personnel shall be provided with, and be required to wear, suitable protective clothing, i.e. overalls, heat-proof gloves, boots, helmets and goggles.

Special care is needed when changing the type of binder being used in the distributor. When changing from hot binders to bitumen emulsions, all residual binder in the tank and spraying system shall be drained completely and the spraying system flushed using diesel. When changing from emulsions to hot binders, all emulsion shall be drained/flushed from the distributor in order to avoid foaming when hot binder is loaded. When it is necessary to load hot binder after using the distributor for spraying cutback bitumen, the cutback bitumen shall be drained completely and the manhole left open for some time to allow solvent vapour to escape.

The spray bar shall be emptied of binder by blowing with air, or by diesel flushing when spraying is suspended for lengthy periods and at the end of each day's work.

The binder shall be introduced into the distributor at a temperature equal to or just above the spraying temperature after preheating in separate tanks fitted with burners and circulating pumps for this purpose. The capacity of the decanters/preheating tank shall be sufficient to preheat the binder required for the full day's work.

The distributor burners shall be used only to make relatively small adjustments to the binder temperature and shall not be used to raise the binder from ambient to spraying temperature. Under no circumstances shall distributor burners be operated during the spraying operation, or when the level of binder in the tank is less than 150 mm over the top of the flues, or when the distributor is moving. The need for end of day maintenance of the distributor is emphasised to reduce fire risk and to ensure its adequate performance when next used for binder application.

Maintenance of all equipment for the surface dressing operation shall be under the control of a competent senior mechanic, approved by the Engineer and fully experienced in the maintenance of all equipment and in the calibration of the bitumen distributor.

The Contractor shall provide all necessary traffic control equipment and shall inform the engineer at least 14 days before commencing the surface dressing Work, of his detailed arrangements for traffic control. After review the Engineer will inform the Contractor in writing of his approval, subject to any modifications to the Contractor's arrangements which he requires for traffic and convenience of the public.

(8) Application of Surface Dressing

Delete and replace with:

Application of Binder

The specified bitumen binder, cut back if instructed by the Engineer, its application rate and spraying temperature shall be instructed by the Engineer on Site after design of the surface dressing, in accordance with the procedures set out in Chapter 5 of TRRL-ORN 3. The range of spraying temperature for binders is given in TRRL-ORN 3, and is normally within the range 140°C to 200°C.

The Contractor shall present his detailed programme and arrangements and methods for the planning and execution of the surface dressing process to the Engineer for approval at least 28 days before he intends to commence this Work. The Contractor's authorised representative shall be responsible for preparation of the programmes and arrangements and the Contractor shall not commence surface dressing until the Engineer has approved his programme.

The Contractor shall base his programme on TRRL-ORN 3 - Section 7. The Surface Dressing Process, Sub-Section 7.1 Planning and 7.2 The Surface Dressing Operation - by selecting the activities appropriate to his particular Work Programme. The Contractor shall appoint a surface dressing overseer approved by the Engineer who shall be fully competent to organise and implement the surface dressing operation with experience in operating all essential equipment.

All operations associated with the surface dressing process shall be described in the Contractor's arrangements and shall include but not be limited to:

- method of bitumen supply, decanting, cutting back where required, heating and storing, transfer to distributor including lists of equipment and capacities;
- location and method of production of cover aggregates and pre-coating with type and output of equipment, including crushers where appropriate; and.
- method of performing the surface dressing process including type and capacity/weight of all main and ancillary items of equipment along with workforce details.

The Contractor shall provide, one day in advance, his following day's surface dressing Work Programme, including his expected spray lengths and widths for each run with details of the quantity of cover aggregate available in approved chip spreaders standing by at the commencement of the spray run. Spraying shall not commence until sufficient cover aggregate is in this position to cover the area programmed for spraying.

The distributor shall be filled with preheated bitumen binder on the same day, shortly before start of binder application. The distributor spray bar and jets shall be preheated by circulating hot binder and the jets operated for at least 10 seconds for testing. This operation shall be carried out before each spray run, off-road onto trays, or at a location where no environmental damage will be created. Jets shall be inspected by the Engineer for shape, direction, blockage or any other defects which shall be corrected before spraying is permitted. At the end of each spray run the distributor shall be driven off-road to avoid binder drippage on the pavement surface. Binder drippage from any location which may contaminate the road surface shall be sufficient for the Engineer to order removal of the offending source from the roadway until repairs are completed.

As emergency/temporary measures, drip protection of the pavement surface shall be provided by use of buckets/trays etc. These shall be available for use at all times, along with equipment for removal of binder spillages on the pavement surface, to the approval of the Engineer.

The Contractor shall carry out a trial section of surface dressing at a location instructed by the Engineer to demonstrate to the Engineer that his surface dressing operation is capable of constructing the surface dressing in accordance with the Specification. The trial length shall be minimum 200 meters using full spray bar width with full width application of cover aggregate. If the trial section of surface dressing complies with the Specification, the Contractor shall receive payment for the Work in accordance with the Contract as if it were Permanent Work. If the trial section of surface dressing fails to comply with the Specification, the Contractor shall carry out further trials until his surface dressing operation complies with the Specification. No payment will be made for trial sections that do not comply with the Specification.

When the Engineer is satisfied that the Contractor is capable of constructing surface dressing that complies with the Specification after trial section or sections, the Contractor will receive permission to commence surface dressing as permanent Work on the road pavement.

Application of binder shall only be undertaken when the surface is dry or slightly damp, but in no circumstances when wet. If in the opinion of the Engineer rainfall is likely before the application of binder or cover aggregate or the temperature or the pavement surface has time to fall below the specified minimum temperature of 15°C, the Engineer will instruct the Contractor to delay surface dressing work until weather conditions are satisfactory. Areas damaged by rainfall shall be rectified by the Contractor without additional payment, in a manner instructed by the Engineer.

If in the opinion of the Engineer the ambient temperature is too cold for surface dressing, the Contractor shall delay this operation until the temperature increases to the specified minimum level of 15°C.

Building paper or other approved protective material shall be used at the start and finish of each spray run of sufficient width (not less than 600mm) to enable the distributor to reach its calibrated road speed with spray jets open before discharging binder onto the pavement under treatment. Ends of previous surface treatment runs shall be trimmed back to clean, straight transverse edges and these shall form the start point for subsequent runs, with completed work suitably protected as described above. Spray runs will be limited to 300 metres length initially until the Contractor demonstrates his ability to plan and execute longer lengths. Spray widths shall be calculated allowing for 150mm longitudinal overlap with adjoining passes and for the width that the following chipping spreader is

able to cover. Longitudinal sprayed butt joints will not be permitted. The Contractor shall submit his spray width and length proposals to the Engineer for approval.

During spraying all passing traffic shall be stopped. If spray jets block, or the chipping spreader stops, or any other event occurs which may affect the surface treatment process, then the spray bar operator immediately shall stop spraying. When the defective equipment or operation is rectified, spraying may restart with the Engineer's approval.

The distributor shall be dipped and the binder temperature recorded before and after each spray run and spray length and width recorded on approved Record Sheets. The hot application rate shall be calculated and recorded and checked against the specified rate. The calculated actual rate shall not vary by more than $\pm 5\%$ from the specified rate. The actual quantity of binder sprayed corrected to 15.6°C shall be calculated.

At least eight clean pre-weighed metal spray trays shall be available for sampling the spray rate for each spray run, to be used in accordance with TRRL-ORN 3 - Section 6.3 Method B - if so instructed by the Engineer.

To ensure that the spray runs are parallel with the road pavement the road centreline or edge line shall be marked every 25 metres and a string line laid out for the distributor driver to follow with the guide bar attached to his side of the cab.

Where a second surface dressing is specified, the first surface dressing shall be left open to traffic for a minimum period of 21 days and preferably a longer period before applying the second surface dressing unless special approval is obtained from the Engineer for a shorter period. Surplus chippings shall be removed by firm hand-brooming or power-brooming before applying the second surface dressing.

The spraying widths shall be so selected that the centreline joint of the second surface dressing is offset from that in the first surface dressing by a minimum 300 mm.

Hand-pouring pots or hand-lances shall be used to touch up carefully any parts of the first surface missed by the distributor/chipping spreader, or for the treatment of areas in which the distributor cannot operate and in this case only, chippings may be applied by an approved manual method.

Areas damaged by excess bitumen or spillages of diesel or other deleterious material shall be repaired by careful cutting out and removal followed by careful hand-poured or hand-lance application of binder and chipping in a manner approved by the Engineer.

The second surface dressing shall be undertaken when the first surface has been approved by the Engineer after all surplus chippings are removed, repairs carried out and the surface thoroughly cleaned as specified. The procedures to be followed are those specified for Surface Dressing in this Specification.

Application of Cover Aggregate

The cover aggregate shall be applied at the rate instructed by the Engineer on Site in square metres of coverage per cubic metre of loose aggregate after design of the surface dressing, in accordance with procedures set out in Chapter 5 of TRRL-ORN 3.

The cover aggregate shall be applied immediately after the binder is applied and with the approval of the Engineer may be applied slightly damp if not pre-coated to depress dust and help adhesion. Aggregate applied to sprayed bitumen emulsion shall, however, be dry.

The cover aggregate shall be applied using approved mechanical spreaders, which shall be tailgate mounted on tipper trucks, pushed spreaders or self-propelled spreaders, specifically manufactured for the purpose and they shall preferably be metered. They shall be capable of uniformly spreading cover aggregate at the instructed rate such that they can deliver the rate specified whilst travelling at the same speed as the binder distributors during spraying.

The bitumen binder surface shall be covered with cover aggregate closely packed in one layer so that adjacent chippings are touching and no bitumen binder is left uncovered.

A sufficient number of loaded spreaders shall be available at the start of binder application to provide cover aggregate over the whole area programmed for spraying. The Contractor shall not commence spraying unless sufficient loaded spreaders are in place. Aggregate spreading by manual methods will not be permitted except in circumstances where:

- mechanical spreaders cannot operate effectively or safely;
- additional aggregate (back-up work) is required;
- breakdown of mechanical spreaders occurs during the spreading operations before stoppage of spraying;
- minor surface repairs are instructed.

The spreader shall follow the distributor at an interval not exceeding 10m for hot binder work and not exceeding 5m when using bitumen emulsion binder. A back-up vehicle or other approved means shall be constantly in attendance during surface dressing, from which additional aggregate may be hand-applied to ensure complete and rapid coverage.

Where an adjoining pass of the distributor is required, no aggregate shall be applied to the binder over a 150 - 200 mm strip so as to permit subsequent overlap.

Under no circumstances will general brooming of the chipped surface be permitted. Aggregate spillage shall be removed with care and excess aggregates may be brushed off carefully after a minimum of 3 days under traffic, after approval of the Engineer.

The cover aggregate shall be rolled with pneumatic multi - tired power rollers. Pneumatic - tired rollers shall have a wheel load in the 1000-2000kg range. Tyre pressures and sizes shall be in accordance with the manufacture's recommendations and shall be the same on each axle and tyres shall be smooth and in good condition to provide uniform rolling of chippings. The roller shall follow directly behind the spreader and shall continue to roll at a speed of approximately 8-10kph, so as to provide minimum 6 passes over the entire treated area. Each pass shall overlap the previous pass by minimum half width of roller rolling shall be continued until all cover aggregate particles are firmly bedded. Tyres shall be in good condition and be kept clean and smooth to avoid pick-up of bitumen and chippings.

(13) Measurement

Delete paragraphs 4 including (a) and (b) and 5 starting with "Chippings of each....." and ending with ".....to rectify at his own cost." And Replace with the following:

"Chippings of each nominal size shall be measured in square meter. The application of the chippings shall be to cover fully the sprayed binder surface to the satisfaction of the Engineer. Any additional quantity of chippings to meet the specified quality of works shall be supplied and applied by the Contractor at his own cost to the satisfaction of the Engineer."

Add at the end following:

Anti-stripping additive shall be measured in kilogram, which shall be the actual mass of the additive used as instructed by the Engineer.

(14) Payment

Add at the end following:

The Anti-stripping additive shall be paid as per the unit contract unit rate which shall be full and final compensation for the cost incurred in compliance with the stipulations of Clause 1301 and 1303 of these Specifications.

1307 General requirements for Asphalt concrete, Sand Asphalt, Emulsion Aggregate Mix and Cold asphalt

(2) Construction Plant (b) Mixing Plant

Add at the end of the second paragraph:

The Contractor shall also ensure that the number and capacity of the plant are or is compatible to the interim or final milestones for completion of AC works set elsewhere in the Contract. The minimum capacity of any plant shall, however, not be less than 100 tons per hour.

(3) Preparation of Surface

Delete the third paragraph and substitute:

"Tack coat shall be provided wherever new asphaltic concrete is laid over existing pavement and wherever a first course of new asphaltic concrete has been exposed to traffic or left to weather to such an extent that the Engineer considers it necessary to provide tack coat in the interests of satisfactory adhesion between the courses. In general tack coat will be required wherever a period of more than 14 days is allowed between successive courses; this period may be substantially reduced if the surface of the underlying course is exposed to excessive traffic. Provision of tack coat will not be the subject of any separate payment and is considered to be included in the rate of asphaltic concrete."

(4) Design and Working Mixes

Add at the end of the first paragraph after the word Specification as follows:

"as outlined in Clause 1308 (4)".

Delete third paragraph and replace with:

The minimum and maximum lift thickness for wearing course shall be 3 to 5 times the nominal size of aggregates and 4 to 5 times the nominal size of aggregates for binder course unless otherwise approved by the Engineer.

Delete 4th paragraph entirely and replace it with the following:

The Contractor shall carry out mix design in the laboratory for the wearing and binder course of asphalt concrete in order to propose the proportion of each constituent of the initial mixes to be used for site trials to be carried out in accordance with Sub clause 1307 (5). The procedure for conducting such mix design shall be in accordance to the MS-2, MS-4 of Asphalt Institute or Superpave Volumetric Design. Important steps starting with assembly to testing of mix design samples are broadly outlined below;

- a. conduct sieve analysis of various aggregate gradation and blend the aggregate to arrive at the desired aggregate design blend for use in the asphalt mixture. The following additional information may be required for the above, depending on the procedure followed:
 - bulk specific gravity of each aggregate
 - chosen unit weight of each aggregate
 - rodded unit weight of each aggregate
 - blend by volume of the coarse aggregate
 - blend by volume of fine aggregate
 - amount of 0.075mm down material desired in the combined blend if mineral fillers or bag house fines are used
- b. prepare trial mixes for various aggregate blends to determine the optimum bitumen content to obtain the minimum stability and flow without crossing the threshold limits on contents of air voids set between 3% to 5%.

- c. get approval from the Engineer of the selected trial mix for site trial.

(5) Site Trials

Delete the first paragraph and replace it with the following:

Site trials shall be carried out in the presence of the Engineer at a location approved by him. These trials shall be carried out after the approval of the Contractor's laboratory mix design.

The Contractor shall produce trial batches with an aggregate blend approximating the laboratory mix design. When the Contractor is satisfied that his Plant is producing a consistent mix, he shall propose laying a trial area for the Engineer's approval to establish that the properties of the mix produced by the Plant are within the limits laid down in Clause 1308 and elsewhere in these Specifications and that his other asphalt finishing equipment is capable of laying the mix to the specified thickness without dragging or other imperfections and that the compaction plant is capable of compacting the mix uniformly to the required density.

The required density from the field trials, assessed by a minimum of three (3) cores of 150 mm shall not be less than 99% density of Marshall Specimens made from the same mix. At least six (6) sample Marshall Specimens shall be made and tested to satisfy the Engineer that the requirements of Clause 1308 have been complied with.

Samples for Marshall Specimens during field trials shall be taken from the vehicle conveying the asphalt concrete mix from the Plant to the job site. Remaining sample mix after producing the six Marshall specimens shall be quartered and analyzed for gradation, and binder content as per AASHTO T 164.

Temperature of the bitumen at the time of mixing shall range between 130° to 160°C while that of the aggregate shall be between 130° to 155°C. In no instances shall the difference of temperature between the binder and aggregate exceed 15°C.

Similarly, the temperature of the asphalt concrete mix when placed in a position for laying shall be within $\pm 10^{\circ}\text{C}$ of specified mixing temperature and shall be such that the kinematic viscosity of the asphalt cement is 280 ± 20 centistokes just prior to initial break down rolling.

The Contractor will be allowed to proceed with the construction of permanent asphalt concrete pavement works only after the trial section has been satisfactorily laid and finished in accordance with these Specifications to the full satisfaction of the Engineer.

Delete the second, fifth including (a) to (h), sixth and seventh paragraphs of (5) Site Trials.

Add before the deleted seventh paragraph of (5) Site Trials:

When the Engineer is satisfied with the outcome from the site trials, the Contractor shall supply to the Engineer with the mix proportions, batch weight, aggregate grading and Marshall Properties as tested. Thereafter, the mix shall be known as the Approved Job Mix and subsequent Plant mixes produced shall conform to the Approved Job Mix within the following tolerances:

Properties	Binder Course	Wearing Course
Aggregate Retained on a No.4 Sieve	$\pm 5\%$	$\pm 4\%$
Aggregate passing a 4.75 mm sieve but retained on 0.180 mm sieve	$\pm 4\%$	$\pm 3\%$
Aggregate passing a 0.180 mm sieve but retained on 0.075 mm sieve	$\pm 2\%$	$\pm 1.5\%$
Aggregate passing a 0.075 mm sieve	$\pm 1.5\%$	$\pm 1.5\%$
Binder Content	$\pm 0.25\%$	$\pm 0.25\%$
For Air Void in Total Mix in the range of 3% -5%	$\pm 1\%$	$\pm 1\%$
Voids Filled with Binder	$\pm 5\%$	$\pm 5\%$
Voids in Mineral Aggregates 13%-15% for	$\pm 1.0\%$	$\pm 1.0\%$

Binder Course and 14%-16% for Wearing Course		
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Any variation to the limits in the Approved Job Mix lasting more than one (1) day shall be addressed by suspending the works, investigating and adjusting or making modifications by checking all aggregate, Plant and material. Mixing and other construction activities shall commence only after mixes produced comply with these requirements.

If there is change in the supply or source of the aggregates or if variations in quality or grading of aggregate or bitumen become necessary for reasons outside the control of the Contractor, the Contractor shall readjust or redesign the Approved Job Mix as may be necessary to satisfy the Engineer that the Plant can consistently produce mixes within tolerances as specified above. Thereafter the adjusted or new mix shall become the Approved Job Mix.

(13) Tolerances

Delete second paragraph including (a) Bitumen Content and (b) Aggregate entirely and replace it with the following:

Tolerance for bitumen content, aggregate gradation and void contents shall be as outlined in 1307 (5) and relevant sub clauses of 1308.

FOR REFERENCE

1308 Asphalt concrete

(3) Materials

(a) Penetration Grade Bitumen

Delete the text and substitute with:

"Bitumen shall be 60/70 penetration grade or VG 30 or VG 40 as specified in Section 600 and as indicated in the Bill of Quantities or as instructed by the Engineer."

(b) Aggregates

Modify Table 13.17 to read

Table 13.17: Requirement of Coarse Aggregates

Coarse Aggregate (retained on 4.75 mm sieve)	
LAA Max	35 max. for both Wearing and Binder Course
ACV Max	25 max. for both Wearing and Binder Course
SSS Max	12% max
Flakiness Index Max	25 max for both Wearing and Binder Course
Coarse Aggregate Fractured Face (ASTM D 5821)	Wearing Course: 85% to 95% / 80% to 90% for one and two fractured faces Binder Course: Minimum 80% / Minimum 75% for one and two fractured faces
Clay Content (AASHTO 176)	Minimum Sand Equivalency Value of 45%
Flat and Long Elongation Particles (ASTM D 479)	Max 45%
Fine Aggregate Angularity Requirement (AASHTO 304 Method A)	Minimum 45%

The coarse aggregate shall have an affinity for bitumen when coated and shall pass the stripping test in accordance with AASHTO T-182.

Modify second line of the last paragraph to read:

It shall.....having a Los Angeles Abrasion of not more than 40 for the binder course and 35 for the wearing course."

(c) Mineral Filler

Delete the whole paragraph and replace it with the following:

Filler shall consist of fine alkaline material such as cement, crushed limestone, rock dust and shall exclude clay minerals, chlorides, sulphates and other deleterious material. At the time of use, it shall be dry and free flowing without agglomerations. Filler shall conform to the requirement of AASHTO M17 and shall have the following grading:

Sieve Size (mm)	Percent Passing by Weight
0.600	100
0.300	95-100
0.150	90-100
0.075	75-100

(4) Grading Requirement

Modify Table 13.18 to read as follows:

Table 13.18: Provisional Grading Requirements for Binder Course and Wearing Course

Sieve Size (mm)	Percentage Passing	
	Binder Course*	Wearing Course**
25	100	-
19	95-100	
12.5	65-85	95-100
9.5	30-65	70-95
4.75	38-46	55-70
2.36	28-42	39-45
1.18	-	30-45
0.3	7-21	15-30
0.075	2-8	3-7

Note: * For Binder Course, max. % passing 4.75 mm sieve should not exceed 46%

** For wearing course, the minimum fraction passing 2.36 mm sieve should not be less than 39%.

(5) Requirements for Asphalt Concrete

Modify Table 13.19 to read as follows:

Table 13.19: Requirements for Asphalt Concrete

Parameter	Binder Course	Wearing Course
Number of blows at each end	75	75
Marshall Stability (kN)	7	7
Flow Value (mm)	2-4	2-4
Air Voids in total mix (%)	3-5	3-5
Bitumen Content by Mass of Total Mix	Minimum 5%	Minimum 5.5%

Add the following at the end of the last paragraph:

The bitumen content for the job mix shall be determined on the basis of laboratory Marshall Tests, using the procedure described in the Asphalt Institute publication MS-2 or as in Superpave system of mix design considering the following:

- i. maximum density
- ii. maximum stability
- iii. mid specification air voids
- iv. mid specification voids filled with bitumen
- v. the flow value and voids in the mineral aggregates corresponds to the optimum asphalt cement content which shall be checked for compliance with these Specifications

Compression tests before and after immersion in accordance with AASHTO T 165 shall be carried out on both binder and wearing course mixes. The resulting % of retained strength shall be as below:

Binder Course	Wearing Course
not less than 65%	not less than 75%

(7) Compaction

In the second paragraph delete the reference to "(50 blows)" and replace with "(75 blows)"

(8) Testing (b) Process Control

In Table 13.20 in the minimum number of tests for Quality of Binder delete the words "in addition, one set of tests for each 50,000 liters or part of it of supply of binder" and substitute:

"In addition, one set of tests for each tanker load of bitumen delivered to site; in the event that bitumen is delivered to the site in drums additional tests shall be made at the frequency stipulated by the Engineer but not less than one set per 10tons of bitumen"

(9) Measurement

At the end of the paragraph add:

"However, in no circumstances shall the volume of asphalt certified for payment exceed the volume calculated as the actual volume laid and accepted for payment on the basis of actual measurements of length, width and thickness made in the field."

(11) Adjustment in Contract Unit Rate

Delete the whole of the text of this item and substitute:

"The rate of asphalt concrete will not be adjusted. The rate given for asphalt concrete in the Bills of Quantities shall be the rate using the percentage of bitumen specified in the Bills. When the actual percentage used has been determined the additional bitumen required or the amount of bitumen saved shall be calculated in kilograms and either paid to the Contractor or credited back to the Employer as appropriate through the Bill item provided for this purpose. The provision of a mechanism for payment for under or over usage shall not in any way alter or reduce the Contractor's responsibility to produce asphaltic material with the correct bitumen content in accordance with these Specifications."

FOR REFERENCE ONLY

Section 1400 – Kerbs and Footpaths

Add new "Clause 1406: Precast Concrete Property Access Slabs" after "Clause 1405: Cycle Tracks" as follows:

1406 Precast Concrete Property Access Slabs

The Contractor shall provide and install precast concrete slabs in accordance with the detail shown in the drawings to permit access across lined and unlined side drains wherever directed by the Engineer.

The materials and workmanship used in the fabrication of these slabs shall be entirely in accordance with the requirements of the relevant Clauses of this Specification governing concrete, reinforcement and formwork. Formwork for the slabs shall be such as to provide a class F2 finish throughout.

The measurement of precast concrete property access slabs shall be in numbers of each type of slab fabricated, transported and placed in accordance with the Drawings and these Specifications.

The quantities measured as provided above shall be paid at the respective contract unit rates for each type of slab. The contract unit rates shall be the full and the final compensation to the Contractor for installation where and as directed and shall include for fabrication of the slabs including the concrete of specified grade, reinforcement and form works, transport to the location for installation, any necessary trimming and bedding and placing of the slabs in their final position.

Add new "Clause 1407: Precast Reinforced Cement Concrete (RCC) Covered Drain" after "Clause 1406: Precast Concrete Property Access Slabs" as follows:

1407 Precast Reinforced Cement Concrete (RCC) Covered Drain

The Contractor shall provide and install precast Reinforced Cement Concrete (RCC) covered drains in accordance with the details shown in the drawings along the road side wherever directed by the Engineer.

The materials and workmanship used in the fabrication of RCC covered drain shall be entirely in accordance with the requirements of the relevant Clauses of this Specification governing concrete, reinforcement and formwork. Formwork for works shall be such as to provide a class F3 finish throughout.

The measurement of precast Reinforced Cement Concrete (RCC) covered drains shall be in meter of each type of RCC covered drain fabricated, transported and placed in accordance with the Drawings and these Specifications.

The quantities measured shall be paid at the respective contract unit rates for each type of Reinforced Cement Concrete (RCC) covered drains. The contract unit rates shall be the full and final compensation to the Contractor for installation where and as directed and shall include for fabrication of the Reinforced Cement Concrete (RCC) covered drains including the concrete of specified grade, reinforcement and form works, transport to the location for installation, any necessary trimming, bedding and placing in their final position, use of cement sand mortar at joints etc to meet the requirements of the drawings and these Specifications and to the satisfaction of the Engineer .

Section 1500 – Traffic Signs, Road Marking, Road Marker Stones and Delineators

1501 Permanent Traffic Signs

(11) Payment

Add the following additional paragraph at the end of this Sub-clause:

"The Bills of Quantities provide for two classes of sign for payment purposes:

- i) Single post
- ii) Double or more posts

All signs supported by a single post shall be classed as "single post"

"All signs supported by two or more posts shall be classified as "double post or more posts"

1502 Road Markings

Change the heading to read "1502 A: Road Markings using Road Paint"

At the end of Clause 1502A insert the following new Clause:

1502 B: Road Markings Using Thermoplastic Road Marking Material

(1) Scope

This Clause covers the provision of permanent road markings using reflectorised thermoplastic road marking material.

(2) Material

a) General

The material to be used for road marking and striping shall be a reflectorised thermoplastic type of material specifically produced for the purpose. The material shall be applied to the pavement in a molten state by mechanical means.

Upon cooling to normal pavement temperature, it shall produce an adherent reflectorised stripe of specified thickness and width capable of resisting deformation by traffic.

b) Thermoplastic Material

Thermoplastic material shall be a high quality, elastic type with mix-in of 20% by weight of reflecting beads. The beads shall be ballotini, or similar approved and shall be reasonably spherical and free from flaws and of a size suitable for this type of Reflectorisation. Ballotini shall comply with the requirements of BS 6088 Class A.

The raw thermoplastic material shall be composed of the pigment, the reflecting beads and the filler uniformly dispersed in the resin. It may be supplied in bags, ready mixed as powder, which shall be heated and stirred prior to application in accordance with the manufacturer's recommendations. Thermoplastic Road Marking Material shall comply with the requirements of BS 3262.

c) Colour

The thermoplastic material shall be available in yellow and white colour.

(i) White

The colour of white markings shall match the colour No. 00E55 of BS 4800. Pigment shall be Titanium Dioxide complying with Bs 1851.

(ii) Yellow

The colour of yellow markings shall match the colour No. 08E51 of BS 4800.

d) Test Certificates

The Contractor shall submit, for each consignment of thermoplastic material delivered to site, the Manufacturer's certificate to show that the materials comply in all respects with the relevant product Specifications.

(3) Application of Thermoplastic Road Markings

(a) Weather Limitations

Road marking material shall not be applied to a damp surface or when the relative humidity exceeds 80%, or at temperatures lower than 10° C, or when in the opinion of the Engineer, wind strength is such that it may adversely affect the application operations.

(b) Mechanical Equipment for Application

The equipment shall consist of a suitable apparatus to clean the road surface, a melting pot of minimum 250 litre capacity, an automatic, self-propelled thermoplastic laying machine and all additional hand operated equipment necessary to complete the work.

The laying machine shall be capable of laying road markings of different widths in the range of 50-500 mm.

(c) Surface Preparation

Traffic markings shall be applied to bituminous surfaces only after sufficient time has elapsed to ensure that damage will not be caused to the surface by volatile substances evaporating from the bituminous surfacing. In no case shall traffic paint markings be applied until at least 48 hours after the completion of the bituminous surfacing or any longer period required by the Engineer.

Before the material is applied, the surface shall be clean and dry and completely free from soil, grease, oil, acid or any other material which will be detrimental to the bond between the marking material and the surface. The portions of the surface where the marking is to be applied shall be properly cleaned by means of watering, brooming or compressed air if required.

Where road markings are to be applied on a concrete pavement, all laitance and loose curing compound shall be removed. Particular care shall be taken to expose a surface of fresh concrete on all areas where road studs are to be fixed.

(d) Setting Out of Road Markings

The lines, symbols, figures or marks shall be set out by means of paint spots of the same colour as that of the proposed final lines and marks. These spot marks shall be at such intervals as will ensure that the traffic markings can be accurately applied, and in no case shall they be more than 1.5 m from each other. Normally, spots of approximately 10 mm in diameter should be sufficient.

The dimensions and positions of traffic marking shall be as shown on the Drawings or as specified in the national regulations for traffic signs and markings.

After spotting, the positions of the proposed road marking such as dotted lines and starting and finishing points of barrier lines are to be indicated on the road. These pre-markings must be approved by the Engineer prior to the commencement of any marking operations.

The positions and outlines of special markings are to be produced in chalk on the finished road and must be approved by the Engineer before they are applied. The use of approved templates will be permissible on condition that the positioning of the marking is approved by the Engineer before application is commenced.

The position of road studs shall be marked out on the road and shall be approved by the Engineer before they are fixed in position.

The Contractor shall be responsible for all setting out of road marking as agreed with the Engineer.

(4) Construction Requirement

The road marking material shall be applied as figures, signs, letters, symbols, broken or unbroken lines or other marks, as shown on the Drawings or directed by the Engineer.

Where the marking material is applied by means of a machine, it shall be applied in one layer. Before the road marking machine is used on the permanent works, the satisfactory working of the machine shall be demonstrated on a suitable site which is not part of the permanent works. Adjustment to the machine shall be followed by further testing. Only when the machine has been correctly adjusted and approved by the Engineer may the machine be used on the permanent work. The operator shall be experienced in the use of the machine. The rate of application shall be checked and adjusted if necessary before application on a large scale is commenced and thereafter daily.

Where two or three lines are required next to each other, the lines shall be applied simultaneously by the same machine. The marking material shall be treated before application, in accordance with the manufacturer's instructions.

Thermoplastic road marking material shall be applied at a nominal rate of 5 kg/m² on asphalt concrete and 6 kg/m² on surface dressing.

Road marking shall be completed before a particular section is opened to traffic. Each layer of marking shall be continuous over the whole area being marked.

Continuous lines of thermoplastic material shall be broken by a 100 mm gap for every 10 m continuous line.

(5) Protection

After the application, the traffic markings shall be protected against damage by traffic or other causes. The Contractor is responsible for the erection, placing and removal of all warning boards, flags, cones, barricades and other protection measures which may be necessary.

(6) Tolerances

Road traffic markings shall be applied with an accuracy complying with the tolerances given below:

(a) Width

The width of lines and other markings shall not deviate from the specified width by more than 5%.

(b) Position

The position of lines, letters, figures, arrows, retro-reflective road studs and other markings shall not deviate from the true position specified by more than 20 mm.

(c) Alignment of Markings

The alignment of any edge of a longitudinal line shall not deviate from the true alignment by more than 10 mm in 15 m.

(d) Broken Lines

The length of segments of broken longitudinal lines shall not deviate from the specified length by more than 150 mm.

In broken lines, the length of segments and the gap between segments shall be as indicated on the Drawings or as directed by the Engineer. Lines and curves, whether broken or unbroken, shall not consist of chords but shall follow the correct radius.

(7) Faulty Workmanship or Materials

If any materials not complying with the requirements are delivered to the Site or used in the Works, or if any sub-standard work is carried out, such material or work shall be removed, replaced or repaired as required by the Engineer, at the Contractor's own cost. Rejected traffic markings and paint or marking material that has been splashed or has dripped onto the surfacing, kerbs, structures or other such surfaces shall be removed by the Contractor at his own cost, in such a way that the markings or spilt paint will not show up again later and the underlying bituminous surfacing is not damaged in any way.

(8) Measurement and Payment

Road marking lines shall be measured by the square meter. The rates for road marking lines shall include for the cost of a priming coat of approved material complying with the manufacturers Specifications if instructed, thermoplastic material including application, ballotini, stencils, setting out, temporary signs, barriers, all traffic control and making good.

1503 Road Marker Stones

(3) Construction (b) Placing and Painting of Marker Stones

Insert the following additional paragraph at the end of this Sub-clause:

The concrete bedding for marker stones shall have a minimum volume below ground level of 0.25 cu.m. for 5th kilometer marker stones and of 0.125 cu.m. for standard marker stones. In addition, the actual volume of concrete used shall be sufficient to ensure the secured and permanent bedding of the marker stones in position to the satisfaction of the Engineer having due regard to the soil and slope conditions and to the size of the initial excavation. Excavation for foundation pits for marker stones shall be wholly backfilled with concrete including the backfilling of any over excavation which may have taken place.

1504 Delineator Posts

(4) Erection and Painting

Delete last sentence of first paragraph and substitute with

"Delineator Posts shall be bedded into ground with concrete foundation of grade M10/40 as shown on the drawings".

Delete last word "element" of the last paragraph and substitute with "paint"

Add new Clause "1505 Metal Beam Crash Barrier" after Clause "1504 Delineator Posts"

1505 Metal Beam Crash Barrier

(1) General

This work shall consist of furnishing and erection of metal beam crash barrier of dimensions and at locations as shown on the drawing(s) or as directed by the Engineer.

Metal beam crash barrier shall generally be located on approaches to bridge structures at locations where embankment height is more than 3 metres and at horizontal curves.

(2) Materials

The design materials to be used and the location of metal beam crash barrier shall confirm to relevant drawings or as otherwise directed by the Engineer.

Metal beam is a "W" profiled corrugated beam in single or double row and single or double faced as specified in the drawing made out of cold roll forming from steel strip of 3 mm thick using steel of Fe 410 grade or ST 42 grade confirming to IS:5986 with hot dip galvanized 550 gm per square meter.

The beam after forming shall have formed width of 312 mm and depth of 83 mm and shall have punched holes for fixing as specified in drawings.

The metal crash barrier posts & spacer shall consist 'C' channel section made out of 5 mm thick sheet by cold roll forming process of steel confirming to ST 42 grade with hot dip galvanized 550 gm per square meter.

All bolt, nuts and washers as specified in drawings shall confirm to IS: 1367 & IS: 1364 unless otherwise specified and are hot dip galvanized 550 gm per square meter.

The Guard rail reflector shall be made of material and placed in position as shown in drawings. It shall be hot dip galvanized 550 gm per square meter.

Beams to be erected on a radius of 50 m or less shall be shop curved to the appropriate curvature of the installation.

The mechanical properties of the base metal for Beam shall confirm to the following requirements:

- i) Yield point, minimum 345 MPa
- ii) Tensile strength, minimum 483 MPa and
- iii) Elongation, in 50 mm, minimum 12 percent

Test specimens for mechanical properties and coating shall be prepared and tested as specified in relevant IS codes.

Steel beam elements and terminal sections shall be galvanized (zinc coated, 0.55 kg per square meter, minimum single spot) unless otherwise specified. The galvanizing on all other steel parts shall confirm to the relevant IS Specifications. All fittings (bolts, nuts, washers) shall conform to the IS: 1367 and IS: 1364. All galvanizing shall be done after fabrication.

Concrete for bedding and anchor assembly shall confirm to section 2000 of these Specifications. The size of the concrete foundation block for embedding guard posts and grade of concrete shall be as shown in the drawing.

(3) Construction Operations

1505.3.1. The line and grade of railing shall be true to that shown on the plans. The railing shall be carefully adjusted prior to fixing in place, to ensure proper matching at abutting joints and correct alignment and camber throughout their length. Holes for field connections shall be drilled with the railing in place in the structure at proper grade and alignment.

1505.3.2. Unless otherwise specified on the drawing, railing steel posts shall be given one shop coat of paint (primer) and three coats of paint on structural steel after erection, if the sections are not galvanized. Any part of assembly below ground shall be painted with three coats of red lead paint.

Splices and end connections shall be of the type and designs specified or shown on the plans and shall be of such strength as to develop full design strength of the rail elements.

(4) Installation of Posts

The guard posts shall be embedded in the concrete footing of size and grade of concrete along with the depth of the embedment of post or as indicated in the drawing.

Posts and the end section for metal beam guardrails on bridges shall be bolted to the structure as detailed on the plans. The anchor bolts shall be set to proper location and elevation with templates and carefully checked.

(5) Erection

All guardrail anchors shall be set and attachments made and placed as indicated on the plans or as directed by the Engineer.

All bolts or clips used for fastening the guardrail or fittings to the posts shall be drawn up tightly. Each bolt shall have sufficient length to extend at least 6 mm through and beyond the full nut, except where such extensions might interfere with or endanger traffic in which case the bolts shall be cut off flush with the nut.

All railings shall be erected, drawn and adjusted so that the longitudinal tension will be uniform throughout the entire length of the rail. The guard rail reflector shall be bolted replacing splice washer at every 10th posts interval.

(6) Tolerance

The posts shall be vertical with a tolerance not exceeding 6 mm in a length of 3 metre. The railing barrier shall be erected true to line and grade.

(7) Measurement

Metal beam railing barriers (single or double row) as shown on the drawings or as instructed by the engineer will be measured by linear metre of completed length and accepted in place.

No separate measurement for payment shall be made for Terminals/Anchors of various types required for work and the delineator to replace washer as specified in drawing. The cost of these elements will be deemed to be included in the rate quoted by the Contractor. Furnishing and placing anchor bolts and/or devices for guardrail posts on bridges shall be considered incidental to the construction and the costs thereof shall be included in the price for other items of construction.

No measurement for payment will be made for excavation and concreting performed in connection with this construction.

(8) Payment

Payment shall be made as per the contract unit rate and shall include full compensation for furnishing of labour, materials, tools, equipment and incidental costs necessary for doing all the work involved in connection with the metal beam railing barrier complete in place in all respects as per these Specifications and drawings.

Add new Clause "1506 Reflective Pavement Markers (Road Studs)" after Clause "1505 Metal Beam Crash Barrier"

1506 Reflective Pavement Markers (Road Studs)

(1) General

Reflective pavement marker (RPM) or road stud is a device, which is bonded to or anchored within the road surface for lane marking & delineation for night time visibility. It reflects incident light in directions close to the direction from which it came.

(2) Definition

Description of terms specific to this standard is as follows:

Coefficient of luminous intensity (CIL) or specific intensity: The ratio of luminous intensity of the retro reflector in the direction of observation to illuminance at the retro reflector on a plane perpendicular to the direction of the incident light expressed in terms of millicandelas per incident lux (mcd/lx).

Horizontal entrance angle: The angle in the horizontal plane between the direction of incident light & the normal to the leading edge of the marker.

Observation angle: The angle at the reflector between the illumination axis & the observation axis.

Retro-reflection: Reflection in which the radiation is returned in direction close to the direction from which it came, this property being maintained over wide variations of the direction of incident radiation.

Head: That part of the road stud, which is above the road surface when the road stud is fixed in position in the road.

Upper Surface: That part of the external surface of the road stud which is visible when the road stud is fixed in position in the road.

Anchorage: That parts of a road stud that is below the road surface when the road stud is fixed in position in the road.

(3) Material

Plastic body of RPM/road stud shall be moulded from ASA (Acrylic Strene Acrylonitrite) or HIPS (High- Impact Polystyrene) or ABS or any other suitable material approved by the Engineer in charge. The marker shall support a load of 13635 kg tested in accordance with ASTM D4280.

Reflective panels shall consist of number of lenses containing single or dual prismatic cube capable of providing total internal reflection of the light entering the lens face. Lenses shall be moulded of methyl methacrylate conforming to ASTM D788 or equivalent.

(4) Design

The slope of retro reflecting surface shall preferably be 35 ± 5 degree to base.
The area of each retro reflecting surface shall not be less than 13.0 sq cm.

(5) Optical performance

(a) Unidirectional

Each reflector or combination of reflectors on each face of the stud shall have a CIL not less than that given in table below.

Minimum CIL value for stud

Entrance angle	Observation angle	CIL in mcd/ lx
		White
0o U 5o L&R	0.3o	220
0oU 10o L&R	0.5o	120

Note: - The entrance angle of 0o U corresponds to the normal aspects of the reflectors when the reflecting road stud is installed in horizontal road surface.

(b) Tests

Co-efficient of luminance intensity can be measured by procedure described in ASTM E809 "Practice For Measuring Photometric Characteristics" or as recommended in BS: 873 Part IV – 1973.

Under test conditions, a stud shall not be considered to fail the photometric requirements if the measured CIL at any one position of measurement is less than the values specified in table provided that

- (i) The value is not less than 80% of the specified minimum, and
- (ii) The average of the left & right measurements for the specific angle is greater than the specified minimum.

(6) Fixing of reflective markers

(a) Requirements

The enveloping profile of the head of the stud shall be smooth & the studs shall not present any sharp edges to traffic.

The reflecting portions of the stud shall be free from crevices or ledges where dirt might accumulate. All road studs shall be legibly marked with the name, trade mark or other means of identification of the manufacturer.

Marker height shall not exceed 20mm.

Marker width shall not exceed 130mm & shall not be less than 100mm.

The base of the marker shall be flat within 1.3mm. If the bottom of the marker is configured, the outer most faces of the configuration shall not deviate more than 1.3mm from a flat surface.

(b) Placement

The reflective marker shall be fixed to the road surface using the adhesives & the procedures recommended by the manufacturer. No nails shall be used to affix the marker as nails are hazardous for the roads.

Regardless of the type of adhesive used, the markers shall not be fixed if the pavement is not surface dry & on new asphalt concrete surfacing until the surfacing has been open to traffic for a period of not less than 14 days.

The portions of the highway surface, to which the marker is to be bonded by the adhesive, shall be free of dirt, curing compound, grease, oil, moisture, loose or unsound layers, paint & any other material which would adversely affect the bond of adhesives.

Use a wire brush, if necessary to loosen & remove dirt, then brush or blow clean.

The adhesive shall be placed uniformly on the cleaned pavement surface or on the bottom of the marker in a quantity sufficient to result in complete coverage of the area of contact of the marker with no voids present and a slight excess after the marker has been lightly pressed in place.

For epoxy installations, excess adhesive around the edge of the marker excess adhesive on the pavement and adhesive on the exposed surfaces of the markers shall be immediately removed. Soft rags moistened with mineral spirits or kerosene may be used if necessary to remove adhesive from exposed faces of pavement markers.

(7) Measurement

The measurement of reflective road markers shall be in numbers of markers supplied and fixed.

(8) Payment

Payment made at the contract unit rate for reflective road markers shall be payment in full compensation for furnishing all labour, material, tools, equipment including all incidental costs necessary for carrying out the work at site conforming to the specifications as per approved drawings or as directed by the Engineer.

Add new Clause "1507 Gabion Safety Barrier" after Clause "1506 Reflective Pavement Markers (Road Studs)"

1507 Gabion Safety Barrier

(1) General

This work shall consist of furnishing and erection of stone filled wire crates (Machine Made Gabion) to function as barrier of dimensions and at locations as shown on the drawing (s) or as directed by the Engineer in the same way as the Gabions as described under Clause 2401.

The measurement and payment shall also be as per the same clause.

Add new Clause "1508 Stone Masonry Safety Barrier" after Clause "1507 Gabion Safety Barriers"

1508 Stone Masonry Safety Barrier

(1) General

This work shall consist of furnishing and erection of random rubble stone masonry walls to function as barrier of dimensions and at locations as shown on the drawing (s) or as directed by the Engineer in the same way as the Masonry for Structures as described under Clause 2600.

The measurement and payment shall also be as per the same clause.

Add new Clause "1509 Plum Concrete Safety Barrier" after Clause "1508 Stone Masonry Safety Barrier"

1509 Plum Concrete Safety Barrier

(1) General

This work shall consist of furnishing and erection of plum concrete walls to function as barrier of dimensions and at locations as shown on the drawing (s) or as directed by the Engineer in the same way as the plum concrete as described under Clause 2019.

The measurement and payment shall also be as per the same clause.

Add new Clause "1510 Confidence Blocks" after Clause "1509 Plum Concrete Safety Barrier"

1510 Confidence Blocks

(1) General

This work shall consist of furnishing and erection of confidence blocks with the respective materials on the respective types of structures to function as barrier of dimensions and at locations as shown on the drawing (s) or as directed by the Engineer in the same way as the type of structures as described under the respective Clauses of the Specifications.

The measurement and payment shall also be as per the respective Clause of the Specifications.

Add new Clause "1511 Precast New Jersey Barriers" after Clause "1510 Confidence Blocks"

1511 Precast New Jersey Barriers

(1) Scope

This Section covers the requirements to be met by the Contractor in relation to the materials, fabrication, transportation and installation of Precast New Jersey (NJ) Barriers along the roads. The purpose of NJ barriers is to reduce the risk of an out-of-control vehicle crossing the main road and colliding with the traffic on service roads or vice versa. These can also be used for barricading construction site from moving traffic during road construction to increase the safety of road workers. NJ Barriers also reduce the risk of a vehicle deflecting back into the traffic stream after colliding with the barriers by allowing the errant vehicles decelerate within tolerable limits and by directing traffic in a prescribed manner.

(2) Applicable Standards

RCC NJ barriers shall comply with the requirements of ASTM 825- Standard Specification for Precast Concrete Barriers or its equivalent IS or NS (where available). If required by the Engineer, the contractor shall demonstrate the functioning of crash barriers employing the standard procedure for safety performance evaluation recommended by the Manual for Assessing Safety Hardware (MASH), previous (NCHRP – 350).

Concrete strength shall be tested in accordance with ASTM C39 or equivalent and average strength values for daily testing shall be equal to or greater than the specified design strength. Cross-sectional and longitudinal dimensions, locations and positioning of anchoring devices and reinforcement shall be acceptable to the Engineer.

Two cubes for each 20 cum of concrete or a minimum of 2 cubes per day's production shall be tested in accordance with ASTM C31 or equivalent procedure. These cubes shall have compression strength required for M25 Grade concrete.

(3) Materials

Cement, aggregates, admixtures and steel reinforcement shall conform to applicable ASTM Specifications or to the relevant Clauses of the Specifications as applicable for the materials used for other similar RCC structures in Clause 2000 of these Specifications.

(4) Manufacture

Concrete mixture shall be proportioned and mixed to meet the minimum strength level and cured as per the methods outlined in Section 7 of the ASTM C 825 specification. Formwork used shall be sufficiently rigid to maintain dimensional parameters. All casting surfaces shall be of smooth and tidy finishes free from honeycombs, porous materials or cement sand plasters. Concrete design strength shall be for M25 in 28 days. Air entrainment shall have air content of $5 \frac{1}{2} \pm 1\%$ as measured by ASTM test method C 173 or C 231 or equivalent applicable standards.

Concrete surfaces shall be finished at the option of the manufacturer (contractor) but these should be comparable to the steel form finish and be uniform for all sections in the contract lot.

Steel Reinforcement shall be provided as shown in the drawing or as designated by the Engineer. Reinforcement shall be designed by the producer or contractor (as the case may be) and be sufficient to permit handling delivery and placement of sections without damage. Minimum concrete cover is 50 mm, except for end sections where cover may be less. See applicable project or ASTM specifications for specific details.

Barriers shall be assembled as a cage with sufficient mat and bar to maintain shape during casting. Reinforcement design for the ends of barrier sections should be in accordance with the publication "Concrete Median Barrier Research," Volume 2, Research Report, prepared by the Southwest Research Institute for the FHA, to prevent fracture at the joints. Laps, welds and splicing shall be acceptable to the Engineer and develop full strength of reinforcement.

Cross sectional dimensions shall not vary from design by more than 6 mm. Vertical centerline shall not be out of plumb by more than 6 mm. Longitudinal dimensions shall not vary from design by more than 6 mm in 3 m long barriers and not exceed 20 mm per section.

(5) Handling and Transport

Unless otherwise specified, the minimum length of each barrier section will be 3 m long. For straight sections, Engineer may ask the contractor to provide NJ barriers of 6 m long or more (up to 10 m).

Lifting devices (hooks etc) shall not be cast into the side surfaces of the barriers. Anchorage to prevent lateral movement of the barrier shall consist of dowels and keyway joints on interlocking devices shall be as specified by the Engineer. Location of anchoring shall be as specified by the Engineer.

(6) Measurement and Payment

Erection of NJ barriers shall be measured by the linear meter in place and paid under the Bill of Quantity Item. The rate shall include for the manufacture / supply / transportation of new precast barriers (loading, handling, unloading, excavation, foundation preparation (sand pad, leveling, concreting), preparation of surface, laying in the position, fixing correctly to the lines and levels as per drawings or as directed by the Engineer. No separate payment for concrete or reinforcing steel or formworks etc shall be paid. Any barriers that have edges broken, concrete chipped away during transportation shall not be paid not plastering would be allowed to make surface look good.

Add new Clause "1512 Solar Street Lighting System" after Clause "1511 Precast New Jersey Barriers"

1512 Solar Street Lighting Systems

(1) Definition

A standalone solar photovoltaic (SPV) street lighting system (SLS) is an outdoor lighting unit used for illuminating a street or an open area. It consists of photovoltaic (PV) module(s), compact fluorescent lamp (CFL), lead acid battery, control electronics, inter-connecting wires/cables, module mounting Pole including hardware and battery box. The CFL is fixed inside a luminaire which is mounted on the pole. The PV module is placed at the top of the pole at an angle to maximize incident solar radiation, and a battery is placed in a box attached to the pole. The module is mounted facing south, so that it receives solar radiation throughout the day, without any shadow falling on it. Electricity generated by the PV module will charge the battery during the day time. This system operates from dusk to dawn.

(2) Scope

This section covers the requirements to be met by the Contractor in relation to the materials, fabrication, installation, testing and commissioning of solar street lighting systems. The street light system consists of the specified electrical hardware, mast arm poles, and footing which includes excavation, breaking of concrete or any other hard surface such as road pavement, concreting,

erecting poles to lines and levels and curing the concrete and re-instatement of the surface to its original condition and disposal of excess spoil materials: on an all complete net basis.

The solar street lighting system shall be provided along the sections of road passing through built up areas, on areas of high pedestrian activity and at all pedestrian zebra crossings and intersections as shown in the drawings or as directed by the Engineer. Electric poles along the bridges shall be anchored as shown in the bridge drawings or as directed by the Engineer. The Contractor shall be required to submit shop drawings of the anchorage details for Engineer's approval.

(3) Specifications of the Solar Street Lighting System

(A) Duty Cycle

The system should automatically switch ON at dusk, operate throughout the night and automatically switch OFF at dawn.

(B) PV Modules (s)

- (a) Both crystalline and thin film technology modules are allowed in the system. The PV module should have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 or IEC 61646 for crystalline and thin film PV modules respectively. The certificate should be from an NABL or IECQ accredited Laboratory.
- (b) The power output of the module(s) under STC should be a minimum of 74 Wp. Either two modules of minimum 37 Wp output each or one module of 74 Wp output should be used. In case of thin film technology PV modules, the specified values refer to the stabilized power output after the initial degradation. The module efficiency should not be less than 12%.
- (c) The operating voltage corresponding to the power output mentioned above should be 16.4 ± 0.2 V.
- (d) The open circuit voltage of the PV modules under STC should be at least 21.0 Volts.
- (e) The terminal box on the module should have a provision for opening for replacing the cable, if required.
- (f) Each PV module must use a RF identification tag (RFID), which must contain the following information:
 - (i) Name of the manufacturer of PV Module.
 - (ii) Model or Type Number
 - (iii) Serial Number
 - (iv) Month and year of the manufacture
 - (v) I-V curve for the module
 - (vi) Peak Wattage of the module at 16.4 volts
 - (vii) I_m , V_m and FF for the module
 - (viii) Unique Serial No and Model No of the module Until March 2013, the RFID can be inside or outside the module laminate, but must be able to withstand harsh environmental conditions.
- (g) A distinctive serial number starting with NSM will be engraved on the frame of the module. The distinctive number starting NSM will also be screen printed on the tedlar sheet of the module.

(C) Battery

- (i) Lead Acid, tubular positive plate flooded electrolyte or Gel or VRLA Type.
- (ii) The battery will have a minimum rating of 12V, 75 Ah (at C/10 discharge rate).
- (iii) 75 % of the rated capacity of the battery should be between fully charged and load cut off conditions.

(D) Lamp

- (i) The lamp should be 11 Watt compact fluorescent lamp (CFL) with 4 pins along with proper pre-heating circuit.
- (ii) The light output from the lamps should be around 900 ± 5 % lumens (for 11 W CFL).

- (iii) The lamp should be housed in an assembly suitable for outdoor use, with a reflector on its back.
- (iv) No blackening or reduction in the lumen output by more than 10%, should be observed after 1000 ON/OFF cycles (two minutes ON followed by four minutes OFF is one cycle).

(E) Electronics

- (i) The inverter should be of quasi sine wave/ sine wave type, with frequency in the range of 20 - 30 KHz. Half-wave operation is not acceptable.
- (ii) The total electronic efficiency should be not less than 85 %.
- (iii) The idle current consumption should not be more than 10 mA.
- (iv) The PV module itself should be used to sense the ambient light level for switching ON and OFF the lamp.

(F) Electronic Protections

- (i) Adequate protection is to be incorporated under no load conditions e.g. when the lamp is removed and the system is switched ON.
- (ii) The system should have protection against battery overcharge and deep discharge conditions.
- (iii) Fuses should be provided to protect against short circuit conditions.
- (iv) Protection for reverse flow of current through the PV module(s) should be provided.
- (v) Electronics should have temperature compensation for proper charging of the battery throughout the year.

(G) Mechanical Hardware

- (i) A metallic frame structure (with corrosion resistance paint) is to be fixed on the pole to hold the SPV module(s). The frame structure should have provision to adjust its angle of inclination to the horizontal between 0 and 45, so that the module(s) can be oriented at the specified tilt angle.
- (ii) The pole should be made of mild steel pipe with a height 6 m above the ground level, after grouting and final installation. The pole should have the provision to hold the weather proof lamp housing. It should be painted with a corrosion resistant paint.

All poles will be of slip base type. This type of special purpose Street Lighting Pole addresses the universal problem of high-speed road accidents (over 60km/h) involving roadside collisions with light poles. These poles shall comply with Australian Standards 1158.1.3 or equivalent Indian Standards. Slip Base Poles differ in design which features the two base plates bolted together with the facility of freely coming apart if a crash occurs. This separation lessens resistance and mitigates the overall effects of the impact (and subsequent damage to the vehicle or injury to its occupants).

All poles shall be tapered round of specified diameter and consist of standard base-plate mounted with either in-ground section or connection spool on rag bolts, bolts, slip washer and rectangular washers. All poles shall be hot dip galvanized to Australian Standards 4680:2006 or equivalent Indian Standards and shall be either powder coated or painted as approved by the Engineer. The slip base poles shall be in a single and double outreach arm arrangement, curved or straight as approved by the Engineer. Poles shall have security or tamper proof screws for access door covers.

- (iii) A vented, acid proof and corrosion resistant painted metallic box for outdoor use should be provided for housing the battery with a provision of lock and key.

(H) Other Features

- (i) The system should be provided with 2 LED indicators: a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery.
- (ii) There will be a Name Plate on the system, which will give: (a) Name of the Manufacturer or Distinctive Logo. (b) Serial Number.

- (iii) Components and parts used in the solar street lighting systems should conform to the latest BIS specifications, wherever such specifications are available and applicable.
- (iv) The PV module(s) will be warranted for a minimum period of 25 years from the date of supply and the street lighting system (including the battery) will be warranted for a period of two years from the date of supply. PV modules used in Solar Street Lighting System must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Twelve (12) years and 80% at the end of Twenty five (25) years. The Warranty Card to be supplied with the system must contain the details of the system.
- (v) Necessary lengths of wires/cables and fuses should be provided.
- (vi) An Operation, Instruction and Maintenance Manual, in English should be provided with the Solar Street Lighting System. The following minimum details must be provided in the Manual: basic principles of photovoltaics; a small write-up (with a block diagram) on the Solar Street Lighting System – describing its components (PV module, battery, electronics and luminaire) and their expected performance; a section on charging and significance of indicators; together with clear instructions about erection of poles and mounting of PV module (s) and lamp housing assembly on the pole.

(5) Measurement and Payment

The solar street lighting system including all the PV modules, battery, lamp, electronics and electronics protection, mechanical hardware including solar light pole and other features for the complete functioning of the solar street lighting system shall be measured in number (n) and paid as per contract price on lump sum basis. The contract price and/or rates shall be the full and the final compensation to the Contractor as per Clause 112.

FOR REFERENCE ONLY

Section 1600 – Piling for Structures

1612 Bored and Cast In-situ Piles

(5) Construction Methods

(c) Tolerances

Replace "100" and "1:100" in 1st and 3rd line of the Paragraph by "75" and "1:50" respectively.

Add "(d) Setting out Piles" after "(c) Tolerances" as follow:

(d) Setting out Piles

Marker pins for the pile positions shall be set out and installed by the Contractor. Immediately prior to installation of the piles, the pile positions shall be checked by the Engineer. The position and verticality/alignment of any auger, tool, casing and/or liner shall be checked by the Contractor immediately prior to installation. For piles with casings and/or liners, the Contractor shall check the position of the casing or liner during and immediately after placing.

Any checks by the Engineer shall not relieve the Contractor of his responsibility.

Add "(e) Length and Diameter of Piles" after "(d) Setting out Piles" as follow:

(e) Length and Diameter of Piles

The length of pile and its diameter are shown on drawings. The final length shall be decided by the Engineer on the basis of study of the results of initial load test on piles and on the basis of actually boring data observed on site for individual pile. Test piles shall be installed as directed by the Engineer at selected locations at each bridge site.

For uncased piles the minimum diameter of the boring shall be ± 25 mm the diameter shown in the drawings. When casing is used, the inside diameter of the casing shall be not less than the pile diameter shown in the Drawings.

(10) Removal of Obstruction

Delete both paragraphs entirely and replace with the following paragraph:

Where boulder/rock or other obstruction render, it's difficult to bore the pile. Excavation operation inside pile casing as directed by Engineer shall be carried out to remove obstructions. No additional payment shall be made for removal of such obstructions.

Add new Sub-clause (17) Telltale Rod as follows:

(17) Telltale Rod

At least 3 telltale rod arrangements shall be extended in each test pile. Each telltale shall be placed as indicated on the Drawing or to each quarter length of pile or extend to depths instructed by Engineer.

The installation of Telltale rod arrangement shall generally be those recommended in ASTM D1143_07.

1614 Pile Tests

(1) Test Piles

Add the following at the end of the Sub-clause 1614 (1):

The boring and cast in-situ test RCC pile of 1 m diameter and 16.50 m length includes reinforcement steel bar, M25/40 grade concrete, providing and installation of anchorage rods, telltale setup and grouting, using Bentonite as per these Specifications and as shown in the drawings etc., all complete. It shall be measured and paid in number (nr).

(2) Loading Tests

Delete the entire content of (b) in second paragraph and replace with the following:

- (b) The test load shall be applied in the increments as specified or approved by the Engineer. These shall generally be those recommended in ASTM D1143_07.

Add the following additional pay item at the end of the Sub-clause 1614 (2):

Static Load Test i.e. Ultimate Pile Load test on Pilot Pile for Test for test load not exceeding three (3) times the maximum design load, which shall be paid in number against the rate quoted in the Bill of Quantities. The payment shall also include the costing of design and providing of steel girders and all other necessary arrangements to conduct this test.

Location and placing of the test piles shall be determined by the Engineer who shall instruct the Contractor accordingly.

After carrying out the above mentioned test on test piles, the Contractor may be required to review of the design of the piles and revise accordingly as per the test results as instructed by the Engineer.

(3) Other Requirements of Loading Tests

Delete entire write ups from (d) to (h) and replace with the following paragraph at the end:

"In general, all pile loads and settlement shall be measured as per the provisions of ASTM D1143_07".

Add "(4) Pile Integrity Tests" after "(3) Other Requirements of Loading Tests" as follow:

(4) Pile Integrity Tests

(a) General

Pile Integrity Testing (PIT) shall conform to the provisions of the relevant ASTM Specifications as follows:

- impulse response method conforming to ASTM C 1740
- sonic echo, frequency response or transient dynamic steady state vibration method conforming to ASTM D 5882

Other methods may be considered by the Engineer subject to satisfactory evidence of performance.

(b) Test Equipment

Provide a pile integrity tester (PIT) with the following minimum requirements:

- The analogue to digital resolution shall be at least 24 bytes,
- The sampling frequency shall be at least 25,000 Hz.

- Data shall be stored such that additional processing or further wave analysis is possible.
 - o Data shall be displayed in the field for evaluations of preliminary data quality and interpretation.
 - o The equipment shall allow attachment of a motion sensing device capable of measuring acceleration, velocity or displacement due to the impact of the pile top with a hand held hammer.

(c) Specialist Subcontractor

The field testing shall be performed by a specialist nominated Sub-contractor with a minimum of five years' experience in the field of pile integrity testing and interpretation of results pertaining to bored cast in place large diameter piles.

(d) Test Preparation

For cast in place piles, integrity testing shall not be performed until the concrete has cured for a minimum of 28 days and the head trimmed down to cut-off level, unless otherwise approved by the Engineer. The pile head shall be free from water, dirt or other debris. The concrete at the pile top surface must be relatively smooth and provide sufficient space for attaching the motion sensing device and for the hammer impact area.

(e) Result Presentation

The testing subcontractor shall present a report within 7 days after performing the field test to provide the final test results and integrity evaluation direct to the Engineer. For each pile tested, the averaged, amplified velocity versus time record shall be included in the report, with a table summarizing results and conclusions. Additional plots and analyses may be required by the Engineer

(f) Acceptance and Rejection

Shafts with no significant deviations from locations above the pile toe, will be accepted. Where no clear toe deviation is apparent, the test engineer shall state to which shaft depth the test appears to be conclusive. Where deviations from locations with significant reductions in pile area or pile material strength or stiffness above the pile toe are observed, the pile has a serious defect. If the record is complex, the results may be deemed inconclusive and the Engineer shall determine what course of action is to be followed. The Contractor shall inform the Engineer of any anomalous results within 12 hours. The decision to reject and replace any defective shaft is at the sole discretion of the Engineer.

(g) Measurement

Pile Integrity Tests shall be measured in number. The Number means a set of tests conducted in one pile as per the provisions of ASTM D 5882.

(g) Payment

Payment for Pile Integrity Test shall be full compensation for testing, analyzing and reporting using low strain waves as per ASTM D 5882 or equivalent standard or as directed by the Engineer, all complete.

1616 Measurement

Add at the end of the first sentence as follow:

“, except concrete and reinforcement bar for working piles”.

1617 Payment

Add the following at the end:

The rate shall also include the cost of undertaking 'confirmatory sub-soil investigation' as per Clause 1619, boring equipment, standard penetration testing, split spoon sampling, boring, excavation, concreting, inspection and control, cutting off, welding, coupling and all related tools, rigs, cranes, jets, frames, leads, labour, barge mounted platform/island of adequate sizes and other incidental equipment and work necessary to complete the work.

Add new Clause "1618 High Strain Dynamic Testing (HSDT) of Piles" after Clause "1617 Payment"

1618 High Strain Dynamic Testing (HSDT) of Piles

(1) PDA Test -Foundation Piles

In addition to load tests described in 1614 above the Contractor shall carry out the following High Strain Dynamic Test (popularly known as Pile Dynamic Analyser or PDA) on;

1. Foundation piles on which load test will be carried out,
2. One third of working piles randomly selected by the Engineer

(2) Specification

- a) The purpose of high strain dynamic testing shall be to obtain pile capacities for bridge foundation piles with a higher confidence level than obtainable with a static load test. This shall be achieved by correlating dynamic tests with static load tests on pilot piles.
- b) The equipment for dynamic testing shall be 'Pile Dynamic Analyser' (PDA) or similar approved equipment conforming to the requirements of ASTM D-4945.
- c) Ram weight, height of fall, cushioning (wood + steel plate) to prevent damage to pile head shall all be in accordance with standard documented international practice.
- d) This work shall be carried out by a specialist sub-contractor who shall employ a professionally qualified engineer with a minimum of 5 years of experience in pile dynamic testing using PDA or similar equipment. He shall be in charge of testing and interpretation of results. He shall present himself at least by video contact for interview prior to being engaged.

(3) Number of Test Piles

Dynamic pile testing shall be carried out on one working pile as selected by the Engineer and pilot test pile. However, the Engineer may reconsider the total number of piles to be tested depending on the quality of results.

(4) Test Report

On completion of all field work, the specialist engineer shall prepare a final report covering all aspect of pile load-settlement behavior including ultimate tip resistance and ultimate shaft resistance. This final report shall incorporate results of the PDA monitoring, and results of all CAPWAP computer analyses. The results of CAPWAP analysts shall be compared to the PDA results and correlations shall be drawn between the CAPWAP results and the PDA field monitoring results.

(5) Measurement

High Strain Dynamic Test (popularly known as Pile Dynamic Analyser) shall be measured in number.

(6) Payment

Payment for High Strain Dynamic Test shall be full compensation for Pile Instrumentation, Accelerometer, Strain transducer, Pile Driver Analyser, Impact Pile Driving Hammer, labour, transportation, professionals, recording and reporting including all incidentals necessary to complete the test.

Add new Clause "1619 Ground Conditions" after Clause "1618 High Strain Dynamic Testing (HSDT) of Piles"

1619 Ground Conditions

No responsibility is accepted by the Engineer or the Employer for any opinions or conclusions given in any factual or interpretative Site Investigation Reports. The Contractor shall report immediately to the Engineer any circumstances which indicates that in the Contractor's opinion the ground conditions differ substantially from those reported in or which could have been inferred from the site investigation reports, geotechnical design report, or from pilot pile test results or from trial boreholes SPT values and tests.

The Contractor shall drill one borehole at each pier and abutment to the design depth of the piles at that location. The borelog shall be provided to the Engineer within three days of the completion of each borehole for his assessment of the consistency of the subsurface conditions with those used for design. No separate payment will be made for such boreholes.

The pile lengths shown on the Drawings are design lengths. Final pile lengths will be determined in the field by the Contractor and approved by the Engineer after considering the pilot pile load test results. If the results vary significantly the Engineer may order confirmatory subsoil investigation.

(1) Confirmatory Sub Soil Investigation

(a) Boreholes

Confirmatory boring and sub soil investigation during construction shall be carried out by the Contractor,

(b) Boring

Boring shall be carried out in accordance with the provisions of AASHTO T-86 or ASTM D 420 and ASTM D 1452 as agreed with the Engineer. Field identification and logging of soil samples shall be made in accordance with the Unified Soil Classification System (USCS).

Before taking any undisturbed samples or making any in-situ test, the lining shall be carried down to the bottom of the borehole at the test depth.

Augers of proper size shall be used in very soft to soft clays and silts to avoid suction, the use of shell shall only be restricted to moderately stiff to very stiff and hard clays and also in sandy strata below water table. The use of a chisel will be permitted only in boulder or rock formation or through local obstructions etc.

Uncased boreholes may be permitted only up to a depth where, the sides of the hole can stand unsupported. In case side fall or squeezing is noticed, steps shall be taken immediately to stabilize the sides of the borehole by casing pipes as directed by the Engineer. Use of bentonite slurry of 5% concentration may be permitted to stabilize the borehole.

No water shall be added while boring through cohesive soils and cohesion-less soils above the water table. While boring through cohesion-less soil below the water table, the water level in the casing shall always be maintained at or above the water table.

The cuttings brought up by the auger, shell or the split-spoon or undisturbed sampler shall be carefully examined and the soil description duly recorded after performing field identification tests.

After completion of the boring at any borehole, a bore log shall be prepared in an approved standard template in consultation with the Engineer and submitted to the Engineer in triplicate. After observing the position of the water table after 24 hours, backfilling of the borehole shall be carried out with approved materials and in a manner as directed by the Engineer.

(c) Standard Penetration Test (SPT)

SPT tests will be carried out in accordance with the procedure in AASHTO T-206 or ASTM D-1586 at 1.5 m interval or at every identifiable change of strata, whichever is earlier.

The driving of split-spoon shall be recorded for every 150 mm of penetration until the total penetration is 450 mm.

Boring shall be terminated when a combined 100 blow count (from SPT) is recorded for 300 mm of penetration or less in the borehole. Other conditions for termination of SPT and subsequently, the borehole are as follows:

- i. 50 blows produce less than 150 mm advance
- ii. 10 successive blows produce no advance

When termination conditions are met, the borehole log shall show the number of recorded blows for the amount of penetration e.g. 70/100 (or 50/100) will indicate that 70 (or 50) blows resulted in a penetration of 100 mm.

N-values as observed in the field shall be reported in the bore logs without any correction for overburden and water table.

(d) Disturbed Samples

Disturbed samples shall be taken from borehole cuttings and split-spoon for visual classification tests at the site. The samples shall be taken at 1.5 m intervals or at every identifiable change of strata, whichever is met earlier to give a reliable record of the variations in the conditions of the soils. Disturbed samples shall be sent to the laboratory in air-tight plastic container with proper labelling for the purpose of record and laboratory testing.

(e) Undisturbed Samples

Undisturbed samples (75 mm diameter) shall be collected in good quality thin walled seamless Shelby Tubes conforming to the ASTM D-1587/AASHTO T-207 from cohesive soil strata. No SPT shall be conducted immediately before collection of an undisturbed sample.

Undisturbed samples shall be taken from the boreholes at following intervals or at every identifiable change of strata if met with earlier.

0.00 m to 15 m @ 1.5 m interval
15 m and above @ 3.0 m interval

The size of the thin walled sampler should be such that a sample having a minimum size of 75 mm diameter and 450 mm length can be recovered. The sampler shall be pushed straight by jacking in soft to firm deposit and no hammering shall be allowed. Use of thick wall samplers may be permitted in case of deposits having very high consistency, subject to the approval of the Engineer. Recovery ratio shall be observed and reported in the boreholes, for every sample. The top and bottom of a sample must be indicated clearly on the sample tube to facilitate laboratory testing in proper orientation.

(f) Handling and Labeling of Samples

The following conditions of handling and protection of undisturbed samples shall be undertaken on undisturbed sample.

- a) Immediately after being taken from the borehole pit, the ends of the sample shall be cut and removed to a depth of about 25 mm (or more in the top to cover any obviously disturbed soil). Several layers of molten wax should then be applied to each end to give a plug about 25 mm thick. If the sample is very porous a layer of waxed paper should first be placed over the ends of the sample.

Any space left between the end of the samples tube and the top of the wax should be tightly packed with saw dust or other suitable material, and a close fitting lid or screwed cap shall be placed on each end of the sample tube.

The lids should, if necessary, be held in position by adhesive tape.

- b) A label bearing the number of the sample, borehole number, depth of sample, date etc., shall be placed inside the container just under the lid. It shall be placed at the top of the sample. In addition, the number of the sample shall be painted on the outside of the container, and the top or bottom of the sample shall be indicated.
- c) Undisturbed soil sample tubes shall be placed in a stout wooden box, and packed with moist saw dust, paper, etc. to prevent damage during transit to the laboratory.

(g) Dispatch of Samples

Samples shall be dispatched to the laboratory as soon as possible after being obtained and shall not be allowed to accumulate on site. If it appears to the Engineer that there is a danger of samples deteriorating through further storage, the contractor shall dispatch such samples as soon as directed by the Engineer.

(h) Groundwater Table Measurement

Groundwater table shall be measured 24 hours after drilling and shall be recorded in the bore log.

(i) Laboratory Tests

Laboratory tests shall be carried out as per relevant AASHTO or ASTM specifications, the results of all tests shall be submitted in the template approved by the Engineer.

(j) Reports and Records

On completion of each borehole, three copies of each bore log shall be submitted to the Engineer, together with one copy of the list of disturbed and undisturbed samples taken from the borehole.

The bore log shall show:

- i) Ground level at borehole referred to the reduced level;
- ii) Co-ordinates of the borehole location;
- iii) A detailed description of each stratum;
- iv) The position, type and identification of each sample and SPT value;
- v) Location of samples in bore log;
- vi) Any other site test results available;
- vii) The levels at which each separate ground water level is first encountered and at which it comes to rest (standing water level).

The Engineer shall select the samples and type of test to be conducted.

On completion of all field and laboratory testing, three copies of all the results shall be submitted to the Engineer in hard and digital format.

(k) Measurement and Payment

There shall be no separate payment to the Contractor for the subsoil boring and testing. The cost for these investigations and related works is covered under payment under the relevant Clause of these Specifications.

FOR REFERENCE

Section 1900 – Bearings and Expansion Joints

Add New Clause 1903 "Rubber Strip Bearing" as follows:

1903 Rubber Strip Bearing

This Sub-clause covers the work in connection with the furnishing and fixing of rubber strip bearings in position for the minor slab bridge in accordance with the details shown on the Drawing to the requirements of these Specifications or as directed by the Engineer.

The thickness of the rubber strip bearing shall be as shown in the Drawings or as mentioned in the Bill of Quantities. The quality of the rubber strip bearing shall meet the requirements as detailed in the ORN 9 "Design of small bridges" or as instructed by the Engineer.

The rubber strip bearing shall be measured and paid in square meter in the respective unit rate of Bill of Quantities.

FOR REFERENCE ONLY

Section 2000 – Concrete for Structures

2004 The Design of Concrete Mixes

Add before Sub clause (1):

All necessary labour, materials, equipment, etc., for sampling, preparing test cubes, curing, crushing of cubes, etc. shall be provided by the contractor. The cube-crushing machine to be provided by the contractor, in accordance with this special provision, shall be approved by the engineer and shall be duly calibrated by an independent inspector/ agency approved by the engineer.

The machine shall be recalibrated at one (1) year intervals or more frequently if instructed by the Engineer, all at the Contractor's expense.

Testing of other materials and concrete may be arranged by the Engineer in an approved independent laboratory at the cost of the Contractor in case the equipment is not operational or test facility does not exist at site.

As a confirmatory test, the Contractor shall carry out the third party lab test on his own cost upon the request of the Engineer.

Add after Sub-Clause: 5(a)

The test cubes prepared during the trial mixes shall be designated preliminary test cubes and as such shall comply with Clause 2004 Sub-Clause 5(a) of the Standard Specifications.

The engineer shall require the contractor to make trial mixes and preliminary test cube at least 40 days before the start of concreting.

2006 Transportation of Concrete

In the last paragraph delete from the end of first sentence "...shall not be longer than the initial setting time of the concrete" and substitute:

".. shall not be longer than 45 minutes. At the discretion of the Engineer, when the ambient air temperature is below 30 degrees Centigrade and conditions are suitable this period may be increased to 90 minutes but in no case shall it be longer than the initial setting time of the concrete."

2007 Placing of Concrete

(3) Placing Procedures

In the first sentence delete "...as nearly as possible in its final position." and substitute with:

"...as nearly as possible to and in no case more than 3 metres from its final position."

Add to the 7th Paragraph as a final sentence.

"In no case shall concrete be discharged from such devices at a height of more than 1.5 metres above its place of final disposition."

2011 Concreting in Hot Weather

(2) Concrete Placing in Hot Weather

Insert as Final Paragraph:

Concrete shall not be placed when the ambient air temperature exceeds 40 Degrees Celsius unless the Contractor submits a proposal for special precautions and receives written approval from the Engineer."

2012 Construction Joint

Add after Clause 2012

The surface of the concrete against which fresh concrete is to be placed is to be maintained in a damp condition for 24 hours before placing the fresh concrete.

2014 Reinforcement

Add after Sub-Clause (1)

Reinforcement bars shall be of high yield strength deformed (HYSD) type (Grade Designation Fe 415) and/or Thermo Mechanically Treated, having specified minimum 0.2 percent proof stress of 500 MPa, conforming to IS:1139 or IS:1786 or equivalent or shall be as specified on the Drawings, or as instructed by the Engineer.

Add after Sub-Clause (4)

Prior to pouring the concrete all reinforcement placed in position shall be checked and approved by the Engineer

2017 Measurement

(4) Reinforcement

Delete "All types of reinforcement shall be measured in metric tonnes in the given ranges:" together with the three bullet ranges and substitute:

"All types of reinforcement shall be measured in metric tonnes irrespective of bar diameter"

2018 Payment

(2) Admixtures, Workability and Hardening Agent

Delete entire paragraph and replace with:

No separate payment shall be made for these agents and all costs in connection with these agents shall be considered included in the respective items of work provided in the Bills of Quantities.

(5) Payment for Sub-standard Works

Delete all paragraphs

Add new Clause 2019 "Plum Concrete" as follows:

2019 Plum Concrete

(1) Scope

This covers the works related to the construction of scour protection, works required to fill scour holes, works required to repair the existing structures, works required to construction the foundation base or to the works related to the construct of retaining structures etc as specified or directed.

(2) Materials

Stones/rocks shall be hard, dense, un laminated natural stone, not liable to deterioration in water and of general quality of soundness and abrasion resistance prescribed for concrete aggregates. Broken rocks shall be of regular "cubical" shape and shall not be flaky. Flat or needle shaped rocks shall not be accepted unless the thickness of the individual piece exceeds 1/3 of their length. The specific gravity of the stone/rock shall be not less than 2.50 and when immersed in water for 24 hours, it shall not absorb water more than 5 percent of its dry weight tested in accordance with IS: 1124. The size of the stone/rock shall not be larger than 200 mm measured in any direction.

Concrete to be used in plum concrete shall be as specified in Section 2000.

(3) Construction

Composition of the plumb concrete shall be 60 to 70 % M15/20 concrete and 40 to 30 % of stones by volume or as directed by Engineer. The place to be filled up with the plum concrete shall be cleaned and chipped for adhesion with the concrete. Following completion of form work a layer of concrete minimum 100 mm thick shall be laid upon which clean and moist stones shall be placed at a distance of min 100 mm measured from face to face in any direction. The distance between the outer edge of the concrete mass and the nearest face of the stone to the edge shall not be less than 100 mm.

Then another layer of concrete having thickness not less than 100 mm measured from the top of the stone to the top surface of the layer shall be laid and compacted.

In case the proportion of concrete to stones is to be changed, the clear space between stones shall be adjusted as directed by the Engineer.

After compaction, again stones shall be placed on the layer as described above and the process shall be continued until the top layer of the concrete is completed. The placing of stones shall be staggered both in horizontal and vertical directions

(4) Tests and Standards of Acceptance

Stones shall be tested for specific gravity and water absorption test. The test result shall meet the requirements as specified in these Specifications.

Concrete shall be tested as specified in section 2000.

(5) Measurement

Plum concrete work shall be measured in cubic meter to the lines and levels shown on the drawing or as directed by the Engineer. Formworks (Class F2 finish) shall be measured in sq. m. separately and paid. Struts, bracing supports etc. shall not be measured separately. They are deemed included in the measurement of form work.

(6) Payment

Payment will be made as per contract unit rate of the item which shall be the full and the final compensation to the Contractor as per Clause 112 to complete the works as per these Specifications.

Section 2100 – Pre-stressed Concrete

2102 General

In first paragraph in first sentence, replace "IRC:18-1985" by "IRC:18-2000".

2103 Cement and Concrete Classes for Prestressed Concrete Structures

In second paragraph, replace "M45/20" by "M50/20" or "M50/40".

2113 Measurement

Delete the third paragraph and replace with the following:

"Provision of ducts/sheaths shall be measured in meter which shall be inclusive of removal of extractable formers and then grouting in ducts."

Insert new Clause 2115 "Lifting and Placing of Precast Girders" as follows"

2115 Lifting and Placing of Precast Girders

(1) Description

The Work shall consist of:

- 1) Lifting or launching of the precast post-tensioned girders from the precast yard;
- 2) Transportation if required;
- 3) Installation of the girders at the designated space on the substructure;
- 4) Securing the girders in place for further operations with necessary false work or bracings.

(2) Submittals

The Contractor shall submit the following to the Engineer, in accordance with this Specification, for his approval:

- (a) A Girder Transportation Plan, if required, identifying the loading and transportation procedures, including the proposed route, schedule and traffic control procedures.
- (b) A Girder Erection Plan comprised of a schedule and detailed procedure clearly illustrating the method and sequence by which the Contractor proposes to unload and erect the precast prestressed concrete girders.

The Girder Erection Plan shall include detailed notes and Shop Drawings, as necessary to describe the following:

- i) Access to undertake work, including earth berms, work bridges, and/or platforms;
- ii) Type and capacity of equipment;
- iii) Sequence of operation, including position of cranes, trucks with girders, and traffic accommodation for all stages of unloading and erection;
- iv) Detailed crane position on the ground, particularly adjacent to substructure elements, such as piers and abutments;
- v) Details of temporary supports, falsework and bracings, including proposed methods to be used to ensure structure stability during further construction activities.

(3) Compliance

The Contractor shall strictly adhere to the following instructions:

- (a) During any operation of transportation or erection the girders shall be lifted only by the lifting loops provided at both ends. In the absence of such loops the girders shall be lifted by holding at both ends, the position of grip or support being at the designated position of bearing centerline. Lifting the girder by any kind of grip or support towards the mid-span is strictly prohibited.
- (b) The re-bars projecting outside the girder concrete surface, such as shear connector bars at the top or the dowel bars at the positions of cross girders or diaphragms, or any other bar provided for the purpose of further construction shall not be used for any operation of lifting, transportation or securing the girder in place. All such bars shall be kept in the shape shown in the drawings.
- (c) Any kind of support, fulcrum or underpinning at any position towards the mid-span from the designated position of bearing centerline is strictly prohibited during storage, lifting, transportation or installation of the precast girders.

(4) Measurement and Payment

Unless specified otherwise in the contract, the item of lifting, transportation and installation of the girders shall be considered one job per girder and shall be measured and paid in number per girder. All the incidental costs including the submittals shall be considered included in the quoted rate.

FOR REFERENCE ONLY

Section 2400 – Miscellaneous Structures

2401 Gabions

(1) Scope

Delete “This Clause covers the furnishing of materials and construction of gabion works...” and substitute:

“This Clause covers the furnishing of materials, reuse of salvaged materials and construction of gabion works...”

(2) Materials

(b) Gabions

Delete Table 24.2 and Add:

Gabion Mesh Type shall be 100 x 120 mm (hexagonal), thickness of mesh wire shall be 3 mm, thickness of binding and connecting wire shall be 2.4 mm, and thickness of selvedge wire shall be 3.9 mm. Gabion boxes and mattresses shall be machine made.

(3) Construction of Gabions

(a) General Requirements

Add as additional last paragraph:

“Where salvaged materials are to be used they shall meet the requirements of this Specification and are subject to written approval of the Engineer.”

(4) Test and standard of Acceptance

Delete clause (c) and (d)

(5) Measurement

Replace all by following:

The Gabion and Gabion Mattresses shall be measured in cubic meters all in place which includes all materials, making of gabion boxes, placing of gabion boxes in position, filling of stones and tying with binding wires and tension wires as specified.

(6) Payment

Replace all by following:

The quantity of the gabion masonry work measured as provided above shall be paid at the contract unit price per cubic meter.

The contract unit price for gabion masonry work will be considered full and final compensation to the Contractor for all expenditure incurred in providing and placing machine made gabion wire mesh boxes and mattresses, including binding wires, selvedge wire and tension wires. It also considers stone filling in gabions including fixing of gabions in position, tying with binding wires and tension wires and preparation of the bottom foundation to the lines and in levels shown on the drawings or as directed by the Engineer and in accordance with the Drawings and the Specifications.

The payment for gabion masonry work shall be made in two (2) installments. First installment 80% of the unit rate quoted in the BOQ shall be made after the construction of gabion masonry structures. The second installment 20% of the unit rate quoted in the BOQ shall be made after carrying out the

backfilling of the structures as per the Specifications and to the satisfaction of the Engineer along with the payment of the backfill works.

2406 Scour Protection and River Training Works

(3) Rip Rap

(b) Tests and standards of acceptance

Delete Fourth sentence onwards

(5) Pitching/Revetment on Slopes

(a) Dry stone Pitching

(ii) Tests and standards of acceptance

Delete the second and third paragraphs

(c) Gabion Pitching

(ii) Test and standards of Acceptance

Delete the second paragraph and replace with the provisions of 2401(4) above

FOR REFERENCE ONLY

Section 2600 – Masonry for Structures

2603 Construction

(1) General

Add the words "levelled, compacted" after the word "cleaned" in the first sentence of fourth paragraph.

2610 Test and Standard of Acceptance

Delete the second and third paragraphs

2611 Measurement

Delete the 2nd sentence and add:

"Pointing shall not be measured separately".

2612 Payment

Delete the 1st sentence and replace by:

The stone masonry shall be paid at the contract unit price which shall be full and the final compensation to the Contractor as per Clause 112. The cost of the pointing shall be deemed to be included in the cost of the stone masonry.

Add the following paragraph after the first paragraph.

The payment for stone masonry works shall be made in two (2) instalments. First instalment 80% of the unit rate quoted in the BOQ shall be made after the construction of stone masonry structures. The second instalment 20% of the unit rate quoted in the BOQ shall be made after carrying out the backfilling of the structures as per the Specifications and to the satisfaction of the Engineer along with the payment of the backfill works.

FOR REFERENCE ONLY

Section 2700 – Repair of RCC Structures

2709 Cement Grouting

Add Sub-clause (7) Measurement and Payment after Sub-clause (6) Testing as follow:

(7) Measurement and Payment

The cement (pressure) grouting with admixtures shall be measured and paid in number (nr) for each pile which shall include adding of admixtures, and other set ups as necessary for performing the works as per the specifications.

The measurement in number (nr) for each pile shall have the limits for 0.06 m³ of grouting material including admixtures or 100 kg of cement quantity. Any under or over use of specified limit of grouting material shall be deducted or paid separately in kilogram of cement-admixture.

FOR REFERENCE ONLY

Section 2800 – Bio-Engineering Works

2802 Provision of Seeds

(2) Tree and Shrub Seed Collection

Delete Clause 2802 (2) (f) and substitute:

- (f) Seeds shall only be collected when fully ripe. Seeds collected early shall not be accepted. The Contractor shall be held liable if the germination rate of seeds is lower than the rates given for each species in manuals and information bulletins published by the Geo-Environmental Unit of the Department of Roads or the Ministry of Forests and Soil Conservation.

2803 Provision of Plant Cuttings

(2) Provision of Hardwood Cuttings

Delete Clause 2803 (2) (g) and substitute:

- (g) Hardwood cuttings are to be 20 to 40 mm in diameter and 300 to 500 mm long for palisades, vegetated stone-pitched walls and for pegging jute netting; 450 to 600 mm for brush layers; and a minimum of 1000 mm long for fascines. These sizes should not be exceeded unless specified or approved by the Engineer.

Delete Clause 2803 (2) (h) and substitute:

- (h) For live check dams, all cuttings are to be 2000 mm in length; the cuttings for cross pieces should be 20 to 50 mm in diameter and the truncheon cuttings for the vertical elements should be 30 to 80 mm in diameter: truncheon cuttings are made from the species listed in Clause (i) below. These sizes should not be exceeded unless specified or approved by the Engineer.

Delete Clause 2803 (2) (j) and substitute:

- (j) Once cuttings have been made, they shall be wrapped in wet hessian jute immediately. At all times, cuttings shall be kept moist and as cool as possible, and shall be wrapped in wet hessian between all operations such as taking from the parent plant, trimming and planting. Under any circumstances, all cuttings shall be planted the same day that they are made.

Provision of Bamboo Cuttings

Delete Table 28.2: Types of bamboo cuttings and substitute:

Table 28.2: Types of Bamboo Cuttings

Local name	Botanical name	Best propagation	Details
Choya/tama bans	Dendrocalamus hamiltonii	Rhizome cuttings / Single node culm	Rhizome cuttings: culm 2500-3000 mm length, leave all branches; rhizome 300-500 mm. Single node culm cuttings: 1 node and 150 mm of culm each side, straight and fine cut, main branch should be 200-300 mm long.
Dhanu bans	Bambusa balcooa	Rhizome cuttings / Single node culm	Rhizome cuttings: culm 2500-3000 mm length, leave all branches; rhizome 300-500 mm. Single node culm cuttings: 1 node and 150 mm of culm each side, straight and fine cut, main branch should be 200-300 mm long.
Kalo bans	Dendrocalamus	Rhizome cuttings /	Rhizome cuttings: culm 2500-3000 mm length,

Local name	Botanical name	Best propagation	Details
	hookeri	Single node culm	leave all branches; rhizome 300-500 mm. Single node culm cuttings: 1 node and 150 mm of culm each side, straight and fine cut, main branch should be 200-300 mm long.
Mal bans	Bambusa nutans (subsp. cupulata)	Rhizome cuttings	Rhizome cuttings: culm 2500-3000 mm length, leave all branches; rhizome 300-500 mm.
Nibha/ghopi/lyas bans	Ampelocalamus patellaris	Rhizome cuttings	Rhizome cuttings: culm 2500-3000 mm length, leave all branches; rhizome 300-500 mm.
Padang bans	Himalayacalamus hookerianus	Rhizome cuttings	Rhizome cuttings: culm 1500-2000 mm length, leave higher branches; rhizome 200-300 mm.
Tharu bans	Bambusa nutans (subsp. nutans)	Rhizome cuttings	Rhizome cuttings: culm 2500-3000 mm length, leave all branches; rhizome 300-500 mm.
Tite nigalo bans	Drepanostachyum intermedium	Rhizome cuttings	Rhizome cuttings: culm 1500-2000 mm length, leave higher branches; rhizome 200-300 mm.

2804 Nursery Construction

Delete Table 28.3: Construction details of nursery beds and substitute:

Table 28.3: Construction Details of Nursery Beds

Bed type	Bed size	Details of construction
Beds for grass seeds, grass slips and tree stool cuttings	1000-1200 mm wide × 250 mm high	50 mm of washed gravel placed above the ground; then 50 mm of 1:1 mix of sieved soil and compost; and topped with 150 mm of 3:1 mix of sieved forest topsoil and washed sand
Seed beds for tree seedlings	1000 mm wide × 170 mm high	50 mm of washed gravel placed above the ground; then 50 mm of unsieved forest soil; 50 mm of 1:3 mix of sieved forest soil and washed sand; and topped with 20 mm of washed, sieved and sterilised sand.
Stand out beds for polypots seedling	1000 mm wide × 150 mm high	50 mm layer of gravel placed above compacted ground. A flat stone or brick surround.
Beds for the propagation of bamboo culm cuttings	1000 mm wide × 300 mm high	Ground below the bed is dug to a depth of 300 mm. Bed is made with 100 mm of un-sieved soil (lower) and 200 mm of sieved soil (upper). A bund 100 mm high is formed around the edge.

(2) Construction of Nursery Beds

Delete Clause 2804 (2)(d) and substitute:-

- (d) Soil beds shall be constructed to hold grass seeds, grasses being propagated by vegetative means and tree stool cuttings. These can be of any practical length but shall be flat and of 1200 mm base width and 1000 mm of top width on compacted and cambered ground. They shall rise to a height of 250 mm above the surrounding ground. They shall be made up as follows: 50 mm of washed gravel is placed above the ground; then 50 mm of 1:1 mix of sieved soil and compost; and the bed is topped with 150 mm of 3:1 mix of fertile, loamy forest topsoil and washed sand. All sieving should be done with a mesh size of 2 mm or smaller.

2805 Nursery Operation and Management

Delete Clauses (b) and replace with:

- (f) **Measurement and Payment:** The basis of measurement shall be the actual numbers of plants counted, certified and accepted by the Engineer. Quantities measured as above shall be deemed to be included in the other respective items in the Bill of Quantities. So no separate payment will be made this operation and management.

2806 Final Slope Preparation for Bio-Engineering

(2) Final preparation of fill Slopes for Bio-Engineering

Add, between Clauses (b) and (c) the following:

If backfilling is required behind a retaining structure, the trimmed material shall be compacted at intervals as the operation proceeds. This will require halting the trimming. The debris shall be redistributed and compacted as backfill. Compaction shall be carried out in level layers approximately 100 – 150 mm thick, laid back into the slope at about 5°. In dry conditions, water shall be added while compacting the material.

2807 Site Planting and Sowing

(2) Direct Seed Sowing of Shrubs and Trees on Site

Delete 2807 (2) (g) and substitute:

- (g) In some cases the Engineer will instruct that seed shall be broadcast on to the slope. In this case, seeding shall be started at the top of the site, working down slope as evenly as possible so that the whole site is lightly covered. This shall be instructed where the site is still active and only warrants minimum expenditure, or where the site is naturally rough, providing plenty of niches in which the seed can catch. Quantities of seed shall depend on the type of seed involved but are generally half that of the quantities used in the nursery. With utis (*Alnus nepalensis*) seed it should be at a rate of 1 gramme of seed per square metre.

Delete 2807 (2) (h) and substitute:

- (h) **Measurement and Payment:** Work shall be measured in square metres on the basis of the actual area of surface over which seeds have been sown. The payment shall be the full and the final compensation to the Contractor for making arrangements for traffic control, providing seeds, all labour, tools, equipment, safety harness and incidentals to complete the work as specified herein. If the seeds are supplied through a separate contract, costs for the supply of the same shall not be included herein. However, if the Contractor is responsible for the supply and storage of seeds no separate payment shall be made for these items.

(3) Site Planting of Grass Slips and Cuttings

Delete 2807 (3) (e) and substitute:

- (e) All grass slips, whether supplied to the Contractor from a nursery (if so provided in the Contract) or otherwise obtained by the Contractor, shall be prepared for planting by the Contractor as given below. The Contractor shall transport them from the source wrapped in hessian jute. At all times, plants shall be kept moist and as cool as possible, and should be wrapped in wet hessian between all operations such as extraction from the bed, pruning and planting. Under any circumstances, all plants shall be planted in the same day that they are lifted from the nursery or other source.

(6) Brush Layering, Palisades and Fascines

Delete 2807 (6) (d) and substitute:

- (d) If the instruction to the Contractor includes the provision of cuttings, then the Engineer shall specify the species and expected sources, and the Contractor must then obtain the cuttings

required. This shall be done in the manner described in Sub-clause 2803 (2), wherein the size of the cuttings shall be 20-40 mm in diameter and of length 300-500 mm for palisades, 450-600 mm for brush layering, and a minimum of 1000 mm for fascines.

Delete 2807 (6) (e) and substitute:

- (e) Cuttings of the following species, if specified for truncheons, shall be a minimum of 2000 mm in length: chuletro (*Brassaiopsis hainla*), dabdabe (*Garuga pinnata*), kavro (*Ficus lacor*), phaledo (*Erythrina species*) and Gliricidia sepium.

Delete 2807 (6) (k) (iv) and substitute:

- (k) (iv) Cuttings shall then be laid along each trench, so that they lie horizontally along the trench. There shall normally be eight cuttings together, although where material is short a minimum of four cuttings is permissible at the Engineer's discretion. They shall be overlapped so that no two ends coincide. Under no circumstances shall buds be damaged. The cuttings shall then be tied using jute or coir (coconut fibre) string at 500 mm intervals to form a bundle, as the fascine is created, it thereby forms a continuous bundle right across the slope.

2810 Site Protection

Add Clause 2810 (4) as follows:

(4) Fabrication and Placement of Steel Tree Guards

The Contractor shall provide steel tree guards as shown on the Drawings in place of the bamboo tree guards as specified in the Clause 2810 (2). No bamboo tree guards shall be accepted.

The steel tree guards shall be placed in line with the provisions detailed in the Clause 2810 (3).

No separate payment shall be made for the fabrication and placement of steel tree guards. All the associated cost is deemed to be included in the relevant item of tree and/or shrub plantation.

2811 Site Aftercare and Maintenance

Delete Clause 2811 (12) and substitute:

(12) Measurement and Payment

"No separate payment will be made for site aftercare and maintenance and all the associated cost is deemed to be included in the relevant item rate".

Add new Clause 2812 "Turving" as follows:

2812 Turving

Grass turfs shall be harvested, delivered and planted within 36 hours, unless otherwise authorized by the Engineer. Grass turfs shall be free from noxious weeds and diseases and shall contain a minimum of 30 mm of soil. The turfs shall be of a variety of grass approved by the Engineer. The grass shall either have been grown specifically for turf purposes, mown regularly and maintained to provide an approved quality of uniformity or shall be from some other source approved by the Engineer. It shall be harvested by special machines which ensure an even depth of cut with sufficient root material and soil.

Areas to be grassed by turving shall be given a layer of topsoil at least 75 mm thick unless, due to the presence of suitable sub-soil, the Engineer orders that the topsoil be omitted. The areas to be turfed shall be thoroughly watered beforehand so that they are wet to a depth of at least 150 mm when turving is done. The surface shall be made slightly rough to ensure a good penetration of roots into the soil. Turfs shall be protected against drying out and shall be kept moist from the time of harvesting until finally placed.

The first row of turfs shall, where it is possible, be laid in a straight line and, if on a slope, starting at the bottom of the slope. The turfs shall be butted tightly against each other, care being taken not to stretch or overlap turfs. Where a good fit cannot be obtained, the intervening space shall be filled with topsoil. The next row shall be placed in the same manner tightly against the bottom row with the joints staggered and so on until the full area is covered with turfs. On steep slopes, when instructed by the Engineer, the turfs shall be held in position by sufficient wooden stakes approximately 300 mm long by 20 mm in diameter.

The Contractor shall water the turfs directly after placing to prevent undue drying out. As turfing is completed, each section shall be lightly rolled and thoroughly watered.

All turfed and planted areas shall be adequately watered at frequent and regular intervals in order to ensure proper germination of seeds and growth of grass until the grass has established an acceptable cover and thereafter until the beginning of the maintenance period of the grass. The amount and frequency of watering shall be subject to the Engineer's approval.

The Contractor shall further mow the grass on all areas that have been grassed whenever so instructed by the Engineer, until the end of the maintenance period. All grass cuttings shall be collected and disposed of if so directed by the Engineer. Weeds shall be controlled by means of pulling, cutting or any other approved means. Any bare patches where the grass has been damaged or has dried up, shall be cultivated, planted, turfed or seeded at the Contractor's expense until an acceptable healthy cover has been established.

All grassed areas shall have acceptable cover as defined below at both the beginning and the end of the maintenance period.

In the case of turfing, acceptable cover shall mean that the full area shall be covered with live, healthy grass without bare patches at any time not less than three months after turfing.

"The maintenance period of grass shall commence when an acceptable cover as defined above has been established and shall be one year or until the end of the defects liability period, whichever is the later.

Payment for Turfing shall be by the square metre instructed to be turfed and successfully turfed to provide acceptable cover as defined above. Payment shall include the full costs of all works required to establish and maintain acceptable cover and to comply with the Specification requirements.

Add new Clause 2813 "Site Planting of Bamboo" as follows:

2813 Site Planting of Bamboo

- (a) The planting of bamboo is intended to replace or restore something of the natural vegetation on the slope to be treated. The Contractor is required to carry out the planting of seedlings to the Engineer's specific instructions.
- (b) The spacing of plants will be determined according to individual site conditions. However, it will normally be at two meters across a slope and five meters up and down the slope.
- (c) Select a suitable culm of the parent clump and dig out the rhizome carefully. Cut off the clump about two meters above the ground level. Cut the rhizome where it branches from the main plant, taking great care not to damage buds and small roots.
- (d) Wrap the root ball in damp Hessian and transport the cuttings to site for planting on the same day.
- (e) Dig a hole (at least five times the size of the cutting rhizomes) and plant the rhizome either upright or at right angles to the slope. Carefully backfill the hole and firm the soil as much as possible.
- (f) The Contractor is required to supervise all field operations very closely. The planting of bamboo is a delicate business and should be approached in the same way as the planting of horticultural seedlings. The Contractor should employ experienced agricultural or forestry labourers for this work.
- (g) Measurement and Payment:

The measurement shall be made in number of plants planted, counted and accepted by the engineer at site. The quantities measured shall be paid at the unit rates shown in the Bill of Quantities.

Add new Clause 2814 "Live Check Dam Construction" as follows:

2814 Live Check Dam Construction

- (a) The cuttings should be at least 2000 mm long and 50-80 mm in diameter made from woody material that is 6 to 30 months old. The contractor is to collect the cuttings from local area and transport them from there wrapped in hessian jute. At all times, cuttings are to be kept moist and as cool as possible. Under any circumstances, all plants supplied must be planted the same day.
- (b) Cuttings of the following species, if specified, should be a minimum of 2000 mm in length: dabdabe (*Garuga pinnata*), kavro (*Ficus lacor*), phaledo (*Erythrina spp*) and *Gliricidia sepium*.
- (c) Spacing between check dams depends on the steepness of the gully slope and the profile of the floor. Live check dams should normally be at intervals of between three and five metres. Within check dams, cuttings should be about 30 to 50 mm apart.
- (d) Live check dams should be constructed as given below, unless specified differently.
 - (i) Make a hole deep and big enough to insert vertical hardwood cuttings of the largest size available. Use a crowbar if necessary to extend the hole.
 - (ii) Insert the vertical cuttings by carefully pushing them into the hole and firming the soil around them. Try not to damage the bark. They should protrude about 300 mm above the ground surface.
 - (iii) Place long hardwood cuttings on the uphill side of the vertical stakes.
 - (iv) Backfill around the check dam and compact the soil.
- (e) Measurement and Payment: The measurement shall be measured separately as per the accepted final product in linear metre. The quantities measured shall be paid at the unit rates shown in the Bill of Quantities.

Add new Clause 2815 "Measurement and Payment" as follows:

2815 Measurement and Payment

All the bioengineering items shall be measured in the respective units of the items of works specified in the Bill of Quantities (BoQ).

The payment of all the bio-engineering work items shall be made in two installments. First installment of 50% of the unit rate quoted in the BoQ shall be made after the completion of the works as per the Specifications and satisfaction to the Engineer. The second installment 50% of the unit rate quoted in the BoQ shall be made at the end of Defect Liability/Notification Period after carrying out the aftercare and maintenance of the bioengineering works that deem to be covered within the quoted rate, and acceptable to the Engineer.

Add new Clause 2816 "Priority on Bioengineering Works" as follows:

2816 Priority on Bio-engineering Works

The bioengineering works are very important to stabilize the side slopes. The Contractor shall require prioritizing the bioengineering works and stabilizing the side slopes before carrying out the bituminous works at the locations as instructed by the Engineer. In case of the bituminous works are carried out by the Contractor without carrying out the bioengineering works, and hence the bituminous works are damaged due to the slope failure in the absence of the bioengineering works, it is the responsibility of

the Contractor to repair the bituminous works at his own cost. In no case, the Works shall be considered as completed unless the Contractor completes the bioengineering works to the satisfaction of the Engineer.

FOR REFERENCE ONLY

Section 3100 – Miscellaneous Works

3105 Railings

(5) GI Pipe Railing with RCC Posts

(a) GI Pipe

Add at the end of the second paragraph as follows:

“The diameter of GI Pipe shall be as shown in the Drawings and/or as mentioned in the Bill of Quantities.”

(b) RCC Posts

Add at the end of the second paragraph as follows:

“The size of the RCC poles shall be as shown in the Drawings.”

Insert new Sub-clause (5a) “GI Pipe Railing” as follows:

(5a) GI Pipe for Railing

GI pipe shall comply with NS: 199/2046 (Heavy Duty). The diameter of GI Pipe shall be as shown in the Drawings and/or as mentioned in the Bill of Quantities.

All GI pipes shall be free from abrasions, rough or sharp edges, and shall not be kinked, twisted or bent. Any pipe which does not meet the requirements of the field Specifications shall be replaced at the Contractor's expense.

(6) Measurement

Delete the whole content of (6) Measurement and replace with the followings:

(a) Measurement for GI Pipe Railing with RCC Posts

GI Pipe Railing with RCC Post shall be measured in linear meter for complete railing set including GI pipes and RCC posts installed and accepted. Railing shall include both horizontal and vertical members, posts including bolts, nuts, fittings, etc as shown in the Drawings. It also includes the excavation for the foundation of the RCC post, preparation of the foundation and backfilling with the concrete of grade as shown in the Drawings to the satisfaction of the Engineer.

(b) Measurement for GI Pipe for Railing

GI Pipe for Railing shall be measured in linear meter installed and accepted. The works shall also include complete fixing with the respective elements including bolts, nuts, fittings, etc. as shown in the Drawings to the satisfaction of the Engineer.

3106 Approach Slabs

(1) General

Delete “..M20/40.” and substitute with:

“..M25/20.”

(2) Measurement

Delete existing sentence and substitute:

“Approach slabs shall be measured as per the respective items in Section 2000 - Concrete for Structures”.

3107 Drainage Spouts

(5) Measurement

Delete the entire content and modify as follows:

The drainage spouts shall be measured in number for the complete set including the materials, fabrication, and placement and finishing and the pipes for drainage spouts as shown in the Drawings and to the satisfaction of the Engineer.

(6) Payment

Delete the entire content and modify as follows:

The drainage spouts shall be paid at the contract unit price as mentioned in the Bill of Quantities. Such cost shall include all the cost for the complete set including the materials, fabrication, and placement and finishing and the pipes for drainage spouts as shown in the Drawings and to the satisfaction of the Engineer.

3108 Utility Facilities

(3) Measurement

Delete the entire content and modify as follows:

The galvanized steel bracket under utility facilities shall be measured in number (nr) for the complete set including procurement of materials, fabrication, installation and completion as shown in the Drawings and to the satisfaction of the Engineer.

(4) Payment

Delete the entire content and modify as follows:

The galvanized steel bracket under utility facilities shall be paid at the contract unit price as mentioned in the Bill of Quantities. The payment shall include all the cost for the complete set including procurement of materials, fabrication, installation and completion as shown in the Drawings and to the satisfaction of the Engineer.

3109 Weep Holes

(2) Measurement

Modify the 1st sentence of this Sub-Clause as follows:

Where instructed by the Engineer and placed in the works, pipes for weep holes shall be measured in linear meter.

(3) Payment

Modify the 1st sentence of this Sub-Clause as follows:

Pipes for weep holes shall be paid at the contract unit price shown in the Bill of Quantities.

Add new Clause 3111 “Interlocking Concrete Block” after Clause “3110 Pervious Material” as follow:

3111 Interlocking Concrete Block

(1) General

Interlocking Concrete Block Pavements shall be used in footpaths for the pedestrians or as per the instruction of the Engineer. Laying of the blocks shall be done, precisely at the indicated level and profile. The blocks shall be laid to the pattern as shown in the drawings or as directed by the Engineer. The blocks shall be laid as tight as possible to each other. The maximum joint width shall be limited to 4 mm. Fine angular sand as per specification shall be brushed into the joints, and thereafter compaction shall be done with a vibrating plate compactor on a clean surface.

(2) Design Parameters

(a) Block Thickness

The thickness of interlocking blocks shall be 60 mm. The blocks shall be constructed with M 20/20 grade concrete. All blocks should be of the same thickness, with a maximum allowable tolerance limit of ± 3 mm.

(b) Sand Bedding and Jointing

A layer of stone dust /fine sand bedding is provided between block pavement and compacted base with granular sub-base material to provide a cushion between the hard base and the paving blocks and to correct the permitted surface unevenness of sub-base.

The stone dust /fine sand bed should not be too thick lest it would be difficult to control the surface level of the blocks. A layer thickness of 20 to 40 mm is found to be satisfactory. The stone dust /fine sand used should be free from plastic clay and should be angular type.

Joints between blocks are filled by stone dust /fine sand. Normally, the bottom 20 to 30 mm of the joint gets filled with bedding sand, whereas, the remainder space has to be filled with jointing sand by brooming it from the top. The joints are normally 2 to 4 mm wide.

(c) Base Construction

This layer is the important structural layer of a block pavement. The material used for base construction consists of granular sub-base material meeting the standard of Clause 1201 of 75 mm thickness.

(3) Construction

(a) General

The construction of interlocking concrete block involves preparation of sub-grade and sub-base layers, bedding sand and finally the laying of blocks. The block paving can be done entirely by manual labour. However, for efficient construction work, the work force has to be properly trained for this specialized job.

(b) Preparation of Sub-grade

Sub-grade should be compacted in layers of 150 mm to 200 mm thickness as per the use of compaction equipment. The prepared sub-grade should be graded and trimmed to a tolerance of ± 20 mm of the design level.

(c) Sub-base Course

The granular sub-base course shall be constructed following the section 1201 of this Specification.

(d) Placing and Screeding of Bedding Sand

The thickness of the sand bed after compaction should be in the range of 20 - 40 mm, whereas, in the loose form it can be 25 to 50 mm. Bedding sand should not be used to fill-up local depressions on the surface of a sub-base layer. The depressions should be repaired in advance before placing sand. Sand to be used should be uniformly in loose condition and should have uniform moisture content. Best moisture content is between 6 to 8 per cent.

The processed sand is spread to the required thickness. The sand is subsequently compacted with plate vibrators weighing 0.6 tonnes or more.

(e) Laying of Blocks

Blocks can be laid generally by manual labour.

As far as possible, laying should proceed in one direction only, along the entire width of the area to be paved.

While locating the starting line, the following should be considered:

- In case of irregular shaped edge restraints or strip, it is better to start from straight sting line.
- Influence of alignment of edge restraints on achieving and maintaining laying bond.

(4) Measurement and Payment

The measurement and payment of the interlocking concrete block shall be made in Square meter. Payment made at the contract unit rate for interlocking concrete block shall be payment in full compensation for furnishing all labour, material, tools, equipment including all incidental costs necessary for carrying out the works of sub-grade preparation, sub-base layer, stone dust/fine sand laying, supply and laying of concrete blocks etc at site conforming to the Specifications as per approved drawings or as directed by the Engineer.

Add new Clause 3112 "Passenger Shade" after Clause 3111 "Interlocking Concrete Block" as follow:

3112 Passenger Shades

The Contractor shall procure materials and fabricate the passenger shades as shown on the Drawings. The location of the passenger shades at site shall be determined and instructed by the Engineer. The placement, erection and the finishing of the passenger shades shall be to the satisfaction of the Engineer. The passenger shades shall be measured and paid in number as specified in the Bill of Quantities for the procurement of material, general requirements, fabrication, placement and finishing of the whole unit of the passenger shade as shown on the drawings and to the satisfaction of the Engineer. The payment shall be full and final to the Contractor to complete the work as per these specifications and the Drawings.

Add new Clause 3113 "High Density Poly-Ethylene (HDPE) Pipe" after Clause 3112 "Passenger Shade" as follow:

3113 High Density Poly-Ethylene (HDPE) Pipe

The pipes to be used for sub-surface drain, grouting purpose etc. if specified in the Bill of Quantities shall be made of high density polyethylene and shall comply with series II as specified by NS 40/2040. Jointing of pipes shall be done by fine-cutting and heating following with equipment complying with the prescription of the HDPE pipe manufacturer. Pipes may be jointed with angles to fit the requirements of the terrain, but angles shall not exceed the maximum specified by the manufacturer. The joints shall be watertight and develop the same strength as unjointed HDPE material. The method of jointing shall be approved by the Engineer prior to starting the works.

For sub-surface drain purpose, pipes shall be provided with holes of minimum 5 mm diameter. The pipes shall be perforated by drilling minimum 50 holes per meter length on the upper half of the pipe

in a staggered pattern uniformly distributed. The Engineer might adjust these specifications according to the site conditions.

The measurement and payment of HDPE pipe shall be made in meter (m) including jointing, fitting etc. all complete. The contract unit rate shall be the full and the final compensation to the Contractor as per Clause 112 to complete the works as per these Specifications.

Add new Clause 3114 "Galvanized Steel Base Plate" after Clause 3113 "High Density Poly-Ethylene (HDPE) Pipe" as follow:

3114 Galvanized Steel Base Plate

The galvanized steel base plate shall be used in fixing the pedestrian handrails and crash barriers railings in the bridges as shown in the drawings. Materials, fabrication, transportation, installation and painting for base plate shall conform to the requirements of Section 2200.

All complete steel base plate elements, bolts, nuts, hardware and other steel fittings shall be galvanised or painted with an approved paint as specified in the Contract. If galvanized, all elements of the base plate shall be free from abrasions, rough or sharp edges, and shall not be kinked, twisted or bent.

Galvanising shall be carried out as per Clause 2209. Damaged galvanised surfaces, edges of holes and ends of base plate cut after galvanising shall be cleaned and re-galvanised.

The galvanized steel base plate shall be measured and paid in Kilogram (kg) for the complete works as shown in the drawings and specified in these specifications.

Add new Clause 3115 "Reflectorized Enamel Painting Works" after Clause 3114 "Galvanized Steel Base Plate" as follow:

3115 Reflectorized Enamel Painting Works

This Clause covers the enamel painting works of safety and/or warning barrier with black or yellow paint as indicated on the Drawing or instructed by the Engineer.

The colour, width and layout of the painting on safety and/or warning barrier shall be in accordance with the Traffic Signs Manual (latest publication), Department of Roads.

Paint shall comply with the requirements of NS 408/054 or BS 6044 (1987) or as specified in the Contract. If specified in the contract, the paint may also be reflectorised paint, in which case the paint shall be reflectorised by the addition of reflecting beads (ballotini). The ballotini shall comply with BS 6088:1981 (1993).

The paint shall be delivered to the site in sealed containers bearing the name of the manufacturer and the type of paint.

The viscosity of the paint shall be such that it can be applied without thinning. Under no circumstance thinning shall be allowed.

The paint shall not be applied to damp surfaces or when the relative humidity exceeds 80%, or at temperatures lower than 10o C, or when, in the opinion of the Engineer, wind strength is such that it may adversely affect the painting operations.

Before the paint is applied, the surface shall be clean and dry and completely free from any soil grease, oil, acid or any other material which shall be detrimental to the bond between the paint and the surface. The portions of the surface where the paint is to be applied shall be properly cleaned by means of watering, brooming or compressed air.

If any material not complying with the requirement is delivered on the site or used in the works, or if any sub-standard work is carried out, such material or work shall be removed, replaced or repaired as

required by the Engineer at the Contractor's own cost. Rejected paint which has been splashed or dripped on the surfacing, kerbs, structures or other such surfaces, shall be removed by the Contractor at his own cost, in such a way that the marking or split paint shall not show up again later. After the application of paint, it shall be protected against damage by traffic or other causes. The Contractor is responsible at his own cost for the correction of the painting works damaged by the external means.

The painting works shall be measured and paid in square meter for completed works. The quantities measured as provided above shall be full and the final compensation to the Contractor as per Clause 112 for carrying out the work as specified in these Specifications.

FOR REFERENCE ONLY

Add new **“Section 3200 – Special Provisions for Minor Bridges”** after **“Section 3100 – Miscellaneous Works”**

Section 3200 – Special Provisions for Minor Bridges

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FOR REFERENCE ONLY

3201 Review of Foundation Design of Minor Bridges

The minor bridges included in the Contract are of type designed. The Contractor shall check, prepare and propose suitability of the foundation of the minor bridges after carrying out hydrological and geotechnical investigations referring the drawings issued.

The foundation design verification of the minor bridges including the required investigations and reporting shall be measured in number (nr) and paid as per contract price on a lump sum basis. The measured number for foundation verification/design of the minor bridges shall cover one set of bridges that includes two (2) bridges in each direction at a river location. The contract price and/or rates shall be the full and the final compensation to the Contractor as per Clause 112.

3202 Dismantling of the Existing Bridges and Clearance of Site

The Contractor shall dismantle the existing bridges completely including the superstructure, substructure, foundation and ancillary structures of the bridge so that the construction site is made clear for new construction. The job also includes the clearance of sites, stockpiling of the reusable materials and disposal of the unusable materials at environmentally safe tipping sites to the satisfaction of the Engineer before the start of the construction of new minor bridges.

The dismantling of existing bridges including clearance of sites shall be measured in number (nr) and paid as per contract price on lump sum basis for the complete job as described above in this Specification to the satisfaction of the Engineer. The contract price and/or rates shall be the full and the final compensation to the Contractor as per Clause 112.

FOR REFERENCE ONLY

Add new “Section 3300 – Performance Based Maintenance Works” after “Section 3200 – Special provisions for Minor Bridges”

Section 3300 – Performance Based Maintenance Works

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FOR REFERENCE ONLY

3301 Overview of Performance Based Maintenance

(1) Description

This Section 3300 Performance Based Maintenance Works and Services describes the works and services to be undertaken during Phase 2: Performance Based Maintenance Works.

The objective of performance based maintenance works and services is to ensure that the good physical condition of the road asset under contract over the entire period of the contract.

In traditional road maintenance contracts, the Contractor is responsible for the execution of works which are normally defined by the Engineer, and the Contractor is paid on the basis of unit prices for different work items and quantities of works executed. In Performance Based Maintenance contracts, the Contractor is responsible to identify, plan and carry out the Works and Services to achieve and maintain the Service Levels (Management Service Levels and Operational Service Levels) specified in Section 3300. He will not receive instructions by the Employer and/or Engineer of what to do when, where and how as in traditional maintenance contracts, except for Emergency Works or Day Works.

The role of the Engineer, on behalf of the Employer, is to enforce the contract by verifying compliance with the agreed Service Levels and with all applicable legislation and regulations.

The Contractor will receive a Monthly Lump Sum Fee for the Performance Based Maintenance Works and Services. Payment reductions will be applied if the Contractor fails to comply with the Service Levels in any given month. Emergency Works are paid on unit price basis.

(2) Required Services

Two groups of services are required: Management Services and Operational Services.

The management services include providing the information the Employer requires to manage the road asset during the Maintenance Phase of the Contract and to facilitate either the next tendering process or handover to the Employer, such as:

- Information on how the Contractor assures the quality of his services, manages the health and safety of his staff, manages emergencies, and manages traffic at the work site
- Contractor's work programs
- Regular progress reports
- Inventory updates and other data sharing requirements
- Maintenance history
- Management of enquiries from third parties (public, police, etc.)

The operational services include the activities needed to maintain the satisfactory condition of the road assets, to assure their durability, as well as to satisfy the road users riding comfort requirement. These include, inter alia:

- Road and lane width
- Road roughness
- Control of potholes and cracking
- Drainage off the pavement
- Rutting
- Visibility of road signs and markings
- Response times to rectify defects that compromise the safety of road users
- Vegetation control
- Edge break
- Depression
- Raveling
- Shoulder condition

(3) Contractor's Responsibilities

Besides the timely provision of management information to the Employer, the Contractor shall be responsible for defining, optimizing and carrying out in a timely manner the works which are needed to ensure the roads remain at or above the Operational Service Levels defined in the Contract. In doing this, the Contractor shall comply with local legislation, the Specifications, environmental and social regulations.

The Contractor shall set up a Performance Monitoring Unit to observe road conditions and plan the various works needed to ensure the roads meet the defined Operational Service Levels. The Performance Monitoring Unit will provide the Contractor with information on the Contractor's compliance with the Operational Service Levels, and data required to define and plan all works. Under the maintenance works and services, the Employer will not issue instructions to the Contractor regarding the types and volumes of works to be carried out but instead, the Contractor will decide what to do where, when, and how.

(4) Definitions

In addition to the terms defined in the Conditions of Contract, the following words and expressions shall have the meanings stated.

- "Day" means calendar day
- "Emergency Work" means the works that are defined under Clause 3206.
- "End Date of Phase 2: Performance Based Maintenance Works" means the date on which the maintenance works were completed in accordance with the Contract as stated in the Taking-Over Certificate issued for Phase 2: Performance Based Maintenance Works.
- "GPS" means Global Positioning System.
- "Management Service Levels" means Service Levels associated with the Management Services.
- "Maintenance Unit" means the Contractor crew dedicated to execute the maintenance works. This Unit shall also act as the initial response unit in case of any emergency.
- "Maintenance Works" means all Works and Services required to comply with the Service Levels. This includes replacements of road assets, if necessary.
- "MSL" means Management Service Levels.
- "Performance Monitoring Unit" means the Contractor's dedicated personnel tasked among other things to evaluate and report on the condition of the road as well as plan the necessary maintenance and rectification works.
- "Monthly Lump Sum" means the monthly rate per Kilometer of road payable to the Contractor for completed Maintenance Works, subject to reductions as provided in the Contract.
- "Operational Service Level" means the level of usability of the road and its various assets as established by the prescribed allowable non-conformances, beyond which the road is considered as non-complying and requiring rectification works to be executed.
- "OSL" means Operational Service Level.
- "Phase 1" means the period for which the upgrading works of the road is to be executed by the Contractor under Phase 1: Upgrading Works.
- "Phase 2" means the period for which the performance based maintenance works and services to be executed by the Contractor under Phase 2: Performance Based Maintenance Works.

- “PRP” means Payment Reduction Point.
- “Payment Reduction Point Value” means the monetary value of one PRP.
- “Rainy Season” means generally the time between June 15 and September 15.
- “Road Assets” means all road related assets, including road furniture, within the right of way of the Narayanghat – Butwal Road section of East – West Highway belonging to the Department of Roads.
- “SL” means Service Level, a generic abbreviation for both OSL and MSL.
- “Commencement Date of Phase 2” means the day immediately following the conclusion of the Defects Notification Period of the Phase 1: Upgrading Works.
- “Works” means Works and Services
- “Work Order” means an order issued by the Employer in response to the Contractor's proposal for the execution of works under Emergency Repair Works, which details the works required as well as the agreed time and cost.

3302 General

(1) Project Site

The project site is Narayanghat – Butwal Road section of East – West Highway.

Maintenance is to be provided for the road and all associated items for the full width of the road right of way and for any ancillary works outside the right of way such as drainage inlets and outlets, slope and structure protection works etc. The area to be maintained includes the first 10 m length of the side/approach roads.

(2) Scope of Services

In accordance with GCC Clause 7, the Works to be provided by the Contractor include all managerial, administrative and physical activities that the Contractor needs to carry out, to comply with the Service Levels specified herein, or with any other requirements of the Contract. In particular, they include physical activities associated with the following road-related assets and items:

- (i) Paved areas of roads, parking areas, lay-bys, shoulders, footways and the like;
- (ii) Unpaved shoulders, medians and verges;
- (iii) Signs, road markings and road safety furniture;
- (iv) Road lighting and associated facilities;
- (v) Bridges, culverts, earth retaining structures and other structures;
- (vi) Drainage ditches, pipes, manholes and related items;
- (vii) Slopes of cuttings and embankments;
- (viii) Landscaped areas; and
- (ix) Other road assets, which have been constructed or installed during Phase 1.

Management services include processes and procedures such as:

- (a) assure the quality of the services;
- (b) manage the health and safety of the Contractor's personnel;
- (c) protect the environment;

- (d) manage emergencies;
- (e) manage traffic at work sites, and
- (f) collect, manage and report on data specifically required by the Contract and in addition necessary for the effective management of the services
- (g) Daily inspection patrols.

(3) Performance Criteria and Service Levels

The required condition of road assets is achieved by satisfying performance criteria designed to limit the presence of defects such as potholes and cracking in the pavement. Performance criteria are defined by Service Levels, which are the specified threshold for each of the performance criteria; for example, it may be specified that there shall be no pothole in excess of 150 mm in diameter or 50 mm deep and no crack shall be wider than 5 mm. The defined Service Levels are the accepted minimum thresholds for the quality levels of the road assets for which the Contractor is responsible.

Service Levels are specified in two categories:

- (a) Management Service Levels relating to the various management processes and procedures of the Contractor that deliver the Operational Service Levels, ensure good governance of the asset during the term of the Contract, provide information that the Employer concerning the delivery of the Works and facilitate the next tender round. They address matters such as:
 - (i) Information on how the Contractor assures the quality of his services, manages the health and safety of his staff, protects the environment, manages emergencies, and manages traffic at work sites;
 - (ii) Contractor's work programmes;
 - (iii) Regular progress reports;
 - (iv) Recording of network and inventory updates;
 - (v) Recording of maintenance history; and
 - (vi) Management of enquiries from third parties (public, police etc)
- (b) Operational Service Levels that are measures of the condition of the assets to assure their durability, to provide road user services and to ensure safe operation and comfort, such as:
 - (i) Timely response to rectify defects that compromise the safety of road users;
 - (ii) Repair of potholes and cracking;
 - (iii) Repair of Rutting;
 - (iv) Maintenance of drainage systems;
 - (v) Keeping road signs and markings clean, visible and in good condition;
 - (vi) Keep lighting equipment suitably visible and in good condition;
 - (vii) Vegetation control;
 - (viii) Maintenance of structures; and
 - (ix) Safety Inspection Patrol

For each performance criterion, a Service Level (SL) is specified. Throughout the contract period, if the Contractor fails to comply with an SL, reductions will be made from amounts due to the Contractor. The fundamental concept associated with such reductions is the Payment Reduction Point (PRP). Each SL breach attracts PRPs, which are accumulated and combined with the value of the individual PRP to evaluate the total reduction applicable.

(4) Monitoring of Performance

Under the terms of the contract, the Contractor shall also be responsible for the continuous monitoring and control of road conditions and Service Levels for the road or road sections included in the contract. This shall be necessary not only to fulfill the contract requirements, but the activity shall also provide the Contractor with the information needed to be able (i) to know the degree of his own compliance with Service Level requirements, and (ii) to define and plan, in a timely fashion, all physical interventions required to ensure that service quality indicators never fall below the indicated thresholds. The Contractor shall not receive instructions from the Employer concerning the type and volume of road maintenance works to be carried out. Instead, all initiative rests with the Contractor who shall do whatever is necessary and efficient to achieve the quality levels required.

Some emergency works are to be foreseen. Those are meant to remedy unexpected damage which occurs as a result of extraordinary natural phenomena, and which affect the normal use of the road network, or the safety and security of the users. For emergency works, the contract limits the responsibility of the Contractor, establishing that the Employer will approve execution of services and separate remuneration based on specific amounts proposed by the Contractor for each case, on the basis of volume of works estimated at each time and on unit prices included in the bid and in the contract.

3303 Management Services

Management Services are the various management processes and procedures of the Contractor that deliver the Operational Service Levels, ensure good stewardship of the road asset during the term of the Contract, provide information that the Employer requires concerning the delivery of the Services and facilitate the next tender round.

(1) Functions of Contractor's Key Personnel

During the Maintenance Phase of the Works, the Contractor's key personnel shall include but not be limited to the following key personnel whose duties are outlined below:

- Contract Manager/Contractor's representative shall act and represent the Contractor during the Phase 2 of the Contract. His duties and responsibilities include those discussed in Sub-Clause 4.3 of the General Conditions of Contract.
- Performance Manager shall be responsible for the Performance Monitoring Unit and for the development and monitoring of the Program of Performance.
- Maintenance Engineer shall instruct and supervise the works undertaken on the site based on the requirements of the Contract.
- Performance Based Road Maintenance Expert (part time) to coach and train the staff of the contractor and subcontractors in the planning, execution and monitoring of the performance based maintenance works.

(2) Performance Monitoring Unit

The Contractor shall establish a Performance Monitoring Unit staffed by qualified personnel, who shall verify continuously the Contractor's degree of compliance with the required Operational Service Levels. The Performance Monitoring Unit shall also be responsible for undertaking the quality control testing required for all Works.

The Performance Monitoring Unit shall maintain, at all times, a detailed and complete knowledge of the condition of the road sections included in the Contract and shall provide the Contractor with all the information needed in order to efficiently manage and maintain the roads. The Performance Monitoring Unit shall carry out, together with the Employer, the formal and scheduled inspections of Operational Service Levels.

(3) Facilities for the Employer

The facilities provided to the Employer under the Construction Phase of the Contract such as offices, accommodations, laboratory, vehicles, supplies, consumables, telephone services, internet services, utilities and the like shall not be required.

(4) Communication System

In accordance with Clause GCC 1.3, the Contractor shall provide and maintain in operation for the duration of the Contract a communications system or systems that ensure that both written (letter, fax or E-mail) and oral (voice) communications can be established at all times:

- (i) between the Contract Manager and his senior field staff;
- (ii) between the Employer/Engineer and the Contract Manager;
- (iii) between the public telephone system and the Contract Manager;
- (iv) between the public telephone system and the Employer/Engineer;

The equipment to be provided and maintained includes the equipment located at the Employer's and/or Engineer's office.

The equipment may comprise cellular mobile phones, satellite phones, radio equipment, tele-facsimile equipment and computers with broad band internet access linked by local area network and/or similar. The Communications System shall provide for "24/7/365" (i.e 24 hours per day, every day of the year) communication with security and redundancy provisions that are fully fit for purpose.

(5) Site Regulations

In accordance with GCC Clause 4, the Contractor shall prepare Site Regulations setting out the rules to be observed in the execution of the Contract at the Site and shall comply therewith. Such Site regulations shall include, but shall not be limited to:

- (a) Security;
- (b) Gate control;
- (c) Safety;
- (d) Traffic control;
- (e) Accident and Emergency response;
- (f) Dealing with third party enquiries and complaints;
- (g) Sanitation;
- (h) Medical care, and
- (i) Fire prevention.

The Site Regulations shall comply with the relevant laws and regulations of Nepal.

(6) Specifications and Work Methods

The Maintenance Works shall be executed in accordance with the Specifications and the Special Provisions for Performance Based Maintenance Works and/or any applicable Standards stated in the Specifications.

In case of conflict between the Specifications and Work Procedures defined in Phase 1 and the Service Levels or specifications of Phase 2, the Service Levels and Work Procedures of Phase 2 shall take precedence.

With the prior written approval of the Employer, the Contractor may introduce new materials and work methods as long as they provide a better quality of work.

Under no circumstances shall the Contractor be entitled to any additional payment or relief from payment reduction due to the inadequacy of the materials and work procedures that he has proposed and employed in the Works and Services, notwithstanding any consent by the Employer to their use.

(7) Program of Performance

The Contractor shall develop, implement and maintain a Programme of Performance, which shall set out in detail the management processes, procedures and controls that he will employ to deliver the Services and Works. The Programme of Performance shall comprise the following components:

a) Operational Plan

The Operational Plan shall describe how the Contractor will undertake the Works to achieve the Service Levels, including but not limited to the following matters:

- (a) Organisational structure for management and delivery of the Services;
- (b) Locations and coverage of depots and storage facilities;
- (c) Numbers, classification and deployment of equipment and personnel;
- (d) Provisions for procurement and storage of materials;
- (e) Procedures for Safety Inspections and Service Level Inspections;
- (f) Procedures for Structural Inspections;
- (g) Procedures for routine maintenance and repair works;
- (h) Procedures for incident response and emergency works;
- (i) Procedures for response to third party enquiries, reports and complaints.
- (j) Procedures for data collection, recording and storage.

b) Contractor's Quality Assurance Plan

The purpose of the Contractor's Quality Assurance Plan is to integrate the requirements of the Contract and the Contractor's quality assurance systems to deliver the Services.

The Quality Assurance Plan describes the methods and procedures, which the Contractor will apply for the execution of the Contract, including how the Contractor will:

- (a) identify the quality requirements specific to the Contract;
- (b) plan and execute the Services and Works to satisfy those requirements;
- (c) inspect and/or test work and materials to ensure compliance with the quality requirements;
- (d) record and monitor the results as evidence of compliance;
- (e) audit the Quality Assurance processes and procedures to ensure compliance; and
- (f) ensure that prompt action is taken to correct non-compliance.

The Quality Assurance Plan shall comply with the principles of ISO 9001:2008 or any revision thereof. It shall clearly describe the systems, procedures and methods that will be used to deliver and monitor compliance of the Services.

c) Health and Safety Management Plan

The purpose of the Health and Safety Management Plan is to foster a responsible attitude towards occupational health and safety and to comply with the provisions of the Law of Nepal.

Because of the nature of the Services, the Contractor may occasionally be exposed to hazardous situations, which could involve risk of various degrees of harm, to the Contractor's personnel and/or the public.

Situations will arise when it is not practical to eliminate or isolate significant hazards. In these situations, the Contractor must mitigate hazards by ensuring planned protection systems (e.g.

equipment, clothing) are available and used. The Contractor's personnel and all sub-contractors must comply with the Health and Safety Management Plan at all times.

The Health and Safety Management Plan shall, when implemented in accordance with the plan requirements:

- (a) Ensure the systematic identification of existing and new hazards on work site(s) and at depots, storage facilities, in offices or wherever activities are undertaken;
- (b) Ensure the mitigation of significant hazards, where elimination and isolation are impractical;
- (c) Ensure the provision and use of appropriate protective measures;
- (d) Include emergency procedures for dealing with accidental spillage, pollution or imminent danger;
- (e) Ensure regular review and assessment of each hazard identified and monitor own staff and subcontractor's exposure to these hazards;
- (f) Ensure reporting and recording of work site safety incidents so health and safety problems can be addressed quickly and regularly. It is a requirement of this Contract that any such incident be advised promptly to the Engineer;
- (g) Comply with all other health and safety aspects requirements of Nepalese law and regulations.

d) Environmental Management Plan

The purpose of the Environmental Management Plan is to foster a responsible attitude towards occupational health and safety and to comply with the provisions of the Law of Nepal. The Environmental Management Plan shall comply with the principles of ISO 14001:2008 or any revision thereof.

Because of the nature of the Services, the Contractor's operations have the potential to cause adverse environmental impacts. Situations will arise when it is not practical to avoid such impacts. In these situations, the impacts must be mitigated by planned actions and protection measures, which must be employed.

The Contractor's personnel and all sub-contractors shall comply with the Environmental Management Plan at all times.

The Environmental Management Plan shall, when implemented be in accordance with the plan requirements:

- a) The means by which the environmental management systems will be supervised, monitored and audited to ensure compliance with the principles and objectives of the EMP at all times;
- b) Records to be prepared and maintained by Environmental Management staff and communication procedures to be followed so that the Employer and others associated with the Works (e.g. sub-Contractors) are kept fully informed on matters relating to the EMP and applicable regulations throughout the Contract period;
- c) Proposals to ensure that maintenance methods do not compromise the Contractor's commitment to the EMP and compliance with all relevant statutory regulations;
- d) An organizational structure showing the appointed environmental management staff and the responsibilities of environmental protection participants;
- e) The names, addresses, telephone and fax numbers of all participants;
- f) The criteria used for the appointment of the principal staff;
- g) The proposed interactions and communications procedures between the Contractor's personnel and the environmental protection staff, including proposals for the communications

facilities to be provided. In particular, the establishment of a regular communications and reporting system;

- h) The frequency, coverage and intent of environmental management meetings together with the rationale for attendance;
- i) Frequency, coverage and intent of regular environmental reports;
- j) Methods proposed for promoting awareness of environmental protection issues among all personnel directly or indirectly associated with the maintenance works;
- k) Provisions for storage of liquid, toxic and dust creating materials;
- l) Waste control and management;
- m) Materials handling;
- n) Erosion prevention;
- o) The powers vested in the environmental management staff that would enable them to take urgent, appropriate and direct action to prevent or correct environmental impacts;
- p) The means by which environmental management matters will be communicated to Sub-Contractors to ensure effective compliance by subcontractors.

Further details of the Environmental Management are described in Appendix B of Phase 2.

e) Risk Management Plan

The Purpose of the Risk Management Plan is to ensure that uncertain events that may have adverse impacts on the integrity and condition of the road assets or on the Operational Service Levels are identified, analysed and placed under a proactive management regime. The Risk Management Plan shall, as a minimum, include:

- (a) establishment of a risk register, in which all foreseeable adverse events are identified and assigned values of probability and consequence of occurrence;
- (b) analysis of risks in which the impact of potential combinations of events is considered across a range of scenarios;
- (c) identification of risk management strategies involving avoidance and mitigation of risks together with management strategies for residual risks;
- (d) assignment of responsibility for risks to the organisations or individuals best able to manage them;
- (e) a process for the regular review and updating of the risk register and the risk management plan.

f) Emergency Procedures and Contingency Plan

The Emergency Procedures and Contingency Plan shall establish the roles, practices and procedures to be followed during and following the occurrence of natural phenomena with imponderable consequences, such as strong storms, flooding and earthquakes. The Emergency Procedures and Contingency Plan shall be developed by the Contractor and agreed with the Engineer and any other stakeholders the Engineer may identify.

The purpose of the Emergency Procedures and Contingency Plan is to ensure the safety of the Contractor's personnel and road users in the case of emergency and/or road closure. It should include:

- (a) an effective communication and event recording system;
- (b) the names, 24-hour contact telephone numbers and specific duties of the Contractor's personnel nominated to respond to an emergency event;

- (c) the contact telephone numbers of other parties who need to be notified in cases of emergency events, e.g. police;
- (d) detailed response procedures for all potential emergency events;
- (e) possible detour routes in the event of road closure.

g) Traffic Management Plan

The Traffic Management Plan establishes the practices for traffic management at work sites and shall comply with the relevant rules and regulations in Nepal. The Traffic Management Plan must be developed by the Contractor and agreed with the Engineer.

The objectives of the Traffic Management Plan are to:

- (a) Clearly define and document the responsibilities and chain of command for the development, implementation and management of traffic control measures and systems,
- (b) establish the minimum requirements for temporary traffic control,
- (c) establish the minimum geometric, cross section and surfacing standards for temporary works,
- (d) provide appropriate transitions and enable safe and efficient traffic flow into, through and out of work sites,
- (e) protect the Contractor's personnel at all times,
- (f) protect the Road and related assets and the Contractor's resources at all times, and
- (g) meet the operational requirements for the Road.

The Traffic Management Plan must include at least the following:

- (i) a documented process for preparation, review and approval of the Traffic Management Plan;
- (ii) a document tracking and control system to ensure that only the latest operative copy of the Traffic Management Plan is in circulation;
- (iii) 24-hour contact telephone numbers for Contractor, Engineer, emergency services and other stakeholders; and
- (iv) layout diagrams, method statements, etc. for implementation of traffic control while undertaking each aspect of the Services (including site specific layout diagrams and method statements if the Services require traffic control measures not covered by standard codes of practice.

h) Road Management Database

Data about the conditions of the road assets being maintained under this Contract are required for current and future reference. The Contractor shall prepare and maintain a road management database of accuracy and completeness appropriate to the uses for which it is intended, which shall be kept current at all times. The Contractor shall supply all information necessary to prepare and maintain this data. The following information is to be collected and updated:

- Road and bridge inventory and treatment history
- Road condition and section rating
- Traffic and classification details
- Maintenance history

The Contractor shall undertake whatever actions may be necessary including detailed road condition surveys to obtain the above data and all information required to maintain the road management database.

The Contractor shall provide hard and electronic copies of the updated road management database and all relevant information to the Employer. Report and subsequent updates shall be submitted every three months thereafter together with the relevant monthly progress report.

8) Daily Inspections

The Contractor shall undertake Inspections of all lengths of road in both directions for which he is responsible on at least a daily basis to ensure the continuous safe operation of the roads and the compliance of all road related assets with the Operational Service Levels.

The procedures for Inspections shall be described in detail in the Contractor's Operational Plan.

The Daily Inspection shall as a minimum record the following information:

- (i) Date and time of inspection at start and end of each of each day and the route covered
- (ii) Weather
- (iii) Route of inspection
- (iv) Summary of general operating conditions
- (v) Recording of all non-compliances with Operational Service Levels detected
- (vi) Incidents, hazards and defects discovered and actions taken
- (vii) Record of interactions with:
 - a. Police
 - b. Engineer's staff
 - c. Official bodies
 - d. Members of the public

9) Inspection of Structures

All bridges and all culverts with span or diameter in excess of two (2) metres together with all earth retaining structures with a height in excess of two (2) metres and other significant structures shall be visually inspected at least once in each calendar month to ensure that they are in a safe operating condition.

This inspection shall record:

- (a) Vehicular damage to structures;
- (b) Scour of foundations in watercourses and erosion of protective structures such as revetments, gabions and the like;
- (c) Settlement of foundations, movement or rotation of abutments, wing walls and earth retaining structures;
- (d) Significant corrosion of steel reinforcement in reinforced concrete members causing spalling of concrete;
- (e) New or worsened deflection or cracking of reinforced concrete members;
- (f) Corrosion of structural steelwork with significant loss of metal.
- (g) Anything else that impairs the safe operating condition of the bridge.

Where defects appear to be worsening rapidly, the Contractor shall inform the Engineer without delay and shall take appropriate measures to ensure the safety of road users and employees.

Any non-compliance with the Operational Service Levels discovered during any inspection shall be recorded. The record of each defect shall include an accurate positional reference, description and dimensions of the defect and a photograph taken with a digital camera and bearing a date and time stamp. The record of each inspection shall be recorded. Upon completion of remedial works for each defect or group of defects, the record of works together with a further date and time stamped photograph shall be recorded as well and included in the Monthly Report.

10) Routine Maintenance Unit

The Contractor shall provide on a daily basis a minimum of one Routine Maintenance Unit (RMU) comprising of personnel and equipment required to undertake the carrying out of the Routine Maintenance Works. The Contractor may increase the number of RMUs as he may deem necessary to meet the requirements of the Works.

Each RMU shall have the following minimum resources:

- 1 No. Foreman
- 1 No. Light/Heavy vehicle driver
- 1 No. double cabin pick-up with identification (contractor's name, Employee's name, road name, and emergency contact phone no.)
- 1 Set Operational flashing amber lights fitted to the RMU truck
- 5 No. Maintenance workers
- 2 No. Mobile phones
- 1 No. Jack
- 1 No. Compressor
- 1 No. Vibrating plate compactor
- 1 No. Chainsaw
- 1 m³ Cold storable bituminous premix and 0.5 m³ of sand
- 2 No. "Half Road Closed" Signs
- 2 No. "Roadwork Ahead" Signs
- 12 No. 300 mm plastic 'high visibility' colored traffic cones
- 200 kg drum of bitumen
- 1 No. Bituminous spray pump
- 1 No. 200 litre drum of clean water
- 2 No. Rakes
- 2 No. Long handle shovels
- 2 No. Long handle heavy duty brooms
- 2 No. Picks
- 8 No. Reflectorized safety jackets for the RMU crew

The RMU shall be available to work for a minimum of 8 daylight hours per day from Sunday to Friday inclusive. The starting and finishing times are to be agreed with the Employer.

The RMU shall also be the "Initial Emergency Response Unit" and shall have the following capabilities in case of an emergency:

- Haul a half cubic meter of sand (or other suitable granular material depending on the nature of the requirement)
- Provide an after-hours response with a minimum of a two-person crew
- Mobilize emergency kits such as temporary warning signs, flashing lights, barriers, safety clothing, shovels, brooms, etc.

The RMU shall carry at all times mobile phones to contact police, fire, ambulance, and hospital or medical center to obtain help in the event of accidents or any emergency encountered.

A listing of all emergency contact phone numbers shall be circulated by the Contractor to all relevant officers, including the Contractor's staff and the Employer within 14 days from the Commencement Date of Phase 2.

11) Reporting

a) Inception Report

Within 28 days after the Commencement Date of Phase 2, the Contractor shall submit an inception report to the Employer. The report shall include the following:

- Initial condition survey

- Video survey
- Roughness survey
- Initial road management data base
- Detailed maintenance program for the first 3 months
- Information regarding environmental, safety and social issues and other information as may be necessary

The Contractor's initial condition survey of the roads, structures and other appurtenances shall be attended by the Engineer. The detailed results of the survey shall be recorded by the Contractor and submitted to the Engineer for confirmation.

The initial condition survey will establish a baseline of road conditions at the time of commencement of the Phase 2. The video survey shall be undertaken during daylight hours from the passenger's seat of a slow moving vehicle with the camera aligned towards the center of the road. Video shall also be taken of all bridges, major culverts and any other major structures to show the conditions of each structure from all angles. The Contractor shall complete and formally submit to the Engineer two copies of the video record on DVD.

The roughness data is required to establish the actual roughness condition of the road at the time of commencement of the Phase 2. Roughness shall be measured using a method and equipment approved by the Engineer.

The environmental, safety and social surveys shall establish the issues existing prior to the commencement of Phase 2.

The Employer shall confirm the accuracy of the initial condition survey within 28 days of his receipt of the inception report. The Engineer's opinion on the condition of any road asset or any item shall be final.

Interim Payment Certificates will not be released until such time as the inception report is approved by the Employer.

b) Daily Report to be submitted to the Employer

The Contractor shall prepare and submit daily reports to the Engineer on all inspections, incidents, non-compliance with Operational Service Levels detected, remedial actions taken and other works executed by the Contractor. The format and the information to be supplied shall have to be approved by the Engineer.

The information provided in the daily reports shall be summarized by the Contractor and included in the relevant sections of his Monthly Reports.

c) Monthly Reports

The Monthly Report shall be submitted by the Contractor to the Engineer each month no later than the seventh calendar day of the following month; except for the reports under (b) and (c) below, which shall be submitted on the last working day of the respective month; shall comprise the following components:

- (a) Narrative Report, describing Services and Works undertaken during the period, problems and issues arising and measures taken to deal with them.
- (b) Contractor's Monthly Operational Service Level Inspection Report
- (c) Monthly Evaluation Form for Compliance with Operational Service Levels
- (d) Memorandum of Non- Compliance with Operational Service Levels – based on the Monthly Formal Inspections
- (e) Memorandum of Non-Compliance with Operational Service Levels – based on Informal Inspections

- (f) Report on all Maintenance Works and Services
- (g) Report on any Emergency Works or other Works instructed by the Engineer due to defects to be repaired under the Defects Notification Period liabilities.
- (h) Report on the compliance with the Contractor's Quality Assurance Plan, Health and safety Management Plan, Environmental Management Plan, Risk Management Plan, Emergency Procedures and Contingency Plan, and Traffic Management Plan.
- (i) Report on Testing undertaken in accordance with the Contractor's Quality Assurance Plan or as required by the Engineer. Tests shall be undertaken in accordance with the specifications and appropriate standards and the detailed test results shall be submitted to the Engineer in the respective month.
- (j) Structural Inspection Reports on inspections undertaken. First inspection reports shall be provided within two (2) calendar months of the Commencement Date of Phase 2.
- (k) Summary of Incident Reports shall be submitted for each month (or a nil return).
- (l) Updated Monthly Work Programme, detailing the location, timing and extent of all works the Contractor proposes to complete during the next month.
- (m) Any other information as the Engineer may require from time to time.

d) Incident Reports

Every occurrence of an Emergency that requires "Emergency Works" as defined in Section 3306 Emergency Works below shall be reported to the Engineer as described below:

- (i) Landslides, defined as movement of earth or rocks encroaching on any carriageway or shoulder or blocking any drainage system or watercourse; reported without delay and in any event within one (1) hour of discovery.
- (ii) Flooding, defined as large volumes of water occupying all or parts of the roadway, shoulders and adjoining areas; reported without delay and in any event within one (1) hour of discovery.
- (iii) Any other event where the Contractor proposes to request issue by the Employer of an Emergency Work Order; reported without delay and in any event within one (1) hour of discovery.
- (iv) Road Accidents involving injury to people, significant vehicular damage and/or damage to the road surface, structures or road furniture; without delay and in any event within twenty-four (24) hours of discovery.
- (v) Other Damage, including vandalism, theft, damage of highway furniture and structures; reported monthly.

Incident reports shall include:

- (a) The precise location, timing and extent of the incident, supported by maps/plans and date/time stamped digital photographs;
- (b) A brief narrative description of the circumstances.
- (c) Where applicable, the names of the people and/or organizations responsible for causing the damage. This information is required so that the Employer may seek recovery of the costs associated with repairing the damage.

Copies of incident reports shall be included in the monthly reports.

e) Handover Report

No later than two (2) months prior to the Date of Completion of the Contract the Contractor shall submit the Handover Report in draft to the Engineer. The purpose of the Handover Report is to provide a smooth transition to the next contract and ensure that the next Contractor is aware of any outstanding issues.

The Report shall:

- (a) Summarize any unresolved issues,
- (b) Include the most recent complete set of data on the Road and related assets included in the Contract; and
- (c) Provide the following details:
 - i. The current and up-to-date Programme of Performance including all sections and particularly the updated risk register;
 - ii. A schedule of outstanding defects and liabilities;
 - iii. Any unresolved issues, especially those that may impact on the next Contractor;
 - iv. Details of any sensitive issues;
 - v. Any on-going special monitoring/maintenance needs.

The final Handover report shall be submitted no later than 14 days prior to the Date of Completion of Phase 2.

12) Management Service Levels

Table 33.1 lists Management Service Levels (MSL), which relate to the overall management of the Works along with the corresponding Submission Dates and resulting PRPs for each MSL.

The Management Services cease on the Date of Completion of the Contract. If any requirements are unfulfilled at that time, the Employer and/or Engineer may procure their completion and recover the cost thereof from amounts due to the Contractor.

The Management Service Level Number (see MSL No column in Table 1) comprises a section reference to one of the sections above followed by a count within that section.

Table 33.1 – Required Submission Dates and Payment Reduction Points for Management Service Levels

Management Services	MSL No	Action	Submission Dates	Payment Reduction Point
Key Personnel	1	Key Personnel appointed, approved by the Employer and on the site	At the Commencement Date of Phase 2	10 per day
Performance Monitoring Unit	2	Performance Monitoring Unit fully established	At the Commencement Date of Phase 2	10 per day
Communications System	4 (1)	Details of Contractor's proposed Communications System submitted in draft	At the Commencement Date of Phase 2	4 per day
	4 (2)	Engineer either issues a notification of "no objection" to the proposal or notifies Contractor that the Communications System is unsatisfactory, stating the specific areas of concern	Within 14 days after submission of the Draft	N/A
	4 (3)	Contractor submits revised details	Within a further 7 days of Engineer's notification	4 per day
	4 (4)	Communications System complete and fully operational	Within 60 days after the Commencement Date of Phase 2	4 Payment Reduction Points per day during which any significant element is inoperable for

Management Services	MSL No	Action	Submission Dates	Payment Reduction Point
				the entire day. (For the avoidance of doubt, a "significant element" is a communication medium, such as telephone or internet, for which there is no redundancy or equivalent alternate system in operation)
Site Regulations.	5 (1)	Draft Site Regulations submitted to the Employer, and copied to the Engineer, for approval, which shall not be unreasonably withheld.	At the Commencement Date of Phase 2	4 per day
	5 (2)	Engineer either issues a notification of approval of the draft Site Regulations or notifies the Contractor that they are not approved, stating the specific reasons for rejection.	Within 14 days after submission of draft Site Regulations	N/A
	5 (3)	Contractor submits revised draft Site Regulations	Within a further 7 days of Engineer's notification	4 per day
	5 (4)	Contractor implements Site Regulations and remedies breaches forthwith	N/A	2 Payment Reduction Points during the first week, 4 payment reduction points during the second week and 1 payment reduction point per day thereafter until the deficiency is remedied
Programme of Performance	7 (1)	Contractor's Programme of Performance submitted in draft	At the Commencement Date of Phase 2	4 per day
	7 (2)	Engineer either issues a notification of "no objection" to the Plan or notifies the Contractor that his Programme of Performance fails to comply with the Contract, stating the specific areas of "non-compliance"	Within 14 days after submission of Programme of Performance	N/A
	7 (3)	Contractor submits a revised Program of	Within a further 7 days of Engineer's	4 per day

Management Services	MSL No	Action	Submission Dates	Payment Reduction Point
		Performance	notification	
	7 (4)	Contractor implements Programme of Performance	Continuous	5 Payment Reduction Points for each material breach of the Programme of Performance per day during which the breach persists (For avoidance of doubt, a material breach is a neglect or disregard of any element of the Programme of Performance notified in writing to the Contractor by the Engineer)
	7 (5)	Contractor updates Road Management Data Base	Every three months together with the relevant Monthly Report	1 per day
	7 (6)	Contractor updates Programme of Performance annually or upon the occurrence of any material change to any of the constituent processes and procedures or upon the reasonable request of the Engineer and submits to Engineer	Within 14 days of each anniversary of the Commencement Date of Phase 2 or upon the occurrence of any material change to any of the constituent processes and procedures or upon the reasonable request of the Engineer	4 per day
Daily Safety Inspections	8	Contractor undertakes Safety Inspections on at least a daily basis to ensure the continuous safe operation of the roads	During each calendar day	5 Payment Reduction Points for each instance of failure to undertake an inspection in whole or in part
Inspection of Structures	9 (1)	Contractor inspects all bridges and all culverts with span or diameter in excess of three (3) meters together with all earth retaining structures with a length in excess of 3 m and other significant structures at least	As per Operational Plan	As per Programme of Performance

Management Services	MSL No	Action	Submission Dates	Payment Reduction Point
		once in each month to ensure that they are in a safe operating condition		
	9 (2)	Contractor records any non-compliance with the Operational Service Levels discovered during any inspection and submits report to Engineer	Within 24 hours of completion of inspection	2 per day
Inception Report	11a	Submission of Inception Report	28 days after the Commencement Date of Phase 2	2 per day
Daily Reports	11b	Submission of Daily Report	By the end of the following day	2 per day
Monthly Report	11c	Contractor submits the Monthly Report to the Engineer	No later than the 7th calendar day of the following month (starting with the report on the first month after the Commencement Date of Phase 2)	3 per day
Incident reports	11d	(i) Landslides, defined as movement of earth or rocks encroaching on any carriageway or shoulder or blocking any drainage system or watercourse; reported without delay. (ii) Flooding, defined as large volumes of water occupying all or parts of the roadway, shoulders and adjoining areas; reported without delay. (iii) Any other event where the Contractor proposes to request issue by the Employer of an Emergency Work Order; reported without delay.	Within one hour of discovery	5 per hour
		(iv) Road Accidents involving injury to people, significant vehicular damage and/or damage to	Within twenty-four (24) hours of discovery.	2 per day

Management Services	MSL No	Action	Submission Dates	Payment Reduction Point
		the road surface, structures or road furniture without delay.		
Handover Report	11e (1)	Contractor submits draft Handover Report to the Engineer.	No later than two months prior to the Date of Completion of the Contract	10 per day
	11e (2)	Engineer either accepts the report or notifies the Contractor of any inaccuracies or other inadequacy of the report.	Within 14 days after submission of the Handover Report	N/A
	11b (3)	Contractor submits final Handover Report, in which the comments of the Engineer are addressed and the report updated with any changes in the information contained in therein.	One day prior to the Completion of the Contract	15 per day

3304 Operational Services

The operational services include the activities needed to maintain the satisfactory condition of the road assets, to assure their durability, as well as to satisfy the road users riding comfort requirement. This includes basically routine maintenance works but could include resurfacing, asphalt concrete overlays and replacement of road side assets such as road signs, crash barriers or other road related assets. These requirements are defined through Operational Service Levels, which the contractor needs to comply with during the entire Phase 2.

There are 3 Categories of Operational Service Levels:

- Operational Service Levels Category A: They are the ones that are considered very important and need to be rectified within a short period of between 1 hour and 48 hours.
- Operational Service Levels Category B: They are considered less important. Although the Contractor is required to frequently control that these OSL are complied with, they will attract Payment Reduction Points only if they are not complied and detected during the Joint Monthly Inspection.
- Operational Service Levels Category C: They are controlled only once per year.

For each of the 3 Categories of Operational Service Levels the OLS number, the Item, the Operational Service Level, the Count Unit and the Payment Reduction Points are specified. For the Categories A and C, the Rectification Periods are specified as well.

The Count Unit defines the unit for the application of the Payment Reduction Points, which is either per item, per event, per 1 km of double lane roadway, per 100 m of shoulder, etc. The Count Unit of 1 km of double lane roadway means between two adjacent kilometer posts. The Count Unit per 100 m of double lane roadway refers to 1/10 of a kilometer, whereby the kilometer is divided into 10 sections of 100 m.

For each Item defined in the Tables 33.2 to 33.3, the Payment Reduction Points shall be applied when one or more Operational Service Levels are not complied with. Payment Reduction Points shall be applied for each Item only once, even if several OSL are not complied with for the same Item.

For any section of a four lane highway, "double lane roadway" means the two lanes on each side of the medium.

(1) Operational Service Levels Category A

Note: The detection and measurement of Operational Service Level shall be achieved by visual inspections using the appropriate measuring tools such as a ruler, tape measure, 3.5 m spirit level straight edge (unless indicated differently in the respective OSL), measuring wheel, odometer of a vehicle, reflectometer or equipment for compaction testing and for coring.

Table 33.2: Operational Service Level for Category A

OLS No.	Item	Operational Service Level	Count Unit	Payment Reductions Points	Rectification Period
A.1	Lane Closure	Maximum number of closed lanes at any given time: 1 lane Maximum length of closed lane: 300 m Minimum distance between closed lane sections: 500 m Minimum advance notice: 24 hours	Per event	3	12 hours
A.2	Potholes, including de-laminations on paved surfaces	Maximum diameter: 150 mm or equivalent surface area and /or Maximum depth: 30 mm Not more than 3 potholes in 1 km of double lane roadway. During the rainy season temporary patching of potholes is allowed. These potholes shall be patched permanently latest during the following dry season.	Per item	3	48 hours
A.3	Slides up to 50 m ³	No slide of slope material on the road blocking any lane or shoulder Notes: Clearing of slides up to 50 m ³ shall be part of Maintenance Works. Clearing of slides over 50 m ³ shall be part of Emergency Works	Per event	4	On roadway: 24 hours On shoulders: 48 hours
A.4	Oil spills on pavements	No oil spills more than 50 cm ³ shall be allowed	Per event	5	6 hours
A.5	Other Obstructions on paved roadway and shoulder, unpaved shoulders and roadway (e.g.: rocks, tree branches, animal carcasses, abandoned vehicles, etc.)	No obstruction posing a potential traffic or safety hazard shall be allowed. Maximum volume of obstruction that is not posing a traffic or safety hazard: 150 cm ³ Maximum quantity of debris that does not pose a traffic or safety hazard: 1 kg per 5 m ² pavement surface	Per 100 m of double lane highway	4	4 hours if hazardous 48 hours if not hazardous
A.6	Culverts, inlets, outlets, drainage pipes	Not more than 25% of flow area or cross section is blocked during rainy season	Per structure	4	24 hours

OLS No.	Item	Operational Service Level	Count Unit	Payment Reductions Points	Rectification Period
A.7	Ditches	Not more than 25% of flow area or cross section is blocked during rainy season	Per 50 m of ditch	4	24 hours
A.8	Catch basis	Not more than 25% of sedimentation	Per structure	4	24 hours
A.9	Regulatory and Warning signs	Missing sign Sign obscured by vegetation (sight distance of a driver of 100 m on the roadway)	Per sign	4	24 hours
A.10	Temporary signs and safety devices for works	Missing sign or safety device Signs and safety devices not removed after termination of works	Per work place	4	24 hours
A.11	Waterways	During rainy season: Free flow of water under bridge and up to 50 m upstream and downstream shall not be obstructed by more than 15% of the cross section of riverbed up to design clearance under bridge as per original design	Per bridge	4	48 hours

(2) Operational Service Levels Category B

Note: Count unit of 1 km means between two adjacent kilometer posts. The detection and measurement of Operational Service shall be achieved by visual inspections using the appropriate measuring tools such as a ruler, tape measure, 3.5 m spirit level straight edge (unless indicated differently in the respective OSL), measuring wheel, odometer of a vehicle, reflectometer or equipment for compaction testing and for coring.

Table 33.3.1: Operational Service Levels for Bituminous/Asphalt Concrete Pavement

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.1.1	Cross fall of pavement of double lane roadway	Maximum tolerance: +0% and -0.5% for road sections repaired by Contractor	Per 100 m of double lane roadway	30
B.1.2	Patches	Shape: Rectangular and parallel to road centerline. Circular patches less than 100 mm diameter are allowable Maximum level tolerance with surrounding pavement: +/-10 mm including seals Materials: Equal or better than the surrounding pavement No unsealed cracks wider than 3 mm Temporary patching is allowed during rainy season, but permanent patching is required during the following dry season	Per patch	1
B.1.3	Linear Cracks	Maximum width of unsealed cracks: 5 mm of more than 10 m aggregated length Sealant height tolerance: +/- 5 mm of adjacent pavement surface of more than 5 m aggregated length	Per 100 m of double lane roadway	2
B.1.4	Multiple cracks	Maximum cracked area of 20 m ² and maximum	Per 1 km of	2

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
	(alligator cracking)	width of unsealed cracks: 3 mm Sealant height tolerance: +/- 10 mm of adjacent pavement The "cracked area" is equivalent to the rectangular area fully enclosing the cracks, where the outermost crack is at least 100 mm inside the rectangle	double lane roadway	
B.1.5	Depression, Rutting, Corrugation	Maximum depth of 20 mm for an aggregated length of more than 50 m. Depth measured with a 1.2 m straight edge	Per 1 km of double lane roadway	2
B.1.6	Heaves and Shoves	Maximum height: 25 mm measured with 1.2 m spirit level straight edge centered on the heave and adjusted parallel to the pavement surface	Per item	1
B.1.7	Surface drain defects	Ponding of water: Maximum depth of 20 mm at any point and surface area of more than 1 m ²	Per 100 m of double lane roadway	3
B.1.8	Raveling	Less than an aggregated surface area of 15 m ² Raveling is defined as a loss of binder of more than 5 mm in depth or loss of surface material of more than 10 mm in depth.	Per 100 m of double lane roadway	3
B.1.9	Edge damage	Maximum length from the edge of the paved roadway towards the centerline of the roadway of 150 mm and an aggregated length along the road edge of maximum of 2 m Edge damage of pavement with sealed shoulders shall be treated like potholes, see items A.2 and B.1.2 above	Per 1 km of double lane roadway	3
B.1.10	Edge drop off	Pavement edge shall not be lower than the adjacent paved shoulder and not higher than 20 mm at any point Maximum height difference between pavement and adjacent paved road surfaces at junctions: +/- 30 mm for an aggregated length of 3 m Pavement edge shall not be lower than the adjacent unpaved shoulder and not higher than 50 mm for an aggregated length of 10 m Maximum height difference between pavement and adjacent unpaved paved road surfaces at junctions: +/- 20 mm for an aggregated length of 1 m	Per 1 km of double lane roadway	2
B.1.11	Flushing, bleeding or Glazing	Within horizontal curves, approach to curves or intersections, and within an intersection: Maximum aggregated surface area 10 m ² In other road sections: Maximum aggregated surface area 100 m ²	Per 1 km of double lane roadway	4

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.1.12	Surface dressing, overlays	Shape: Rectangular and parallel to the road center line Maximum level tolerance with surrounding pavement: – 0 mm and +15 mm Materials: Equal or better than the surrounding pavement Applications of surface dressings or overlays require the prior approval of the Engineer. Pavements have to be repaired and inspected by the Project Manager prior to applying surface dressings or overlays.	Per 1 km of double lane roadway	4
B.1.13	Pavement Width	Road width after completing upgrading works to be maintained with a tolerance of + / - 50 mm For edge damage see B.1.11 above	Per 1 km of double lane roadway	3

Table 33.3.2: Operational Service Levels for Unsealed Roads Crossing at Intersections

Note: Unsealed roads crossing the main roadway at intersections shall comply with the following Operational Service Levels up to a distance of 10 meters (both ways) from the edge of the main roadway.

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.2.1	Surface defects	Maximum diameter: 250 mm or equivalent surface area and Maximum depth: 50 mm	Per item	1

Table 33.3.3: Operational Service Levels for Sealed Shoulders

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.3.1	Width	Maximum tolerance: +200 mm / -50 mm of design width	Per 1 km of shoulder	10
B.3.2	Cross fall	Maximum tolerance: +0% and -2% for shoulders repaired by Contractor	Per 1 km of shoulder	5
B.3.3	Potholes	Not more than 5 potholes smaller than 150 mm	Per 1 km of shoulder	2
B.3.4	Patches	Shape: Rectangular and parallel to road centerline. Circular patches less than 100 mm in diameter or equivalent surface area are allowable Maximum level tolerance with surrounding shoulder: -10mm and +20 mm including seals Materials: Equal or better than the surrounding shoulder No unsealed cracks wider than 3 mm For repairs of the base of more than 5 m ² compaction data shall be supplied.	Per item	1
B.3.5	D5:	Maximum width of unsealed cracks: 5 mm	Per 100 m of	2

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
	Linear Cracks	Maximum width of unsealed cracks: 3 mm for an aggregated length of 10 m Sealant height tolerance: +/- 10 mm of adjacent shoulder surface	shoulder	
B.3.6	Multiple cracks (alligator cracking)	Maximum width of unsealed cracks of 3 mm for an aggregated surface area of more than 15 m ² Sealant height tolerance: +/- 10 mm of adjacent shoulder The "cracked area" is equivalent to the rectangular area fully enclosing the cracks, where the outermost crack is at least 100 mm inside the rectangle.	Per 100 m of shoulder	2
B.3.7	Depressions	Maximum depth of 25 mm for an aggregated length of 10 m Measurement of depth with a 1.2 straight edge	Per 100 m of shoulder	1
B.3.8	Heaves and Shoves	Maximum height or depth of 35 mm measured with a 1.2 m spirit straight edge centered on the heave and adjusted parallel to the shoulder surface	Per item	1
B.3.9	Surface drain defects	Ponding of water: Maximum depth of 30 mm and maximum surface area of 2 m ²	Per 100 m of shoulder	2
B.3.10	Edge damage	Maximum length from the edge of the paved shoulder towards the centerline of the road: 150 mm and an aggregated length along the road edge of 3 m	Per 100 m of shoulder	2
B.3.11	Edge drop off	Shoulder shall not be higher than 60 mm for an aggregates length of 10 m than the adjacent surface on the outer edge	Per 100 m of shoulder	1
B.3.12	Vegetation	No vegetation growing on the sealed shoulders	Per 100 m of shoulder	1

Table 33.3.4: Operational Service Levels for Unsealed Shoulders

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.4.1	Width	Maximum tolerance: +200 mm / -50mm of design width	Per 100 m of shoulder	2
B.4.2	Cross fall	Maximum tolerance: +0% and -2% for shoulders repaired by Contractor	Per 100 m of shoulder	2
B.4.3	Potholes	There shall be no pothole bigger than 350 mm in diameter or equivalent surface area and deeper than 30 mm There shall be not more than 10 potholes bigger than 200 mm in diameter and more than 30 mm deep in any continuous 1 km of shoulder	Per 1 km of shoulder	2
B.4.4	Patches	Patches shall be of the same material as the surrounding road surface material, properly compacted and in level with the adjacent road surface within a tolerance of +/- 30 mm	Per 1 km of shoulder	1

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.4.5	Ruts or corrugations	Maximum depth of 60 mm for an aggregated length of 50 m in any 1 km of shoulder Maximum depth measured with a 1.2 m straight edge	Per 1 km of shoulder	2
B.4.6	Surface drain defects	There shall be no ponding of water more than 40mm deep with an area of more than 1 m ² within a distance of 1.5 m of the edge of the pavement	Per 100 m of shoulder	2
B.4.7	Vegetation (e.g.: grass, weeds, plants)	Maximum height of 200 mm for an aggregated surface area of 100 m ²	Per 1 km of shoulder	2

Table 33.3.5: Operational Service Levels for Drainage System, Slope Protection Structures

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.5.1	Slopes of drainage system	There shall be no negative slope	Per 100 m of dual lane roadway	2
B.5.2	Uncovered ditches and drains with or without lining	Maximum area of obstructed cross-section at any point: 15% during the non-rainy season Maximum width of cracks in lined channels: 15 mm Maximum diameter of holes: 40 mm Maximum area of damaged lining: 10% per 5 m length	Per 50 m of ditches and drains	2
B.5.3	Covered Drains	No major damage that may pose safety hazards to pedestrians or vehicles or allow water to leave the channel. Maximum area of obstructed drainage cross-section: 15% during the non-rainy season Maximum damaged surface area of each cover: 10% Maximum space between covers: 40 mm Maximum area of obstructed cover openings: 20% (excluding covers sealed with asphalt or concrete) Maximum level tolerance with adjacent covers: +/- 20 mm Maximum level tolerance with adjacent pavement: +15 mm and -20 mm	Per 50 m of covered drains	2
B.5.4	Culverts and headwalls	Culverts shall be structurally sound and firmly contained by surrounding soil or material with no major damage to allow water to seep through the wall of any culvert Maximum area of obstructed culvert cross-section of 15% during the dry season	Per culvert or headwall	2

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
		Headwalls shall be structurally sound and firmly contained by surrounding soil or material with no major damage		
B.5.6	Manholes, inlets, outlets, drainage pipes, and catch basins	Manholes, inlets, outlets, drainage pipes, and catch and sedimentation basins shall be structurally sound and firmly contained by surrounding soil or material with no major damage to allow water to seep through the structure Maximum sedimentation: 20% during the non-rainy season Maximum area of obstructed cross section: 15% during the non-rainy season Less than 30% of the cross-section shall be obstructed up to 2 m in front of any manhole, inlet and catch basin.	Per item	1
B.5.7	Manhole cover, grates	Maximum level tolerance with surrounding surfaces: +/- 10 mm Less than 20% of the flow area is obstructed	Per item	1
B.5.8	Kerbs and gutters	Maximum surface damage: 10% of any 10 m length	Per 100 m length per item	1
	Debris racks	Debris racks shall be structurally sound and less than 30% obstructed		
B.5.9	Slopes and cuts	Slope protections and gabions in place and functional Maximum cross sectional dimension of erosion gullies: 200 mm x 200 mm for more than 10 m	Per 100 m of slope measured parallel to the centerline of the roadway	1
B.5.10	Retaining walls, cut-off walls and similar structures	Structurally sound and not more than 100 mm displaced from the original place and firmly contained by surrounding soil or material Maximum surface damage: 5% of any surface area of 1 m ² Maximum width of cracks on concrete structures: 5 mm Maximum width of cracks on non-concrete structures: 10 mm Maximum numbers of blocked weep holes: 10% per structure	Per item	1

Table 33.3.6: Operational Service Levels for Road Signs, Pavement Markings and other Safety Devices

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.6.1	Regulatory, Warning, Information	All signs as per Drawings are in place Uniform intensity, clean, legible, and	Per item	2

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
	Signs and Hazard markers	structurally sound Minimum visibility distance at day and night (with low beam headlights) 150 m or if in doubt more than 70% of the required original retro reflectivity Maximum bending of sign face from original position: 30 mm Post must be in place, structurally intact and properly connected to the foundation with less than 5% of its surface corroded Maximum inclination of posts from the vertical: 5%		
B.6.2	Road Markings	All markings as per Drawings are in place Uniform color and intensity, legible and firmly attached to pavement Minimum visibility distance at night: 150 m with low beam headlights Maximum length of damaged or missing edge or centerline markings: 15 m Maximum area of damaged or faded sign markings or markings of pedestrian crossings: 20% Maximum misalignment: 30 mm	Per 100 m of double lane roadway	2
B.6.3	Raised pavement markers or reflective pavement studs	Maximum missing/damaged markers: 5 Maximum number missing/damaged markers in curves: 1 Minimum visibility distance at night: 150 m with low beam headlights The reflective area of markers is higher than the pavement level	Per 100 m of double lane roadway	2
B.6.4	Kilometer posts	Present, properly painted, clean, legible, and firmly founded on the ground Maximum inclination from vertical: 8 degrees	Per item	1
B.6.5	Drainage markers, bollards or similar structures	All structures as per drawings are in place Properly painted, clean, 90% free of corrosion or damages Maximum inclination from vertical: 8 degrees	Per item	1
B.6.6	Kerbstones, traffic islands	Maximum surface damage of any kerbstone: 10% Kerbstones and traffic islands shall not pose potential hazard to pedestrians	Per 1 km of double lane roadway	1
B.6.7	Concrete barriers	All structures as per drawings are in place Properly painted, clean and structurally sound	Per 1 km of double lane roadway	1

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
		Maximum misalignment: 100 mm Maximum damages: 5% of the surface area of any 1 m of barrier		
B.6.8	Guard rails and safety or crash barriers of metal	Guard rails and safety or crash barriers are in place Not more than 3 reflectors are missing or not functional Properly painted where required and free of severe corrosion Structurally sound with all fixing bolts present and secure Maximum misalignment: 100 mm of the original horizontal or vertical position	Per item and per 50 m length	2
B.6.10	Highway lighting	Lightning columns must be present, functional and more than 95% free from damage and corrosion Electrical installations must be electrically safe and functional	Per 1 km of double lane roadway	2

Table 33.3.7: Operational Service Levels for Vegetation and Litter Control

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.7.1	Vegetation (Grass, weeds, plants)	Vegetation height shall be between 50 mm and 600 mm within 50 cm of the outer edges of drainage ditches or the outer edge of the shoulders or embankments. For grass and weeds there shall be not more than 20 m ² deviations from the above-mentioned heights in any continuous 100 m of double lane road section. Vegetation height shall be between 30 mm and 300 mm around: • Edge marker posts • Signposts • Bridge end and culvert markers • Guardrails • Sight rails • Lighting Columns • Bridge abutments Vegetation height shall be less than 250 mm around or in: • Kilometer post • Drainage markers • Culvert ends • Culvert headwalls • Side drains • Culvert waterways • Surface water channels	Per 1 km of the centerline of the double lane roadway	3

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
		- Kerb and channel - Lined channels - All sealed surfaces - Bridge decks. Vegetation height shall be between 30 mm and 200 mm on: - Medians - Traffic islands - Verges AND There shall be not more than 30 m² deviations from the above-mentioned heights in any continuous 100 m of double lane road section. Vegetation shall not hinder the free flow of water.		
B.7.2	Trees, limbs, shrubs and creepers located within the right-of-way	There shall be not shrubs or trees encroaching into the Vegetation Free Zone from the side or top. The Vegetation Free Zone is the area up to 5 m above the roadway and shoulders, and 3 m above a zone of 2 m lateral clearance besides shoulders. Vegetation shall not obscure any road signs or markers or limit sight distance on the inside of curves by more than 50 m. There shall be no dead or leaning trees or other vegetation within the right-of-way Approval of the Employer is required to remove trees with stem diameter more than 100 mm	Per 1 km of the centerline of the double lane roadway	2
B.7.3	Litter	Maximum number of litter items greater than a fist size in any 1 km of double lane road: 50 pieces in the right of way outside built-up areas	Per 1 km of the centerline of the double lane roadway	15
B.7.4	Structures made by third parties	No structures like billboards of third parties within the right of way unless authorized by the Employer.	Per 1 km of the centerline of the double lane roadway	

Table 33.3.8: Operational Service Levels for Bridges

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
B.8.1	Approach to bridges	Maximum level tolerance between bridge deck and approaches: +/- 25 mm measured from the end of deck up to 1.5 m into the approaches	Per bridge	2
B.8.2	Structures	Less than 10% of each the structural element shall show corrosion or missing paint The color of the paint shall be uniform and of the same intensity	Per bridge	3
B.8.3	Expansion joints	More than 95% of each expansion joint shall be clean, without major damage, and	Per bridge	2

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points
		shall not pose any hazard to vehicles		
B.8.4	Drains	More than 80% of drains of each bridge shall be more than 80% open	Per bridge	3
B.8.5	Railings	Less than 10% of the surfaces of the railings shall show corrosion or missing paint Paint shall be of uniform color and of same intensity	Per bridge	1
B.8.6	Scouring around bridge piles and erosion retaining walls	Erosion around bridge abutments and piers and on retaining walls (gabions, pitch, concrete) shall be less than 5% of the respective surface areas Cracks shall be less than 30 mm wide for pitch walls and less than 10 mm for concrete walls	Per bridge	2
B.8.7	Waterways	Free flow of water under bridge and up to 50 m upstream and downstream shall not be obstructed by more than 15 % of the cross section of riverbed up to design clearance under bridge as per original design	Per bridge	3

(3) Operational Service Levels Category C

Table 33.4 Pavement Roughness Survey

OLS No.	Item	Operational Service Level	Count Unit	Payment Reduction Points	Rectification Period
C.1.1	Roughness of pavement of highway	Lane-wise average IRI of the entire contract road length less than 3 m/km	Entire Contract Road Length	1,000	3 months
C.1.2	Roughness of pavement of highway	Average IRI of any continuous one lane kilometre less than 4 m/km	1 km lane	100	3 months

(4) Pavement Roughness

The indicator to be used to determine the road roughness will be the International Roughness Index (IRI), whose measure unit is expressed in meters per kilometre (m/km).

An equipment meeting the Class III: Response Type Road Roughness Measuring System (RTRRMS) precision shall be used to measure the IRI. The measure of roughness shall be made in a continuous manner in the wheel-tracks of each lane of the carriageway. The equipment shall be calibrated/validated in accordance with the manufacturer's recommendations and from observation during previous use.

The IRI shall be measured at the end of Phase 1: Upgrading Works, at the beginning of Phase 2 and in 12 months' interval thereafter. The final measurement of IRI will be done 3 months before the end of Phase 2. The measurement shall be made in the presence of the Employer's and/or Engineer's Representative.

(5) Verification of Operational Service Levels

a) Service Level Inspections by the Contractor

Under the terms of the contract, the Contractor is required to inspect all roads and road assets that have to be maintained under this contract with sufficient frequency to ensure that they always comply with the Operational Service Levels (OSLs). The contractor shall therefore develop and implement a regime of inspections, sufficient to comply with this requirement, and shall document this inspection regime in his Operational Plan.

Any non-compliance with the OSLs discovered during any inspection shall be recorded.

The record of each defect shall comprise:

- (i) Its location reference (GPS position);
- (ii) Attributes of the defect;
- (iii) As appropriate, further textual notes;
- (iv) A photograph taken with a digital camera and bearing a date and time stamp.

The same procedure applies to the repair of each defect.

The record of each inspection shall be recorded and shall be included in the Monthly Reports.

The contractor shall submit the Contractor's Monthly Operational Service Level Inspection Report and the Monthly Evaluation Form for Compliance with Operational Service Levels to the Engineer on the last working day of the respective month. The format of these tables shall be submitted by the Contractor for the Employer's approval within 15 days after the Commencement Date of Phase 2.

For all non-compliances with Operational Service Levels detected by the Contractor during a month and that are rectified during the same month, no payment reductions will be made with the exception of Operational Service Levels of the Category A. In this case Payment Reduction Points will be applied if the contractor does not rectify the non-compliance within the rectification period defined in Table 33.2.

The Contractor shall conduct night inspections at least every month at the end of the month to ensure that when driving at night the road is safe and signs are readily visible at night.

b) Inspections by the Engineer

The Engineer may carry out inspections at anytime and anywhere on the roads included in the contract in order to assure that:

- the Contractor is complying with the Operational Service Levels of the Category A,
- the Contractor has reported the compliance with the Operational Service Levels correctly, and
- the Works are executed in accordance with the Contract provisions.

c) Joint Monthly Inspections by the Engineer and the Contractor

Joint Monthly Inspections are carried out by the Contractor (through his Performance Monitoring Unit) under the supervision of the Engineer. The main purpose of the Joint Monthly Inspections is to enable the Employer to verify the information given by the Contractor in his Monthly Evaluation Form for Compliance with Operational Service Levels.

Starting on the first working day of each month the Contractor and the Engineer shall jointly inspect at least 50% of the road length to check the correctness of the Contractor's Monthly Operational Service Level Inspection Report of the previous month. The selection of road sections to be inspected shall be decided by the Engineer. Any additional non-compliance detected during the joint monthly inspection will be recorded. If the Engineer finds more than 20% additional number of non-compliances during this inspection than have been recorded by the Contractor in his Monthly Operational Service Level Inspection Report for the inspected road sections, the Payment Reduction

Points for all non-compliances detected by the Engineer will be multiplied by a factor of four for the respective month.

In every 3 months, the Joint Monthly Inspection shall include an inspection by night.

As a result of the joint monthly inspection a Memorandum of Non-Compliance with Operational Service Levels shall be issued and signed by the Contractor and the Employer. Based on the Memorandum of Non-Compliance with Operational Service Levels, the Employer will, within 21 days, review and correct as necessary the Contractor's monthly statement and issue the corresponding Interim Payment Certificate to the Contractor in accordance with the General Conditions of Contract.

3305 Payments

1) Basis of Payments

All works and services performed in Phase 2 are deemed to be covered and paid for by the Monthly Lump Sum per kilometer indicated in the Bill of Quantities. Only Dayworks and Emergency Works shall be paid on unit price bases as specified in the Bill of Quantities.

The works and services shall cover all costs associated with Contract obligations during Phase 2, which are not specifically provided for elsewhere, including (but without being limited to) the provision of insurances, security, implementing quality plan requirements, all social, environmental, safety and traffic management requirements, conducting various inspections, surveys, etc.

2) Payment Reductions

In accordance with these Specifications, payment reductions are applied in case of non-compliance with Operational Service Level requirements.

Where the Contractor fails to comply with Management Service Levels or Operational Service Level, the Employer shall deduct moneys from payments due under the Contract. Payment Reduction Points are specified for each non-compliance with Service Levels.

For the Management Service Levels Payment Reduction Points shall be applied when the Contractor does not comply with the Management Service Levels defined in Table 33.1 above.

For Operational Service Levels Category A, the Payment Reductions Points shall be applied when the Engineer detects the non-compliance and communicates the non-compliance to the Contractor. After receipt by the Contractor of the communication of the Engineer concerning the non-compliance, the time starts for the Contractor to rectify the respective non-compliance within the Rectification Period in Table 33.2. Payment Reduction Points shall be applied if the Contractor does not rectify the non-compliance within the Rectification Period. For each additional Rectification Period in which the Contractor does not rectify the non-compliance further Payment Reduction Points shall be applied until the non-compliance has been rectified. If the same non-compliance is not rectified within one month after the date of the first detection, the Employer may contract a third party to rectify the non-compliance at the cost of the Contractor. The same procedure shall be applied if the Contractor detects a non-compliance, except that no Payment Reduction Points shall be applied for the detection of the non-compliance.

For the Operational Service Levels Category B, the Payment Reduction Points shall be applied for any non-compliance of OSL detected by the Contractor at the end of the month or the Joint Monthly Inspection. If any non-compliance has not been rectified before the next Joint Monthly Inspection, the non-compliance will be counted. In addition, 1 Payment Reduction Point shall be applied for each calendar day the non-compliance is not rectified. If the same non-compliance is still not rectified until the following Joint Monthly Inspection, the Employer may contract a third party to rectify the non-compliance at the cost of the Contractor.

For the Operational Service Levels Category C, The Payment Reduction Points shall be applied when the Contractor does not rectify the non-compliance within the Rectification Period. For any further period of one month, in which the non-compliance is not rectified, the Payment Reductions Points shall be applied again, until the non-compliance is rectified. If the same non-compliance is still not

rectified within 6 months of the first detection, the Employer may contract a third party to rectify the non-compliance at the cost of the Contractor.

3306 Emergency Works

(1) Description of Emergency Works

The Contract includes Dayworks and Provisional Sum for Emergency Works to be executed during Phase 2 of the Contract. Emergency Works are designed to repair damage to the roads caused directly by natural or manmade phenomena with consequences occurring either in the area of the roads or elsewhere, but with a direct impact on the roads. Such phenomena may include: tropical depression, rainfall and winds of extraordinary intensity and/or duration, major landslides within or outside the right-of-way, floods with water levels above normal maximum flood levels, earthquake, major accidents or similar events causing considerable damage to the road.

Damage requiring repair by Emergency Works can be generally described as for example:

- (i) complete destruction of a culvert or other similar structure,
- (ii) road washouts or other damage equivalent to more than 50 m³ of material on a road section of 500 meters length,
- (iii) submersion of road along more than 100 meters length provided that the submersion is, in the opinion of the Employer, not the result of deficiencies in the drainage system or of insufficient maintenance of drainage structures, among others.

Eligible damage does not include “normal” damage, such as trees falling on the road, minor erosion of the road and embankments, and minor damage caused by traffic accidents, which shall be made good by the Contractor as part of the Works. Providing full support to the police and road users and arranging of signing and clean-up of the site or similar works as necessary are part of Works.

(2) Obligations of Contractor during Emergencies

During execution of Emergency Works the Contractor shall ensure that Operational Service Levels on the road are maintained. In particular, the Contractor shall ensure the normal use of the road including those sections affected by emergencies.

The Contractor shall take the measures necessary to reopen the road to traffic at the earliest possible time and maintain the road open during Emergency Works, without being entitled to any separate compensation for those measures. If necessary, the Contractor shall provide temporary detour roads as approved by the Employer.

(3) Minor Works

Minor works that are below the thresholds indicated in the following Table 33.5 shall be carried out by the Contractor as part of the normal PBM Works, and a Work Order is not required. The Contractor shall inform the Employer of the damage and the rectification works undertaken.

Table 33.5. Thresholds of Some Activities for the Normal PBM Works

Activity	Unit	Maximum quantity per event to be rectified under normal PBM Works
Slides of material	m ³	50
Asphalt concrete	m ³	7
Sub-base course	m ³	25
Base course	m ³	15
Concrete (of any type)	m ³	5
Stone masonry	m ³	10
Gabion masonry	m ³	15
Embankment	m ³	50

(4) Procedure for Requesting Emergency Works

When damage falling under Emergency Works results in a reduction of any of the Operational Service Levels specified in this Contract, the Contractor shall make a formal request to the Employer to allow him to carry out Emergency Works to rectify that damage.

In such a case, the Contractor shall (i) immediately inform the Employer of his intention to do so by telephone, SMS or other means, (ii) document the circumstances of the event and the damage caused through photographs, video and other suitable means, (iii) prepare a written request stating the type of works he intends to carry out, their exact location, the estimated quantities and costs, the time required to complete the works and any other information as the Contractor may deem necessary. The request for Emergency Works shall be made immediately after the Contractor becomes aware of the existence of the damage.

Within 48 hours after receipt of the request, the Employer shall evaluate the request based on a site visit, and issue a Work Order to carry out the Emergency Works. The Work Order shall specify the type of works, their estimated quantities, estimated valuation, and the time allowed for their execution.

(5) Operational Service Levels

The Emergency Works shall comply with the requirements of the Specifications and/or applicable Standards and be subject to the Employer's approval. There is no individual Operational Service Level requirement for these works.

The Emergency Works are intended to assist the Contractor in bringing the road up to the required Operational Service Levels within the time frame allowed by the Employer in the corresponding Work Order.

Failure to bring the road to the required Operational Service Levels within the stated time frame shall result in deductions of the Monthly Payments to be decided by the Employer. The payment deductions shall not be higher than 15% of the amount for the Emergency Works.

The Contractor shall correct all non-conformances relating to Emergency Works as specified in the Work Order prior to the Time for Completion of Phase 2. If any section of the road does not meet the Operational Service Levels at the Time for Completion due to uncompleted Emergency Works, Liquidated Damages shall apply.

If the maximum amount of Liquidated Damages has been exhausted and the non-conformance on road has not been rectified, the cost of remaining rectifications shall be recovered from Retentions, Performance Security, any/or any other monies due or that may become due to the Contractor.

(6) Measurement and Payment

The quantities of completed Emergency Works shall be measured net on drawings or measured at Site, whichever is more appropriate as determined and approved by the Employer. Where required by the Employer, the Contractor shall verify both quantity and quality of the completed works.

Valuation of the completed Emergency Works shall be as established in the corresponding Work Order issued by the Employer for the particular work using appropriate BOQ Unit Rates and Prices or Dayworks Rates, if appropriate.

For the emergency works the budget is allocated in the Dayworks and/or the provisional sums, as appropriate for the payment of the works. The payment for emergency works shall be made at existing Bill of Quantities (BoQ) rates or at appropriate Dayworks rates for each corresponding BoQ pay items with the CPA. Such payments shall not be subject to additional overhead as per GCC Clause 13.5 (b) (ii) because of the fact that the BoQ and Dayworks rates quoted by the Contractor are with his overhead.

3307 Appendices for Phase 2

Appendix A: Additional Technical Specifications

(a) Patching of Potholes/ Delaminating

(i) General

This covers the repair of the potholes, delaminating and the damaged bituminous surface. The area to be repaired shall be located by the Contractor and marked out in square or rectangular shape, 30 mm beyond the extent of the damaged area, and then it shall be excavated with suitable equipment. The edges shall be cut vertically down to the required depth where the lower layer is suitable without any loose material. If the existing road base is damaged, it shall be also excavated to a depth required and removed as directed by the Engineer. The surface of the excavated area shall be thoroughly cleaned with compressed air to remove all dust and loose particles. The patching then shall be carried out as detailed below. On completion, the patch shall have the tolerances of -0 mm/+10 mm, under a straight edge laid across it.

(ii) Shallow Potholes and Delaminating

Shallow patching shall consist of repairs to the bituminous surface to a depth not exceeding 40 mm.

The area to be repaired shall be excavated and prepared as described in (i) above. The cleaned surface shall be primed with MC 30 cutback bitumen. The sides shall also be tacked/primed with cut back bitumen using brush. The excavated area shall, then, be filled with asphalt premix material. The premix shall have a net bitumen content of 5% to 6% by weight or as per design mix. It shall be compacted with approved mechanical tampers/vibratory roller. After compaction, the surface of the patched area shall be true to the lines and levels of the surrounding existing surface (no "skin patches" are allowable). All loose and/or surplus materials on the surface shall be removed.

Potholes of less than 80 mm in diameter or equivalent surface area do not need to be marked out in square or rectangular shape. They may be filled with asphalt premix after careful cleaning with compressed air to remove all dust and loose particles.

(iii) Deep Patching

Deep patching shall consist of repairs to the bituminous surface to a depth exceeding 40 mm.

The area to be repaired shall be excavated and prepared as described in (i) above. The excavation shall be filled with base course material with each layer not exceeding 75 mm in thickness and duly compacted up to the existing crust thickness less 40 mm. The surface of the compacted base after thoroughly cleaned with compressed air to remove all dust and loose particles shall be primed with MC 30 cutback bitumen and the sides shall also be tacked/primed with cut back bitumen using brush. The top 40 mm portion above the repaired pothole shall be filled with asphalt premix material. The premix shall have a net bitumen content of 5% to 6% by weight or as per design mix. It of the patched area shall be true to the lines and levels of the surrounding existing surface (no "skin patches" are allowable). All loose and/or surplus materials on the surface shall be removed.

(b) Bituminous Surface Edge Repair

Where loss of bituminous surfacing exists at the edge without damaging the base, edge repair shall be performed as described for shallow patching.

Where damage of the edge extends into the base/subbase, the edge repair shall generally be carried out as specified for deep patching. Excavation shall be to a minimum width of 750 mm covering not less than 200 mm of the carriageway and not loose less than 500 mm of the shoulder.

The excavated area shall be filled with base material to a level 40 mm of below the existing level of the road and compacted as mentioned in deep patching. The surface of compacted base and sides of

the excavated area shall be primed/tacked with MC 30 cut back the area shall be filled with asphalt premix material and compacted as specified for the patching. The final surface shall match with the adjacent surface in line and levels.

(c) Repair of Failed Sections

The depth of all dig outs to repair failed sections shall be a minimum 400 mm and all excavated material shall be removed from the site. Where full depth excavation is required, the limit of excavation shall be 25 mm below the existing sub-grade level.

Work shall include the supply, placement and compaction of base course material and the construction of a surfacing layer of 40 mm asphalt premix material, including prime/tack coat.

(d) Removal of Landslide Material

Material from major land slips or other debris or unsuitable material shall be removed and carted to a spoil site approved by the Employer. Work shall include clearing all debris and material from the site, loading, cartage to spoil and disposal.

Appendix B Environmental Management

(a) General

The Contractor shall be solely responsible for any remedial or mitigation measures required by the environment-related effects of any of his maintenance activities. The Contractor shall demonstrate compliance with all environmental stipulations for this project in his Environmental Management Plan (EMP). In case of an environmental problem, the Contractor shall immediately notify the Employer and seek advice on his proposed corrective action. Among the situations that may arise are complaints or legal actions by third parties on matters such as environmental damage to property and natural resources, ground subsidence, interruption of groundwater flow and surface or groundwater contamination.

The Contractor shall conform to the Environmental Management Plan, which was prepared by the Employer for this Contract. The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising from the execution of project activities. This shall, wherever possible, be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated.

The Contractor is encouraged to recruit local skilled and unskilled labour to increase direct benefits in the project area and to minimize potential environmental issues related to construction camps, disease transmission and cultural disputes. Specific requirements in this regard are noted below. In conformance with the Specifications of which this environmental specification is a part, the Employer may withhold payments and/or stop work in the event of serious or repeated violations of the conditions stipulated herein.

(b) Compliance with Environmental Laws and Regulations

The Contractor shall conform to the Government of Nepal's laws for the protection of the environment and other relevant legislation in force, or in the absence of these, with Asian Development Bank requirements.

The Contractor shall comply with all current environmental laws and regulations of the country, be they national or local, relating to (but not limited to) the following:

- Dust
- Noise
- Vibration
- Air pollution
- Water contamination
- Solid waste disposal

- Liquid waste disposal
- Occupational health and safety
- Sanitary conditions (water supply, sewerage, etc.).

(c) Avoidance of Nuisance

The Contractor shall be responsible for ensuring that no earth, rock or debris is deposited on public or private rights-of-way as a result of operations, including any deposits arising from the movement of plant or vehicles. The Contractor shall ensure that vehicles exiting the Site of the works do not carry excessive material on the tires.

All water and waste products arising from the site operation shall be collected and removed from the site via a suitably designed temporary drainage system. They shall be disposed of at a location and in a manner that will not cause pollution problems or other nuisance.

The Contractor shall construct, maintain, remove and reinstate as necessary, temporary drainage works and take all precautions needed to avoid damage by flooding and silt transport in the works. He shall also provide adequate precautions to ensure that no spoil or debris of any kind is allowed to be pushed, washed down or deposited on land adjacent to the site.

In the event that any spoil or debris from maintenance works is deposited on adjacent land or washed into the area, then all such materials shall be immediately removed and the affected land restored to its natural state by the Contractor, to the satisfaction of the Employer.

(d) Air Quality

The Contractor shall not install any furnaces, boilers or other similar plant or equipment using fuel that may produce air pollutants without prior written consent from the Employer.

The Contractor shall not burn debris or other materials on the Site.

The Contractor shall implement dust suppression measures that shall include:

- Effective water sprays shall be used during the delivery and handling of all raw sand and aggregate and other similar materials, when dust is likely to be created and to dampen them during dry, windy weather.
- The Contractor shall require that all vehicles, while parked on the site have their engines turned off.
- The Contractor shall check all equipment and machinery on the site at least once per week and make any necessary corrections or repairs to ensure compliance with safety and air pollution requirements.
- The Contractor shall ensure that vehicles are properly cleaned (bodies and tires free from sand and mud) prior to allowing them to leave the Site.
- The Contractor shall provide necessary cleaning facilities on site and ensure that no water or debris from such cleaning operations is deposited off-site.
- The Contractor shall ensure that trucks used for transporting materials to and from the site are covered with canvas tarpaulins or other type of cover acceptable to the Employer, properly secured to prevent debris and/or materials falling from, or being blown off the vehicle(s).

(e) Water Quality Management

The Contractor shall ensure that no tools or machinery are washed in any water source or areas that drain into a watercourse, canals or channel.

The Contractor shall ensure that all temporary maintenance facilities are located at least 50 m away from any water body.

The Contractor shall check weekly that all equipment is prevented from dripping oil and other lubricants and to ensure that all lubrication and repair operations are carried out only in approved maintenance areas.

(f) Noise and Vibration Control

The Contractor shall consider noise and vibration as an environmental constraint in planning and executing maintenance works.

Noise Control:

The Contractor shall at his own expense, take all appropriate measures to ensure that work carried out by the Contractor, whether on or off the Site, will not cause any unnecessary or excessive noise that may disturb local residents.

Night time work will require the prior written approval of the Employer.

Vibration Control:

The Contractor shall take all necessary measures to ensure that machinery used in the Works will not cause any excessive vibration that may cause damages to any building or structure.

The Contractor shall be responsible for repairing any damage caused by vibrations generated from or by the use of any equipment, plant and machinery.

(g) Environmental Reports

The Contractor shall submit regular environmental reports to the Employer as a requirement of the EMP. A summary report shall be submitted as part of the Monthly Progress Report. Reports shall comprehensively address all relevant aspects of environmental management.

(h) Environmental Inspections

All project locations including maintenance work sites, plant and equipment areas, staff offices, camps and accommodations that are directly or indirectly associated with the Contract shall be regularly inspected for compliance with the requirements of the EMP and related statutory regulations.

Appendices

- Appendix 1: List of Standards
- Appendix 2: Office and Furniture / Equipment for the Employer
- Appendix 3: Accommodation and Furniture / Equipment for the Employer
- Appendix 4: Vehicles for the Employer
- Appendix 5: Survey Instruments Required at Site
- Appendix 6: Site Laboratory
- Appendix 7: Laboratory Equipment
- Appendix 8: Project Signboard

FOR REFERENCE ONLY

Appendix 1: List of Standards

The Contractor shall provide for the use of the Engineer, in accordance with the Specifications, copies of the latest editions of the following Standards, Publications and Codes of Practice; or copies of manuals containing details of these Standards:-

TRL ORN 3 : A guide to surface dressing in topical and sub-tropical countries

TRL ORN18 : A guide to the pavement evaluation and maintenance of bitumen – surfaced roads in tropical and sub-tropical countries

TRL ORN31 : A guide to the structural design of bitumen – surfaced roads in tropical and sub-tropical countries.

TRL RR104 : Preparation of cut-back bitumen.

NEPAL STANDARDS (NS)

NS 163-2045 (1988) Method of Test for adhesion of galvanising of Gabion Wire

NS 169-2045 (1988) Requirements for mild steel wire (for Gabions)

INDIAN STANDARDS (IS)

IS: 73 – 1992 Paving Bitumen Specification

IS: 217 - 1988 Cutback Bitumen- Specification

IS: 1124-1974 Method of Test for water absorption, apparent specific gravity and porosity of natural building stones

IS: 1597–1992 Code of Practice for construction of stone masonry
Part 1 Rubble stone masonry
Part 2 Ashlar masonry

IS: 2116–1980 Sand for masonry mortars

IS: 2250-1981 Method of Test for cement mortar

IS: 2386-1963 Method of Test for Aggregates

IS: 2720 Method of Test for Soils

Parts 1-6
Parts 1-5,7,8,10,14,16,22,28,29,37 & 40

BRITISH STANDARDS (BS)

BS: 812-1975 Testing Aggregates

Part 1: Methods for determination of particle size and shape.

Part 2: Methods for determination of physical properties

BS: 1377 Methods of test for soil for civil engineering purposes

BS: 1881 Methods of testing concrete

Parts 5,101-122,124,125,127,129,201-207 & 209

AMERICAN PUBLICATIONS & STANDARDS (ASTM/AASHTO).

AASHTO

Part I: Standard Specification for Materials

Part II: Method of Sampling and Testing

All standards provided shall remain the property of the Contractor on completion of the contract.

OTHER PUBLICATIONS

In addition, the Contractor is to be familiar with and be able to provide, in part or in full or photocopies where possible, to the Engineer on a temporary basis the latest editions of the following Standards

and/or Publications, which are mentioned in the most relevant Sections of the Standard Specifications for Road and Bridge Works, when so requested.

NEPAL STANDARDS (NS)

NS: 1 – 2035 (1978)	Specification for Burnt Clay Bricks
NS: 40 -2040 (1983)	Specification for High Density Polythene Pipes
NS: 80 -2042 (1985)	Specification for Reinforced Concrete Pipes
NS: 84 -2042 (1985)	Specification for Reinforcing Steel
NS: 112-2042 (1985)	Specification for Enamel and Non-reflectorised Paint
NS: 163-2045 (1988)	Specification for Smooth Wire
NS: 168-2045 (1988)	Specification for Barbed Wire
NS: 190-2045 (1988)	Specification for Primer Paint
NS: 191-2045 (1988)	Specification for Reinforcing Steel
NS: 199-2046 (1989)	Specification for Galvanised Iron (GI) Pipe
NS: 408-2054 (1997)	Specification for Road Marking Paint

Other relevant NS documents as required by these Specifications.

INDIAN PUBLICATIONS & STANDARDS

IS: 277-1992	Galvanised Steel Sheets (Plain and Corrugated)
IS: 432-1982	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement
IS 456-2000	Code of Practice for plain and reinforced concrete
IS: 1079	Steel plate
IS: 1161	Steel tubes
IS: 1566-1985	Steel mesh fabric (for concrete reinforcement)
IS: 1786-1985	High strength deformed steel bars and wires for concrete reinforcement
IS: 2062-1999	Steel for general structural purpose
IS: 2062-1986	Method of Test for galvanised hardware
IS: 2386	Method of Test for Aggregates Parts 7 & 8
IS 2629- 1985	Hot-Dip Galvanising of Iron and Steel
IS: 4031	Method of Test for Cement Parts 2,3,5 & 6
IS: 5758:1992	Pre-cast concrete kerbs, channels, edgings and quadrants

Indian Roads Congress (IRC)

Specifications for Road and Bridge Works (Fourth Revision) 2001	
IRC: 89	Stone for Pitching/ Revetment on Slopes (Clause 5.5.5.1)

Other relevant IS and IRC documents as required by these Specifications.

BRITISH PUBLICATIONS & STANDARDS

BS: 12	Specification for Portland cement Requirements for composition, strength, physical and chemical properties of four strength classes.
BS: 63	Specification for Single-Sized aggregate for general purposes.
BS: 812	Testing Aggregates Methods for determination of soluble Chloride Content. Part 117
BS: 1707	Specification for hot binder distributors for road surface dressings
BS: 3049	Pedestrian guard rails (metal)
BS: 3148	Methods of test for water for making concrete (including notes on the suitability of water)
BS: 5075	Specification for concrete admixtures/workability agents
BS: 6044	Road Paint

BS: 6088	Reflecting beads (Ballotini)
BS: 6906	Method Of Testing Geotextiles
	Part 1 - Determination of tensile properties using wide width strips
	Part 3 - Determination of water flow normal to the plane of geotextile under a constant head.
	Part 4 - Determination of puncture resistance (CBR puncture test)
	Part 6 - Determination of resistance to perforation (Cone drop test)
BS: 7263	Part 1:1990
	Pre-cast concrete kerbs, channels, edgings and quadrants

Other relevant BS documents as required by these Specifications.

AMERICAN PUBLICATIONS & STANDARDS (Including ASTM/AASHTO)

ASTM: D5	Bitumen Penetration of bitumen/(asphalt)
ASTM: D6/D1754	Loss on heating of bitumen/ (asphalt)
ASTM: D36	Softening point of bitumen/ (asphalt)
ASTM: D92	Flash and fire points of bitumen/ (asphalt)
ASTM: D113	Ductility of bitumen/ (asphalt)
ASTM: D2026	Standard specification for cutback asphalt (Slow curing type)
ASTM: D2027	Standard specification for cutback asphalt (Medium curing type)
ASTM: D2028	Standard specification for cutback asphalt (Rapid curing type)
ASTM: D4694	Standard specification for Pavement Falling Weight Deflectometer (FWD)
ASTM: E950	Standard specification for Road roughness

Other relevant ASTM documents as required by these Specifications.

Asphalt Institute

Manual Series No.2 (MS-2) - Asphalt concrete hot mix manual
Manual Series No.4 (MS-4) - The Asphalt Handbook
Manual Series No.14 (MS-14) - Asphalt cold mix manual

Other relevant Asphalt Institute documents as required by these Specifications.

Appendix 2: Office and Furniture/ Equipment for the Employer

Office for the Employer

Each room shall be fitted with sufficient fluorescent light fittings, ceiling fans with regulators and electric outlets. The Contractor shall provide one outside telephone line; with necessary extensions for use in the office. The Contractor shall supply and keep replenished all consumable items.

Furniture and Equipment for the Employer's Office

The furniture and equipment to be supplied and installed in the offices shall be new, and of acceptable quality. The furniture may be steel, aluminium, wood or combination of these. The Contractor should forward details of the items he intends to supply and obtain prior approval from the Engineer.

The Contractor shall provide, install and maintain the furniture and equipment detailed in the table below to the satisfaction of the Employer until the Completion of the Contract.

At Contract Completion the Furniture and Office equipment shall become the property of the Employer.

Furniture and Equipment for the Office of the Employer

S. No.	Item	Description	Unit	Quantity
1.	Executive table	750 mm x 1500 mm with two drawer on either side	No	3
2.	Clerk table	750 mm x 1250 mm with two drawer on either side	No	4
3.	Typist/secretary table	750 mm x 1250 mm with two drawer on one side	No	1
4.	Computer table	Purpose made	No	3
5.	Conference Table	1250 mm x 3000 mm	No.	1
6.	Cushion Chairs		No.	4
7.	Arm Chairs with cushion		No.	10
8.	Typist Chairs with cushion		No.	1
9.	Swivel Chairs		No.	3
10.	Steel Almirah	2.0 m high x 1.0 m wide x 0.35 m deep with shelves and two doors	No.	3
11.	Steel Filing Cabinet	With four drawers	No.	3
12.	Book Shelves	1 m x 2 m x 0.3 m 3 shelves	No.	3
13.	Gas Heater with cylinders	3 Kw	No.	3
14.	Electric Heater	3 Kw	No.	3
15.	Office Safe	0.125 cum. Secured to the building	No.	1
16.	Bulletin Board	1.2 m x 2.4 m		1
17.	White Magic Board	1.5 m x 1.0 m	No.	1
18.	Telephone System EPABX	One independent outside line	No.	1
19.	Cell Phone	Smartphone with network and data connection	No.	5

S. No.	Item	Description	Unit	Quantity
20.	Facsimile Machine		No.	1
21.	3 in 1 Printer, photocopier and scanner	A4 LaserJet Printer or equivalent complete with connecting cables, software etc	No.	1
22.	Stapler	No 56 size heavy duty	No.	1
23.	Punch	2 holes heavy duty	No.	2
24.	Pencil Sharpener	Table Type	No.	4
25.	Camera	Automatic Digital Camera with 10 x Zoom, UV filter, power flash and carrying case with extra 32 GB memory stick	No.	3
26.	Scientific Calculator		No.	3
27.	Commercial Calculator		No.	2
28.	Office Bag		No.	4
29.	Rain Coats		No.	4
30.	Desktop Computer of Acceptable Brand	Processor:-Core i5 or above, Memory:- 2 GB or above, Hard Drive:-500 GB or above, Mouse:-USB Optical Mouse, Keyboard:-USB Standard, Monitor:-18.5" wide LCD Monitor	No.	3
31.	Flat Bed Scanner	Cannon Scan D646UeX	No.	1
32.	Laptop	Processor:-Core i5 or above, Display :- 14" Diagonal Bright view Widescreen Display, Memory:- 8 GB or above, HDD:- 500 GB or above, Power backup: minimum 6 Cell Battery	No.	2
33.	External hard drive	1 TB Capacity	No.	1
34.	Color Printer	A4 size, HP color, LaserJet 2600 or equivalent	No.	1
35.	UPS	500 VA, Uninterrupted Power Supply for the above computer equipment	No.	3
36.	Switch and Server	Network Hub, Lintec Fe 2400 R	No.	1
37.	Networking for 6 nos		No.	1
38.	Air Conditioner	1.5 ton capacity	No.	3
39.	Electric Fan		No.	4
40.	Fire Extinguisher		No.	2
41.	First Aid Box		No.	1
42.	Filing Trays		No.	4
43.	Stationery	Provision of Consumable Items	No.	As required
44.	Waste Paper Basket		No.	4
45.	Refrigerator	8 cu.ft Capacity	No.	1
46.	Gas Hub	With two gas rings complete with two gas cylinders	No.	1

S. No.	Item	Description	Unit	Quantity
47.	Cooking Utensils	Complete Sets	No.	1
48.	Sink Unit Double Basin	With cold water taps and waste water outlet	No.	1
49.	Crockery	Complete set for 12 persons	No.	1
50.	Cutlery	Complete set for 12 persons	No.	1
51.	Tea Service	Complete set for 24 persons	No.	1
52.	Electric Kettle	2 Liter capacity	No.	1
53.	Emergency Lantern	Rechargeable	No.	4
54.	Doormats	Complete Set	No.	1
55.	Curtains	Complete Set	No.	1
56.	Cleaning Equipment Toilets	Complete Set	No.	1
57.	Cleaning Equipment Kitchen	Complete Set	No.	1
58.	Micro oven	Complete Set	No.	1
59.	Multi-media projector	Complete Set with screen and stand	No.	1
60.	Diesel Generator/Solar	Sound Proof min 10 KVA	No.	1

Note: The consumables required for smooth running and maintaining the Office shall be supplied by the Contractor as per the requirement, and to the satisfaction, of the Employer and the Engineer.

FOR REFERENCE

Appendix 3: Accommodation and Furniture / Equipment for the Employer

The Contractor shall provide, install and maintain the furniture, equipment and fittings as shown in the following table to the satisfaction of the Employer. The items shall be new and subject to the approval of the Employer.

The Contractor shall provide, install and maintain the furniture and equipment detailed in the table below to the satisfaction of the Employer until the Contract Completion.

At Contract Completion the Furniture and equipment shall become the property of the Employer.

Furniture and Equipment for the Accommodation of the Employer

S. No.	Item	Description	Unit	Quantity
A	Verandah			
1.	Verandah Table	2.0 m X 1.0 m	No	1
2.	Veranda Chair		No	8
B	Living / Dining Room			
3.	Lounge Suite	1 No. 3 seater, 2 No. 1 seater, 1 No. coffee table and 2 Nos. side tables.	No	2
4.	Dining Table	Formica Topped 2.0 m x 1.2 m	No	1
5.	Dining Room Chairs	Cushioned	No	6
6.	Book case	1.0 m x 2.0 m x 0.35 m x 3 shelves	No	2
7.	Occasional table		No	2
8.	Air Condition	1.0 Ton Capacity	No	1
C	Study Room			
9.	Writing Desk	1.5 m x 0.75 m	No	1
10.	Chairs		No	2
11.	Book case	1.0 m x 2.0 m x 0.35 m x 3 shelves	No	1
12.	Desk top Computer	IBM compatible assembled Computer or equivalent. Intel Pentium - I5 at 2.66 Ghz core to due processor, 4 MB Advanced Transfer L2 Cache 965 Intel Original 1GB DDR-2 RAM 667 MHZ Intel Extreme Graphics 129 MB Interated ADI Audio with Internal Speaker.	No	1
13.	Computer Table	Purpose made	No	1
14.	Steel Almirah	2.0m high x 1.0m wide x 0.35m deep with shelves and two doors	No	1
15.	Steel Filling Cabinet	With four drawers	No	1
D	Bed Rooms			
16.	Beds (double)	With mattress and two pillows.	No	1
17.	Beds (single)	With mattress and two pillows.	No	5
18.	Bedside Cabinet		No	6
19.	Wardrobe with fittings	2 m high, 1.0 m wide, 0.35 m deep, with shelves and two doors	No	6

S. No.	Item	Description	Unit	Quantity
20.	Bedside Lamp		No	6
21.	Mattress covers		No	6
22.	Pillow Cases		No	12
23.	Mosquito Nets		No	6
24.	Waste paper basket		No	6
25.	Air Condition	1.0 Ton Capacity	No	4
E	Pantry			
26.	Store shelves set		No	1
27.	Electric Iron and ironing board		No	4
28.	Pantry Cupboards set		No	1
29.	Glass Cabinet		No	2
30.	Refrigerator	8 cu.ft Capacity	No	1
31.	Water Filter	8 litre capacity	No	1
32.	Sink Unit with draining board	with cold water taps and waste water outlet	No	1
F	Kitchen			
33.	Kitchen Cupboards set		No	1
34.	Kitchen Table		No	1
35.	Chairs		No	2
36.	Sink Unit with draining board	with cold water taps and waste water outlet	No	1
37.	Electric or Gas Cooker	with 3 - Heater Rings , Grill and Oven complete (with two gas cylinders if gas).	No	2
38.	Electric Kettle	2 -litre capacity.	No	1
39.	Microwave Oven	Complete Set	No	1
40.	Cooking Utensils	Complete set for 8 persons	No	1
41.	Crockery	Complete set for 8 persons	No	1
42.	Cutlery	Complete set for 8 persons	No	1
43.	Tea Service	Complete set for 12 persons	No	1
44.	Plate Rack		No	4
G	Watch Person Accommodation		No	
45.	Bed	Single with mattress and two pillows.	No	2
46.	Wardrobe with fittings	2 m high, 1.0 m wide, 0.35 m deep, with shelves and two doors	No	2
47.	Armless Chairs		No	4
48.	Occasional Table		No	1
49.	Mattress covers		No	2
50.	Pillow Cases		No	4
51.	Mosquito Nets		No	2
H	General			
52.	Rugs/blankets		No	6

S. No.	Item	Description	Unit	Quantity
53.	Doormats		No	6
54.	Curtains	Complete Set	No	1
55.	Cleaning Equipment Toilet	Complete Set	No	1
56.	Cleaning Equipment Kitchen	Complete Set	No	1
57.	Cleaning Equipment General	Complete Set	No	1
58.	Diesel Generator/Solar	Minimum 10 KVA complete set	No	1

Note: The consumables required for smooth running and maintaining the Accommodation shall be supplied by the Contractor as per the requirement, and to the satisfaction, of the Employer and the Engineer.

FOR REFERENCE ONLY

Appendix 4: Vehicle for the Employer

The type of vehicles the Contractor is required to provide for the exclusive use of the Employer and his staff shall be in accordance with the Specification and Bill of Quantities and shall be as shown below:

Vehicle Type 1

New, or nearly new (not more than one year old), five door Station Wagon (including one rear door) with a diesel engine of at least 2.2 litre capacity, 110 BHP, 28 kgm torque, four wheel drive, a minimum ground clearance (unladen) of 180 mm, Air Conditioner, cloth seats, seat belts, locking fuel cap, spare wheel, power window, central locking, tool kit, tow rope, jump leads, fire extinguisher and first aid kit.

Vehicle Type 2

New, or nearly new (not more than one year old), "Double Cab" Pick-Up with a diesel engine of at least 2.2 litre capacity, 110 BHP, 28 kgm torque, four wheel drive, a minimum ground clearance (unladen) of 180 mm, Air Conditioner, cloth seats, seat belts, locking fuel cap, spare wheel, power window, central locking, tool kit, tow rope, jump leads, fire extinguisher and first aid kit.

"Nearly new" means less than one (1) year old and with less than 30,000 km travelled and in general good condition.

All vehicles shall be of current manufacture and shall be registered in the name of the Contractor and shall have a guarantee/warranty for a minimum period of one year. It is assumed that the average running distance is 5,000 km per month for vehicles Type - 1 and Type - 2.

Vehicles will revert to the Contractor when no longer required by the Employer.

Vehicle Type 3

New motorcycle with minimum 150 cc and 4-stroke engine, with accessories like helmet with visor, leg guard, gloves, jacket, utility box raincoat and boot.

All motorcycles shall be of current manufacture and shall be registered in the name of the Contractor and shall have a guarantee/warranty for a minimum period of one year. It is assumed that the average running distance is 3,000 km per month for motorcycles.

Motorcycles will revert to the Contractor when no longer required by the Employer.

Appendix 5: Survey Instrument Required at Site

The Contractor shall provide and maintain the following survey instruments and equipment until Contract Completion or as instructed by the Engineer. The items shall be new or nearly new and subject to the approval of the Engineer.

At Contract Completion the survey instruments and equipment shall become the property of the Contractor.

The survey instruments shall also be for the use of the Engineer's Representative until Contract Completion.

The Contractor shall supply immediately replacement for damaged/lost items and be responsible for insurance against theft.

Survey Equipment Required at Site

S. No	Description	Quantity
1	Total Station with Standard Accessories and Aluminum Tripod	1 Set
2	Single Prism with Tribrach Complete Set	2 Set
3	3 mtr. 3 Section Aluminum Ranging Rod	2 Set
4	GPS	2 Set
5	Auto Level with Tripod	1 Set
6	5 mtr 5 Section Levelling Staff	2 Set
7	Clip on Bubble	2 Set
8	50 mtr Nylon Coated Steel Tape	1 Set
9	50 mtr Fiberglass Tape	1 Set
10	30 mtr Fiberglass Tape	1 Set
11	5 mtr Steel Tape	5 Set
12	Field Books	As required
13	Other miscellaneous accessories	As required

The above equipment are minimum numbers required. Depending upon the actual requirements at site, the Contractor shall arrange for other and/or additional survey equipment as instructed by the Engineer.

Appendix 6: Site Laboratory

1. Scope

The Contractor shall provide and maintain an adequately equipped site laboratory complete with all manpower, utility services, apparatus, furniture and fittings to undertake the required testing to assure the quality of the materials and the works.

Site Laboratory shall be fully equipped with a complete set of equipment as indicated in Appendix – 7. The Contractor is responsible for the cost of undertaking all testing necessary for Quality Assurance purposes. Tests which cannot be carried out in Site Laboratory shall be undertaken by an outside laboratory acceptable to the Engineer. The Contractor shall be responsible for providing the vehicles required carrying out day to day (regular) process control testing and collecting the samples to be tested in Site Laboratory at his own cost.

The Site Laboratory shall be located within 500 m of the site and the laboratory building may be located at the rented building or newly constructed on rented land or constructed on land on lease whatsoever shall be available up to the end of the project.

The working table with shelves for storing the equipment, heavy duty working table, and other racks shall be provided by the Contractor at the laboratory as per the instruction of the Engineer. The Contractor shall supply desktop computer and A-4 size printer at laboratory for sole use of the laboratory. First aid kit box, fire extinguisher and other safety appliances shall also be provided at the laboratory by the Contractor.

In order to operate the site laboratory the Contractor shall deploy at least the following:

- Generator 20 KVA minimum
- Pickup truck
- Quality Control Engineer – 1 No
- Laboratory technician – 1 No
- Laboratory helpers – 6 Nos (minimum but shall supply additional numbers as required)
- Office boy – 1 No
- Security guards (day and night)

2. Description

The Site laboratory shall be newly constructed or rented and furnished to be a laboratory and provided with amenities including water supply, electric supply etc. as indicated below:

- The laboratory shall be provided with 240 volt, 50 HZ electricity. Lighting and sufficient electrical outlets shall be provided to the satisfaction and approval of the Engineer.
- A continuous supply of water with a minimum of two sinks with faucets shall be provided.
- The floor of the building shall be concrete suitably sealed and adequate to support operating test equipment without vibration and undue noise.
- A minimum of 10 metres of work benches, 900 mm high by 750 mm wide, shall be provided. The work benches shall have tops covered with approved plastic laminate or equivalent shall contain adjustable shelves and drawers and shall be constructed of concrete / 19 mm plywood. A minimum of 6 metres of cupboards shall be constructed approximately 600 mm above the workbenches. These cupboards shall have a minimum of two 450 mm high shelves approximately 300 mm deep. All cupboards shall be provided with doors.
- A minimum of four exhaust fans, three ceiling fans with regulators and three opening windows with blinds.
- The laboratory shall be provided with double entrance doors wide enough to unload materials from site vehicles into the laboratory. A minimum clear opening of 2 metres shall be provided.

The laboratory shall be operated strictly under the supervision of the Consultant's Material Engineer. The manpower supplied by the contractor for the operation of the site laboratory shall work to the satisfaction of the Consultant's Material Engineer and they will use the facilities detailed above together with the Consultant's Material Engineer. The Contractor shall provide additional office space/accommodation for his other staff in addition to the designated laboratory to the Engineer. The Contractor's other staff shall strictly be prohibited in using the laboratory space for their office/accommodation.

Prior to the construction of the laboratory, the Contractor shall obtain written approval from the Engineer for the proposed construction and arrangement of the laboratory.

Office for Material Engineer

Each room shall be fitted with two 40 watt fluorescent light fittings, ceiling fans with regulators. The laboratories shall have at least five 5A and two 15A electric outlets. The Material Engineer's office shall have minimum required furniture and equipment for the operation of the day to day office works.

The Contractor shall provide the facility for communications between the Consultant's staff and the Contractor's staff.

The Contractor shall supply and keep replenished all consumable items.

FOR REFERENCE ONLY

Appendix 7: Laboratory Equipment

The following items of laboratory equipment shall be provided in the laboratory, as a minimum, however, this does not relieve the Contractor of his responsibility to equip the laboratory with all equipment needed to perform the full range of tests required by the Specifications:

S. No.	Particulars	Quantity
	General	
1	Oven 18" x 18" x 18" Aluminum Chamber	1
2	Platform balance 300 kg	1
3	Electronic Balance Model CH30R11 Capacity 30 kg x 5 gm preferably OHAUS or equivalent	1
4	Electronic Balance Model CT6000 Capacity 6010 gm x 0.5 gm preferably OHAUS or equivalent	1
5	Electronic Balance Model NDB110 Capacity 2100 gm x 0.1 gm preferably OHAUS or equivalent	1
6	Water bath serological 2 rack solar	1
7	Mercury Thermometer 250°C	2
8	Dial Thermometer 400°C	2
9	Mercury Thermometer 50°C	2
	Glassware: containers and small tools including;	
10	Wet and Dry Thermometer	1
11	Spatulas 200 mm	2
12	GI Wire Zinc coating and diameter test	1
13	GI Tray	
	300 mm x 300 mm x 75 mm	6
	400 mm x 400 mm x 75 mm	6
	600 mm x 600 mm x 75 mm	6
14	Aluminum Moisture Container 75 mm x 50 mm	50
15	Rubber Mallet	1
16	Aggregate Steel Scoop (690 mm x 300 mm x 100 mm)	1
17	Aluminum Scoop (125 mm x 200mm x 75 mm)	1
18	Gauging Trowel	2
19	S.S Bowl 2 Lit	2
20	Volumetric Flasks	
	1000 ml	2
	500 ml	2
	250 ml	2
21	Measuring Cylinders	
	1000 ml	2

S. No.	Particulars	Quantity
	500 ml	2
	250 ml	2
22	Beakers	
	1000 ml	2
	500 ml	2
	250 ml	3
23	Evaporating Disc 100 mm	3
24	Vernier Caliper 150 mm	1
25	Steel Ruler 300 mm	1
26	Pairs of heat resistant Asbestos hand gloves	2
27	Set of sampling tools all materials	1
28	Set of crowbar, pick, spade and 5 kg hammer, GI Tray	2
29	Gunny bags and plastic bags	50
30	GI Sieve 450 mm dia Size; 75, 69, 50, 37.5, 31.5, 25, 20, 14, 16, 12.5, 9.5, 6.3, 4.75, Lid and pan set of 15 pcs	1
31	Brass Sieve 200 mm dia Size; 4, 2.8, 2.36, 2, 1.18mm, 600, 425, 300, 150, 75 mic, Lid and pan set of 12 pcs	1
32	Dynamic Cone Penetrometer equipment complete with 2 extra cones and 2 extension rods (set)	1
33	Water Testing kit (set)	1
34	Organic Content testing kit (set)	1
	Soil and Aggregate	
35	Sample Splitters (Riffle boxes) 50 mm	1
36	Liquid limit device with grooving tools and counter	1
37	Glass Plate 400mm x 600 mm x 6 mm	2
38	Specific Gravity Bottle 100 ml	1
39	Compaction Mould 100 mm, 150 mm and Rammer 2.5 kg and 4 kg	1
40	Sand Pouring Apparatus 200 mm (sand replacement test)	2
41	Sand Pouring Apparatus 100 mm (sand replacement test)	1
42	Core Cutter Apparatus	1
43	Aggregate Impact Value Test Apparatus	1
44	Los Angeles Abrasion Test Apparatus	1
45	Flakiness	1
46	Elongation Test Gauge	1
47	Standard Measure 30 lit, 15 lit and 3 lit	1
48	Tamping Rod	1
	CBR Apparatus	1

S. No.	Particulars	Quantity
49	CBR Load Frame – 1	
	Dial Gauge (0.01 - 0.25 mm) – 5	
	Annular Weight 2.5 kg – 3	
	Central Hole Weight 2.5 kg – 3	
	CBR Mould 150 mm – 9	
	Perforated Plate Brass – 9	
	Space Disc – 9	
	Penetration Piston – 1	
	Tripod – 9	
	Rammer 2.6 kg – 3	
	Rammer 4.89 kg – 3	
50	Unconfined Compression Test Apparatus (5 Tonne Capacity plus 5 kN, 10 kN and 20 kN Proving Rings)	1
	Bitumen and Bituminous Mixes	
51	Penetrometer with standard needle automatic	1
52	Viscometer	1
53	Standard spray trays	12
54	Centrifuge Type hand operated bitumen extractor 500 ml	1
55	3 m straight edge	1
56	Camber board and spirit level	2
	Cement and Cement Concrete / Mortar	
57	Vicat Apparatus	1
58	Slump Test Apparatus	1
59	Concrete Cube Mould 150 mm	18
60	Mortar Cube Mould 75 mm	42
61	Compression Strength Testing Machine 200 tonne capacity	1
62	Compression Strength Testing Machine 50 tonne capacity	1
63	Sand equivalent test set, complete with graduate plastic cylinder, manual or mechanical shaker and stock solution	1
64	Curing tank for test cubes (2 m x 2 m x 0.75 m) with controlled heating facilities	1
65	Light weight hammer test	1

The site laboratory equipment and furniture shall become the property of the Contractor when no longer required by the Engineer unless stated to the contrary elsewhere in the contract.

Appendix 8: Project Signboard

The Contractor shall provide and erect at the beginning and end of each section of Project road a signboard approx. 2.50 m wide by 1.80 m high with the wording in Nepali or English.

Final details to be agreed with the Engineer (see drawing).

The board is to be made of galvanised steel; the lettering and border are to be in black on yellow background. The lower edge of the board shall be at approx. 1.20 m above adjacent ground and shall be mounted on suitable posts with struts on concrete foundations. The paint to be used shall be sunshine resistant paint.

The Contractor will be responsible for the repair and maintenance of the signboards up to the completion of all construction works.

The Engineer will direct the location and placing of the signboards.

GOVERNMENT OF NEPAL	
MINISTRY OF PHYSICAL INFRASTRUCTURE AND TRANSPORT	
DEPARTMENT OF ROADS	
PROJECT DIRECTORATE (ADB)	
SASEC Roads Improvement Project (SRIP)	
ASIAN DEVELOPMENT BANK	
ADB Loan No. 48337 - NEP	
NARAYANGHAT – BUTWAL ROAD (SECTION – 2)	
CONTRACT NO.	: SRIP/ICB/NB/02
CHAINAGE	: Km 65 + 000 to Km 113 + 535
CONTRACTOR	: xxxxxxxxxxxxxxxxxxxxxxxxx
	: xxxxxxxxxxxxxxxxxxxxxxxxx
CONSULTANTS	: xxxxxxxxxxxxxxxxxxxxxxxxx
	: xxxxxxxxxxxxxxxxxxxxxxxxx

Section 6D – Drawings

Provided as Section 6D in a separate volume.

FOR REFERENCE ONLY

Section 6E – Personnel Requirements: Phase 1

Phase 1: Upgrading Works

Using Form PER-1 and PER-2 in Section 4 (Bidding Forms), the Bidder must demonstrate that it has Personnel who meet the following requirements:

S. No.	Position	Required Nos.	Minimum Qualification	Total Similar Work Experience [years]	Experience in Similar Position [years]
1	Contract Manager / Contractor's Representative ¹	1	Bachelor's degree in Civil Engineering	10	3
2	Site Engineer	3	Bachelor's degree in Civil Engineering	7	3
3	Quality Control Engineer	2	Bachelor's degree in Civil Engineering	7	3
4	Environment Safeguard/ Safety Engineer	1	Bachelor's degree in Civil / Environment Engineering	5	3
5	Sub Engineers	6	Diploma in Civil Engineering or equivalent	5	3
6	Senior Laboratory Technician	4	Senior Lab Technician or Sub-engineer	5	3

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section 4 (Bidding Forms).

All submitted curriculum Vitae should be duly signed by the concerned person.

1 Note:

- (i) In case of joint venture, the partner who meets the major requirement of experience in Contracts of Similar Size and Nature shall be present at the Work Site throughout the contract duration; and
- (ii) The Contract Manager / Contractor's Representative shall require being the Senior Employee from the Bidder and working with the firm for at least one year prior to the bid submission deadline.

Section 6E – Personnel Requirements: Phase 2

Phase 2: Performance Based Maintenance Works

Using Form PER-1 and PER-2 in Section 4 (Bidding Forms), the Bidder must demonstrate that it has Personnel who meet the following requirements:

S. No.	Position	Required Nos.	Minimum Qualification	Total Similar Work Experience [years]	Experience in Similar Position [years]
1	Contract Manager / Contractor's Representative	1	Bachelor's degree in Civil Engineering	7	5
2	Performance Manager	1	Bachelor's degree in Civil Engineering	5	2
3	Maintenance Engineer	1	Bachelor's degree in Civil Engineering	5	2
4	Sub Engineers	2	Diploma in Civil Engineering or equivalent	3	2
5**	Performance Based Road Maintenance Expert (part time)	1			

The Bidder shall provide details of the proposed personnel and their experience records in the relevant Information Forms included in Section 4 (Bidding Forms).

All submitted curriculum Vitae should be duly signed by the concerned person.

** The successful bidder shall deploy a Performance Based Road Maintenance Expert (part time), who has extensive experience in PBM Works to coach and train the staff of the contractor and subcontractors in the planning, execution and monitoring of the performance based maintenance works.

Section 6F – Equipment Requirements: Phase 1

Phase 1: Upgrading Works

Using Form EQU in Section 4 (Bidding Forms), the Bidder must demonstrate that it has the key equipment listed below:

S. No.	Equipment Type and Characteristics	Minimum Number Required
1	Excavator (> 0.50 m3)	4
2	Loader (> 1.5 m3)	3
3	Motor Grader (> 100 HP)	3
4	Two Stage Stone Crusher Plant (production > 60 cu m per Hr)	3
5	Water Bowser (> 5,000 litres)	4
6	Bitumen Distributor (> 4,000 litres)	3
7	Pneumatic Roller (> 8 Ton)	3
8	Steel Roller (> 8 Ton)	2
9	Tipper Truck (> 5 cu m)	16
10	Vibrating Roller (> 10 Ton at static condition)	3
11	Concrete Batch Plant (> 50 m3/hour)	2
12	Concrete Mixer Truck: (> 6 m3)	8
13	Asphalt Plant (> 100 tonne/hour)	2
14	Asphalt Paver with Electronic Sensor (> 3.0 m)	2
15	Tandem Roller (> 8 tonne)	2
16	Crane (> 50 tonne)	1
17	Cone Crusher Plant (production > 60 cu m per Hr)	2

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section 4 (Bidding Forms).

Ownership attestation documentation for each item of equipment and, where, relevant, the original leasing agreements should be attached.

Resources committed by the Bidder should be physically mobilised at site throughout the contract period.

Section 6F – Equipment Requirements: Phase 2

Phase 2: Performance Based Maintenance Works

Using Form EQU in Section 4 (Bidding Forms), the Bidder must demonstrate that it has the key equipment listed below:

S. No.	Equipment Type and Characteristics	Minimum Number Required
1	Excavator (> 0.50 m3)	1
2	Water Bowser (> 5,000 litres)	1
3	Bitumen Distributor (> 2,000 litres)	1
4	Tipper Truck (> 5 cu m)	3
5	Vibrating Roller (> 10 Ton at static condition)	1
6	Tandem Roller (> 8 tonne)	1
7	Mini Asphalt Plant	1
8	Concrete Mixer Portable (1 bag)	1
9	Portable Air Compressor	1
10	Rammer Compactor	1
11	Generator Set	1
12	Flood Lights set	1
13	Truck Mounted Crane (> 20 tonne)	1

The Bidder shall provide further details of proposed items of equipment using the relevant Form in Section 4 (Bidding Forms).

Ownership attestation documentation for each item of equipment and, where, relevant, the original leasing agreements should be attached.

Resources committed by Bidder should be physically mobilised at site throughout the contract period.

**Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Project Directorate (ADB)
Kathmandu, Nepal**

**SASEC Roads Improvement Project (SRIP)
(ADB Loan No. 3478 - NEP)**

**Narayanghat – Butwal Road (Section – 2)
From Km 65 + 000 to Km 113 + 535**

Contract No. SRIP/ICB/NB/02

Phase 1: Upgrading Works

(Upgrading of existing road from 2-Lanes to 4 Lanes and Service Lanes, Structures, Bridges, etc. including Defect Notification Period)

Phase 2: Performance Based Maintenance Works

(Maintenance works consisting of all activities to be carried out to achieve and keep the road assets as defined in the PBM Specifications)

Bidding Document

Part III Conditions of Contract

**Section 7
Section 8
Section 9**

**General Conditions of Contract
Particular Conditions of Contract
Contract Forms**

April 2018

Preface

This Bidding Document for the Procurement of Works (Single Stage – Two Envelope) has been prepared by the Government of Nepal, Ministry of Physical Infrastructure and Transport, Department of Roads, Project Directorate (ADB) and is based on the Standard Bidding Document for International Competitive Bidding (ICB) under “Procurement of Works without Prequalification” issued by the Asian Development Bank dated December 2015.

FOR REFERENCE ONLY

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PART I BIDDING PROCEDURES

Section 1 - Instructions to Bidders (ITB) ----- 1-1

This Section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

Section 2 - Bid Data Sheet (BDS) ----- 2-1

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section 1 - Instructions to Bidders.

Section 3 - Evaluation and Qualification Criteria (EQC) ----- 3-1

This Section contains the criteria to determine the lowest evaluated bid and the qualifications of the Bidder to perform the contract.

Section 4 - Bidding Forms (BDF) ----- 4-1

This Section contains the forms which are to be completed by the Bidder and submitted as part of his Bid.

Section 5 - Eligible Countries (ELC) ----- 5-1

This Section contains the list of eligible countries.

PART II EMPLOYERS REQUIREMENTS

SECTION 6

Section 6A – Summary of Description of Works

This Section contains the summary list of main works to be executed under the contract. Specification, Special provisions and, the Drawings, that describe the Works to be procured.

Section 6B – Standard Specifications

This document has been issued under the authority of the Government of Nepal, Ministry of Physical Planning and Works, Department of Roads, (July 2001), it can be purchased from the Central Road Laboratory, Kupandole, Lalitpur.

Section 6C – Special Provisions

This section contains amendments, supplements, etc. to the standard specifications to suit the specific requirements of the project, including sections regarding Minor Bridges and PBM works.

Section 6D – Drawings

The drawings are presented in a separate volume.

Section 6E – Personnel Requirements

This section provides the information on Personnel Requirements.

Section 6F – Equipment Requirements

This section provides the information on Equipment Requirements.

PART III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Section 7 - General Conditions of Contract (GCC) ----- 7-1

This Section contains the general clauses that govern the Contract. These General Conditions shall be the Conditions of Contract for Construction, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs-Conseil (FIDIC June 2010 MDB version). These Conditions are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).

Section 8 - Particular Conditions of Contract (PCC) ----- 8-1

This Section contains provisions which are specific to each contract and which modify or supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Section 9 - Contract Forms (COF)----- 9-1

This Section contains forms, which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

SASEC Roads Improvement Project (SRIP)
(ADB Loan No. 48337 - NEP)

Narayanghat – Butwal Road (Section – 2)
From Km 65 + 000 to Km 113 + 535

Contract No. SRIP/ICB/NB/02

Phase 1: Upgrading Works

(Upgrading of existing road from 2-Lanes to 4 Lanes and Service Lanes, Structures, Bridges, etc. including Defect Notification Period)

Phase 2: Performance Based Maintenance Works

(Maintenance works consisting of all activities to be carried out to achieve and keep the road assets as defined in the PBM Specifications)

Part III: CONDITIONS OF CONTRACT

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Section 7 - General Conditions of Contract

Project Directorate (ADB); Department of Roads,
Ministry of Physical Infrastructure and Transport

**Narayanghat – Butwal Road (Section – 2)
(Km 65 + 000 to Km 113 + 535)**

Contract No. SRIP/ICB/NB/02

The Conditions of Contract comprise two parts, this Section 7 - General Conditions of Contract (GCC) and the following Section 8 - Particular Conditions of Contract (PCC). Any amendments and additions to the GCC, specific to this contract have been introduced in Section 8 (Particular Conditions of Contract), Part A (Contract Data) and Part B (Special Provisions). Clause numbers in the PCC correspond to those in the GCC. As per GCC 1.5 (Priority of Documents), the PCC takes precedence over the GCC.

The General Conditions that follow are Conditions of Contract for Construction for Building and Engineering Works Designed by the Employer, Multilateral Development Bank Harmonized Edition, prepared by the Fédération Internationale des Ingénieurs-Conseil, or FIDIC (FIDIC MDB Harmonized Construction Contract) available at FIDIC MDB June 2010. The FIDIC MDB Harmonized Construction Contract is exclusive for the use of ADB Borrowers and their project implementing agencies as provided under the License Agreement dated 09 June, 2005, between the ADB and FIDIC, and, consequently, no part of this publication may be reproduced, translated, adapted, stored in a retrieval system or communicated, in any form or by any means, whether mechanical, electronic, magnetic, photocopying, recording or otherwise, without prior permission in writing from FIDIC, except by the Employer identified in the contract and only for the exclusive purpose of preparing bidding documents for ADB financed contracts.

FOR REFERENCE ONLY

FOR REFERENCE ONLY

Section 8 - Particular Conditions of Contract

The following Particular Conditions of Contract (PCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Part A – Contract Data

Conditions	Ref. GCC	Data
Employer's name and address	1.1.2.2 & 1.3	Ministry of Physical Infrastructure and Transport, Department of Roads, Project Directorate (ADB), Kathmandu, Nepal.
Engineer's name and address	1.1.2.4 & 1.3	M/s Korea Engineering Consultants Corp. (Korea)/Kyong Dong Engineering Co. Ltd (Korea) JV in association with MEH Consultants (P) Ltd., Multi-Disciplinary Consultants (P) Ltd. and Soil Test (P) Ltd. Gairidakot-5, Buddha Chowk, Nawalparasi, Nepal. Represented by the Team Leader (CRE)
Bank's name	1.1.2.11	Asian Development Bank (ADB)
Borrower's name	1.1.2.12	Nepal
Time for Completion	1.1.3.3	Phase 1: Upgrading Works 1,278 days plus 365 days of Defect Notification Period. Phase 2: Performance Based Maintenance Works 1,460 days (This Phase will start at the end of the Defects Notification Period for Phase 1).
Defects Notification Period	1.1.3.7	Phase 1: Upgrading Works 365 days Phase 2: Performance Based Maintenance Works Not applicable
Sections	1.1.5.6	Not Applicable
Electronic transmission systems	1.3	Email, fax supplemented by original hard copy through post, courier or hand delivered.
Governing Law	1.4	The Law of Nepal
Ruling language	1.4	English
Language for communications	1.4	English

Time for access to the Site	2.1	14 days after the Commencement Date
Engineer's Duties and Authority	3.1(B)(ii)	A Variation having a value of more than 0.1% of the Accepted Contract Amount shall require approval of the Employer. Similarly, when the cumulative sum of Variations results in an increase of the Accepted Contract Amount by more than 2 % , any Variation thereafter shall require approval of the Employer.
Performance Security	4.2	The performance security will be in the form of an unconditional bank guarantee in the amount(s) of Ten (10) percent of the Accepted Contract Amount and denominated in the proportions of currencies mentioned in the schedule of currencies and issued by a reputable financial institution/bank. When additional performance security is required due to seriously unbalanced or front-loaded bid in accordance with ITB 36.5, the Employer shall specify the percentage of the performance security and the terms for its release. If the Performance Security is issued by a bank located outside Nepal, it shall be counter guaranteed by a commercial bank established in Nepal.
Normal working hours	6.5	Phase 1: Upgrading Works Normal working hours shall be as per Labor Act 2074 of Nepal Phase 2: Performance Based Maintenance Works Normal working hours shall not be applicable. Daily Inspections and emergency response needs to done on Saturdays and Public Holidays as well.
Delay damages for the Works	8.7 & 14.15(b)	Phase 1: Upgrading Works 0.05 % of the Contract Price for Phase 1: Upgrading Works per day, in the currencies and proportions in which the Contract Price is payable. Phase 2: Performance Based Maintenance Works Not Applicable.
Maximum amount of delay damages	8.7	Ten (10) percent of the Contract Price.
Provisional Sums	13.5(b)(ii)	Five (5) percent

Adjustments for Changes in Cost	13.8	Phase 1: Upgrading Works The Contract Price shall be adjustable during Contract Execution.
The Contract Price	14.1	<i>Delete the last sentence of the Sub-clause 14.1 and replace with the text below relating with the exemption on construction equipment:</i> Notwithstanding the provisions in this document, the Contractor's construction equipment, including essential tools thereof, imported for the sole purpose of executing the contract on condition of re-export upon completion of the Works, shall be exempt from the payment of custom duties. However, the Contractor shall deposit the amount or provide a bank guarantee to the Government of Nepal, Customs Office equal to the amount of custom duties as per the prevailing laws, rules and regulations of Nepal for those imported equipment at the time of import. Such deposited amount shall be refunded, or the bank guarantee be cancelled by the Custom Office after re-export of those imported equipment. The construction equipment imported by the Contractor for the performance of the Works shall be taken out of the Country within the period after the completion of Works as per the prevailing laws of Nepal.
Total advance payment	14.2	Fifteen (15) Percentage of the Accepted Contract Amount less Provisional sum and VAT payable in the currencies and proportions in which the Accepted Contract Amount is payable. The total advance payment shall be made in Two (2) installments as follows: - First (1st) installment of 7.5% within 28 days after the submission of bank guarantee; - Second (2nd) installment of 7.5% after the completion of the Contractor's mobilization of all required resources to the Site as agreed in the Contract document and within 28 days of the date of certification by the Project Manager. The Advance Payment Guarantee shall be valid until the date of Completion of the Phase 1: Upgrading Works. If the Advance Payment Guarantee is issued by a bank located outside Nepal, it shall be counter guaranteed by a commercial bank established in Nepal.

Repayment of advance payment	14.2(a)	Delete "exceeds thirty percent (30%) of the Accepted Contract Amount less Provisional Sums" in third line and replace with: "exceeds thirty percent (30%) of the Accepted Contract Amount less Provisional sum and VAT"
Repayment amortization of advance payment	14.2(b)	Amortization Rate shall be: 30% Delete "when 90 percent (90%) of the Accepted Contract Amount less Provisional Sums" in fifth and sixth lines and replace with: "when 80 percent (80%) of the Accepted Contract Amount less Provisional Sum and VAT"
Percentage of Retention	14.3(c)	Phase 1: Upgrading Works Ten percent (10%) Phase 2: Performance Based Maintenance Works Not applicable
Limit of Retention Money	14.3 (c)	Phase 1: Upgrading Works Five Percent (5%) of the Accepted Contract Amount Phase 2: Performance Based Maintenance Works Not applicable
Plant and Materials	14.5(b)(i)	Not Applicable
	14.5(c)(i)	Not Applicable
Minimum Amount of Interim Payment Certificates	14.6	Phase 1: Upgrading Works One percent (1%) of the Accepted Contract Amount. Phase 2: Performance Based Maintenance Works Not Applicable
Corrupt and Fraudulent Practices	15.6	The following sentence shall apply: For the purposes of this Subclause: ADB's Anticorruption Policy requires Borrowers (including beneficiaries of ADB-financed activity), as well as Contractors, Subcontractors, manufacturers, and Consultants under ADB-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, ADB

		(a) defines, for the purposes of this provision, the terms set forth below as follows: (i) “corrupt practice” means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party; (ii) “fraudulent practice” means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) “coercive practice” means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; (iv) “collusive practice” means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party; (v) “obstructive practice” means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an ADB investigation; (b) making false statements to investigators in order to materially impede an ADB investigation; (c) failing to comply with requests to provide information, documents or records in connection with an Office of Anticorruption and Integrity (OAI) investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or (e) materially impeding ADB’s contractual rights of audit or access to information; and (vi) “integrity violation” is any act which violates ADB’s Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of ADB sanctions, retaliation against whistleblowers or witnesses, and other violations of ADB’s Anticorruption Policy, including failure to adhere to the
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		highest ethical standard. (b) will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract; (c) will cancel the portion of the financing allocated to a contract if it determines at any time that representatives of the borrower or of a beneficiary of ADB-financing engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations during the procurement or the execution of that contract, without the borrower having taken timely and appropriate action satisfactory to ADB to remedy the situation; and (d) will impose remedial actions on a firm or an individual, at any time, in accordance with ADB's Anticorruption Policy and Integrity Principles and Guidelines (both as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate in ADB-financed, administered, or supported activities or to benefit from an ADB-financed, administered, or supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations.
Maximum total liability of the Contractor to the Employer	17.6	The product of 1.10 times the Accepted Contract Amount
Periods for submission of insurance:	18.1 (a)	a. evidence of insurance: 14 days
	18.1 (b)	b. copies of relevant policies: 21 days
Insurance of Contractor's Equipment	18.2 (b)	Contractor's Equipment shall be insured before mobilizing to the Site. The insurance shall be in the name of the legal owner of the Equipment. Insurance in the joint name of the Employer and the Contractor shall not be required for the insurance against loss or damage to the Contractor's Equipment.
Maximum amount of deductibles for insurance of the Employer's risks	18.2 (d)	NRs. 500,000.00 (Five hundred thousand only)
Minimum amount of third party insurance	18.3	NRs. Fifteen (15.00) Million with no limit on the number of occurrences.

Date by which the DB shall be appointed	20.2	28 days after the Commencement.
The DB shall be comprised of	20.2	Three Members
Appointment (if not agreed) to be made by	20.3	“Executive Committee of FIDIC (International Federation of Consulting Engineers) World Trade Center II –Geneva Airport Box 311 29 route de Pres-Bois CH-1215 Geneva 115 Switzerland”
International arbitration shall be administered by	20.6 (a)	International arbitration shall be: (i) Administered by: Singapore International Arbitration Centre (SIAC) shall be the institution to administer the arbitration. (ii) Conducted in accordance with the rules of: the United Nations Commission on International Trade Law (UNCITRAL)
Place of Arbitration	20.6	Singapore (or any other neutral venue agreed upon by both parties.)

FOR REFERENCE ONLY

Part B – Specific Provisions

Conditions	Ref. GCC	Data
Definitions	1.1	
Specifications	1.1.1.5	The Specifications mean: (a) Standard Specifications (b) Special Provisions to the Standard Specifications
Commencement Date	1.1.3.2	<i>At the end of the Sub-Clause add the followings paragraph.</i> “Commencement Date of the Phase 2: Performance Based Maintenance Works” means the day immediately following the conclusion of the Defects Notification Period of the Phase 1: Upgrading Works.
Time for Completion	1.1.3.3	<i>At the end of the Sub-Clause add the followings paragraphs.</i> “Time for Completion of the Phase 1: Upgrading Works” means the time for completing the Phase 1: Upgrading Works under Sub-Clause 8.2 [Time for Completion], as stated in the Contract Data (with any extension under Sub-Clause 8.4 [Extension of Time for Completion]), calculated from the Commencement Date including Defect Notification Period. “Time for Completion of the Phase 2: Performance Based Maintenance Works” means the time for completing the Phase 2: Performance Based Maintenance Works which will start at the end of the DNP for Phase 1.”
Defects Notification Period	1.1.3.7	In the fifth line immediately after “calculated” delete the remaining texts and add “from the date on which the Phase 1: Upgrading Works is completed as certified under Sub-Clause 10.1 [Taking Over of the Works and Sections] and as stated in the Taking-Over Certificate of the Phase 1: Upgrading Works.”
Additional Sub Clause:	1.1.3	<i>Add the following Sub-clause to Clause 1.1.3 [Dates, Tests, Periods and Completion]</i>
Completion Date of Phase 1: Upgrading Works	1.1.3.10	“Completion Date of Phase 1: Upgrading Works” means the date of completing the Phase 1: Upgrading Works including Defect Notification period.
Accepted Contract Amount	1.1.4.1	Immediately after “execution” delete “and” and replace with “,” and immediately after “completion” add “and performance based maintenance”.
Works	1.1.5.8	<i>Delete the sentence and insert the following:</i> “Works” means the Permanent Works, the Temporary Works and Performance Based Maintenance Works.

Conditions	Ref. GCC	Data
Additional Sub Clauses:		<i>Add the following Sub-Clauses to Clause 1.1.5 [Works and Goods]</i>
Maintenance Phase Works	1.1.5.9	"Maintenance Phase Works" means the Phase 2: Performance Based Maintenance Works to be executed by the Contractor.
Construction Phase Works	1.1.5.10	"Construction Phase Works" means the Phase 1: Upgrading Works to be executed by the Contractor including Defect Notification Period.
Care and Supply of Documents	1.8	<i>Add the following text at the end of Sub-clause 1.8:</i> Irrespective of the above, the Contractor shall be responsible for the production of detailed construction drawings as may be necessitated by his work programme pursuant to Sub-Clause 8.3 and as the Engineer may deem necessary for the proper execution of the Works. The Contractor shall supply two copies of draft prints of all such detailed construction drawings for the Engineer's review and when approved by the Engineer shall supply six final prints together with a reproducible copy on computer disk or as may be otherwise approved by the Engineer.
Contractor's General Obligations	4.1	In the fourth paragraph immediately after "construction" add "and maintenance" In the fifth paragraph delete "whenever required by the Engineer" and replace with "as part of his quality assurance obligations". <i>After the fifth paragraph, add the following paragraph:</i> "The Contractor shall prepare and submit working drawings, shop drawings and schedules for all works to be constructed and maintained under the Contract and shall be fully responsible for the accuracy of these working drawings, shop drawings and schedules which shall be deemed to be Contractor's Documents in accordance with the Contract and be submitted in accordance with the provisions for the same. The working drawings, shop drawings and schedules shall be based on the Drawings and the actual site conditions as surveyed by the Contractor and agreed with the Engineer." <i>At the end of this Sub-Clause add the following paragraph:</i> "On or before completion of the Construction Phase Works, the Contractor shall arrange to furnish to the Engineer, as part of Contractor's Documents, "as-built" drawings of the permanent works of the construction phase works (not limited to works designed by the Contractor), in the quality and detail to be approved by the Engineer. The "as-built" drawings shall be prepared, and submitted for the Engineer's checking and acceptance, progressively with the progress of the

Conditions	Ref. GCC	Data
		construction phase works. The Taking-Over Certificate for the construction phase works shall not be issued by the Engineer until the “as-built” drawings of the permanent works of the construction phase works are submitted and accepted.
Performance Security	4.2	In the third paragraph immediately after “Certificate” add “for the Phase 1: Upgrading Works and Phase 2: Performance Based Maintenance Works”. <i>Add the following paragraph after the sixth paragraph</i> The Contractor may prepare two separate performance securities: (i) One 5% of the Accepted Contract Amount with the validity period of 8.5 years and (ii) Other 5% of the Accepted Contract Amount with the validity period of 4.5 years, hence totaling 10% of the Accepted Contract Amount. At the completion of the Defects Notification Period of the Phase 1: Upgrading Works, the Contractor may be released with the performance security of 5% of the Accepted Contract Amount with the validity period of 4.5 years. The remaining 5% Performance Security may be released during PBM phase in the manner described below: If the Contractor complies with the Operational Service Levels defined in Table 33.4 Pavement Roughness in Section 3300 of Part 2 Employers Requirements, the Performance Security may be reduced by one percent (1%) of the Accepted Contract Amount after the completion of each year of Phase 2. Performance Security with two percent (2%) of the Accepted Contract Amount shall be retained until the Contractor has complied with all obligations of the Contract.
Subcontractors	4.4	<i>Add the following at the end of the Sub-clause 4.4 :</i> Maximum percentage of Subcontracting permitted is: 40% of the Contract Price. The proposed Subcontractor shall meet, on a pro rate basis, the following criteria as specified in Section 3 Evaluation and Qualification Criteria: (i) Average Annual Construction Turnover; (ii) Financial Resources; (iii) Construction Experience in Contract of Similar Size and Nature that is similar to the proposed subcontract; - and (iv) Construction Experience in Key Activities, if the subcontractor is proposed for key activities.

Conditions	Ref. GCC	Data
		<i>Add new text to this Sub-clause 4.4, after item (d) as follows:</i> (e) In the event of approved subcontracting the Contractor shall ensure that Subcontractors do not further subcontract their contract; (f) The Contractor shall keep a log showing the following information on all Subcontractors, suppliers and transporters engaged in the Contract Works: (a) Name and address (b) Copy of Subcontracting agreement (c) Works and value of Subcontract (d) Commencement and completion dates (e) Copy of payments and Interim payments made to Subcontractor The Contractor shall submit a copy of the above log monthly to the Engineer's representative.
Co-operation	4.6	<i>Add new text to this Sub-clause 4.6 at the end as follows:</i> There may be other contractors working on the similar and/or adjacent road. The Contractor shall at all times allow the free passage of all traffic, including vehicles and equipment of other Contractors. The maintenance for the road or way shall be the responsibility of the Contractor.
Setting Out	4.7	<i>At the end of the second paragraph, add the following:</i> "For this purpose, before commencement of the work on the site, the Contractor shall carry out a check survey, in the presence of the Engineer, to verify the accuracy of the items of reference and submit the results of the verification survey to the Engineer for his acceptance."
Safety Procedures	4.8	<i>At the end of this Sub-Clause, add the following paragraph:</i> "Within twenty-eight (28) days of the Commencement Date, and before commencing any construction on Site, the Contractor shall provide a Site Safety Manual, which shall be subject to the Engineer's consent, specifically for the Site which shall establish all of the requirements for effecting and maintaining a safe working environment for Contractor's and Employer's Personnel and any other authorized personnel entering the Site in accordance with the Contractor's obligations. The Site Safety Manual shall include all of safety obligations of the Contractor including safe traffic management for all Site activities and personal protective equipment required for each working area. The Manual shall be

Conditions	Ref. GCC	Data
		revised as deemed necessary to suit with the changed site situation by the Contractor with the consent of the Engineer."
Unforeseeable Physical Conditions	4.12	<i>Add the following subparagraph at the end of GCC Sub-clause 4.12:</i> In addition to notice of any unforeseeable physical conditions, the Contractor shall provide the Engineer with a written notice of any unanticipated environmental, resettlement indigenous peoples risk or impacts that arise during construction, implementation or operation of the Project that were not considered in the applicable Environmental Impact Assessment, Environmental Management Plan, and Resettlement Plan, attached hereto as Appendix 1 through Appendix 4.
Rights of Way and Facilities	4.13	<i>Add the following paragraphs as first paragraphs of Sub-clause 4.13:</i> The Contractor shall ascertain the location of all access paths, watercourses, irrigation channels, sewers, drains, water pipes, electricity and telecommunication cables and other services, and structures etc. which may be encountered during the execution of the Works. He shall temporarily support or divert and subsequently reinstate all such services and structures as necessary and to the satisfaction of the Engineer. As soon as any such service or structure is encountered on, over, under, in or through the Site during the performance of the Contract, the Contractor shall make a record of the location and description of such service or structure and shall send the same forthwith to the Engineer. Where permanent diversion or support of such service or structure is rendered necessary as the unavoidable result of the execution and maintenance of the Works in accordance with the Contract, the Engineer after consultation with the Employer will instruct the Contractor as to the diversion or support to be provided and the Contractor shall be paid the costs thereof in accordance with Clause 13 hereof. <i>Add the following paragraphs at the end of Sub-clause 4.13:</i> The Contractor shall comply with (i) the measures and requirements set forth in the Resettlement Plan ("RP"), to the extent it concerns impacts on affected people during construction; and (ii) any corrective or preventive actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the RP. The Contractor shall allocate a budget at his own cost for compliance with these measures, requirements and actions.
Avoidance of Interference	4.14	<i>After the first paragraph of this Sub-Clause, add the following paragraph:</i> "Without in any way limiting the Contractor's obligations

Conditions	Ref. GCC	Data
		and responsibilities under the Contract, because the Site or part thereof is used by the public, the Contractor shall programme and execute the Works to avoid inconvenience or disruption of the public. No work on any part of the Site used by the public shall be permitted until such time as alternate routes in the form of roads, diversions, footpaths, accesses and the like (whether permanent or temporary) have been provided by the Contractor, together with all necessary safety features and devices and appurtenant drainage, and the alternate route(s) have been deemed acceptable for public use by the Engineer."
Transport of Goods	4.16	<i>Add the following paragraph at the end of Sub-clause 4.16:</i> The Contractor shall agree with the Engineer and adequately record the condition of roads, agricultural land and other infrastructure prior to the start of transporting materials, goods and equipment, and construction.
Protection of the Environment	4.18	<i>Add the following paragraphs at the end of Sub-clause 4.18:</i> The Contractor shall, to the satisfaction of the Engineer, take all necessary precautions for the efficient protection of all surface and sub-surface watercourses against all kinds of pollution arising from the execution of the works. The Contractor shall ensure that at all locations where his labour force are living or working, other than labour living in their own homes, adequate facilities are provided to collect and treat all sewage and wastewater and to ensure that the outflows from such treatment facilities comply with recognised national or international standards for sewage treatment discharges. The Contractor shall ensure that fuel wood is not used as firewood and as a means of heating during the preparation or processing of any materials forming part of the Works. The Contractor shall take special precautions in connection with the establishment of storage facilities for diesel fuel, petrol, lubricants, bitumen and bituminous materials. Storage facilities shall not be placed in rock-fall prone areas. They shall have barriers and impervious surfaces preventing leakages of spilt material outside the storage area or into the underlying soils. The Contractor shall ensure that any cut or fill slopes are planted with grass or other approved plant cover as soon as possible to protect them from erosion. This planting shall follow the recommendations in the Nepali manual entitled "Vegetative Structures for Stabilizing Highway Slopes" (DoR), or the requirements of the

Conditions	Ref. GCC	Data
		Specification as directed by the Engineer. The water used in the construction shall not be allowed to affect water availability in the local communities. Where a scarcity of water is expected to arise, the Contractor shall explore and tap alternative sources of safe water. In case of interference with the water supply of a settlement, the Contractor is liable to provide the affected population with potable drinking water from alternative sources at no extra cost to the Contractor or the local people. The Contractor shall also comply with all applicable national, regional and local environment laws and regulations. The Contractor shall (a) establish an operational system for managing environmental impacts, (b) carry out all of the monitoring and mitigation measures set forth in the EIA and EMP attached hereto as Appendix 1 & Appendix 2, and (c) allocate the budget required to ensure that such measures are carried out. The Contractor shall submit quarterly reports on the carrying out of such measures to the Employer. The Contractor shall allocate a budget at his own cost for compliance with these measures, requirements and actions.
Progress Reports	4.21	In the sub-paragraph (g) just after "relations;" delete "and" At the end of sub-paragraph (h), delete "." and replace with ";", and add the following sub-paragraphs (i), (j), (k) and (l): (i) the status of all Variations; (j) details of all matters affecting, or likely to affect, the progress or cost of the Works and particulars of the preventative and remedial measures which have been, are being, or may be taken in respect of those matters; (k) any other particulars reasonably required by the Engineer and (l) monitoring of the obligations in Sub-Clauses 4.7, 4.13, 4.18, 6.4, 6.7, 6.20, 6.21 and 6.23.
Labour Laws	6.4	The Contractor shall comply with the Employer's applicable Labour Laws and regulations and incorporate applicable workplace occupational Safety norms.
Health and Safety	6.7	The Contractor shall disseminate, or engage appropriate service providers to disseminate, information on the risks of sexually transmitted diseases, including HIV/AIDS, to its employees engaged under the Project and to members of the local communities surrounding

Conditions	Ref. GCC	Data
		the Project area, particularly women.
Keeping Records of Contractor's Materials, Equipment and Incidents	6.25	<i>Add new GCC Sub-clause 6.25:</i> The Contractor shall prepare and submit to the Engineer on a monthly basis detailed records showing: (i) materials delivered to the Site and materials consumed in the Works; (ii) plant and equipment on Site together with number of hours worked by and current condition of each item (iii) all incidents affecting the safety and the health and welfare of persons and causing damage to property together with such other records as the Engineer may from time to time require to be kept and provided.
Contractor's Employees	6.26	<i>Add new GCC Sub-clause 6.26:</i> To the maximum extent possible, the Contractor's unskilled labour shall be drawn from the area of influence of the road, defined as within 2 hours walk of the place of work. Every effort shall be made to establish a gender balance within the local labour force with the employment of 50% female labour. The Contractor is required to give preference for employment as unskilled labour to one member per household of those households identified as losing land or livelihood as a result of the land acquisition process. The Engineer may identify such people to the Contractor and he shall be required to offer them employment on the same terms and conditions as the rest of his local labour force.
Inspection	7.3	In sub-paragraph (b) delete "and construction" and replace with ", construction and performance based maintenance".
Programme	8.3	In sub-paragraph (a) immediately after "erection" insert ", performance based maintenance".
Taking Over of the Works and Sections	10.1	After the third paragraph, add the following paragraph: "Pursuant to sub-paragraph (a) above, any works related to road, traffic or public safety or which may affect the protection of the Works in any respect, as determined by the Engineer, shall not be deemed to be minor outstanding works or defects which will not substantially affect the use of the Works within the meaning of this Sub-Clause."

Conditions	Ref. GCC	Data
Taking Over Parts of the Works	10.2	Add the following paragraph at the end of Sub-clause 10.2: In the operation of this Sub-clause the passage over or through the Works by the public or the agents or servants of the Employer or by public traffic or by vehicles of the Employer, whether connected with the Contract or not, shall not constitute use or occupation by the Employer.
Interference with Tests on Completion	10.3	In the second paragraph immediately after "Period" add "of the Phase 1: Upgrading Works".
Completion of Outstanding Work and Remedying Defects	11.1	In sub-paragraph (a), after "Taking-Over Certificate" insert "for Phase 1: Upgrading Works".
Cost of Remedying Defects	11.2	Add the following at the end of Sub-clause 11.2: Upon the completion of construction, the Contractor shall fully reinstate pathways, other local infrastructure, and agricultural land to at least their pre-project condition as recorded by the Contractor in consonance with its obligation in Sub-clause 4.16.
Extension of Defects Notification Period	11.3	In the first paragraph immediately after "taking over" add "for Phase 1: Upgrading Works".
Performance Certificate	11.9	Delete the second paragraph and replace with the following: "Separate Performance Certificate shall be issued for Phase 1: Upgrading Works and Phase 2: Performance Based Maintenance Works. The Engineer shall issue Performance Certificate for Phase 1 within 28 days after the latest of the expiry dates of the Defect Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. The Engineer shall issue Performance Certificate for Phase 2 after completing all the works specified in Special Provisions to the Standard Specifications for Performance Based Maintenance. A copy of the Performance Certificates shall be issued to the Employer."
Provisional Sums	13.5 (b) (ii)	Add the following paragraphs at the end of (b) (ii) of Sub-clause 13.5: For the emergency works as determined by the Engineer during Phase 2, the budget is allocated in the provisional sums for the payment of the works. The payment for emergency works shall be made at existing Bill of Quantities (BoQ) rates or at appropriate Dayworks rates for each corresponding BoQ pay items with the CPA. Such payments shall not be subject to additional overhead because of the fact that the BoQ and Dayworks rates quoted by the Contractor are with

Conditions	Ref. GCC	Data
		his overhead.
The Contract Price	14.1	Add the following paragraph at the end of Sub-clause 14.1: The Contractor shall also pay royalties, tolls, value added tax and income tax. With respect to the income taxes including taxes on the Contractor's staff, personnel and labour, the Contractor shall perform such duties in regard to Tax Deductions at Source (TDS) thereof as may be applicable by the laws and regulations of Nepal.
Payment of Retention Money	14.9	In the first paragraph in the first and second sentence after "Taking-Over Certificate" insert "for Phase 1: Upgrading Works". Delete the second paragraph and replace with the following: "Promptly after the expiry date of the Defects Notification Period of Phase 1: Upgrading Works, out of the 50% outstanding balance of the Retention money, the Engineer shall certify 25% of it for payment to the Contractor." In the fifth paragraph in the first sentence after "Taking-Over Certificate" and insert "for Phase 1: Upgrading Works". Delete the sixth (last) paragraph of the Sub-clause 14.9. Add the following paragraph at the end of Sub-clause 14.9: If the Contractor complies with the Operational Service Levels defined in Table 33.4 Pavement Roughness in Section 3300 of Part 2 Employers Requirements; the outstanding 25% of the Retention Money after the Defects notification Period of Phase 1: Upgrading Works shall be repaid to the Contractor in the following manner: At the end of each completed year of the Phase 2: Performance Based Maintenance Works by 5 % of the Retention Money for the first three (3) years and by 10% at the end of fourth year, so that the Retention Money will be reduced to nil at the completion of Four (4) years of Phase 2: Performance Based Maintenance Works.
Payment Reduction	14.16 (Additional Clause)	Add additional Clause 14.16 "Payment Reduction" as below: Reduction of monthly payments for performance based maintenance works shall be applied in case of non-compliance with Service Levels by means of Payment Reduction Points (PRP), as indicated in the Section 3300 of Part 2: Employers Requirements. The value of each Payment Reduction Point (PRP) is NRs. 600.00 during the first full six (6) months of Phase

Conditions	Ref. GCC	Data
		2 and NRs. 1,000.00 thereafter. The Payment Reduction Points are subject to price adjustment in a manner as described in Clause 13.8 for Phase 2 works.
Eligibility	21	<i>Add New GCC Clause 21 "Eligibility"</i>
	21.1	<i>Add new GCC Sub-clause 21.1 as follows:</i> The Contractor shall have the nationality of an ADB member country. The Contractor shall be deemed to have the nationality of a country if the Contractor is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.
	21.2	<i>Add new GCC Sub-clause 21.2 as follows:</i> The materials, equipment and services to be supplied under the Contract shall have their origin in eligible source countries and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, the Contractor may be required to provide evidence of the origin of materials, equipment and services.

FOR REFERENCE

Appendix 1 – Environmental Impact Assessment

FOR REFERENCE ONLY

Appendix 2 – Environmental Management Plan

FOR REFERENCE ONLY

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Chakupat, Lalitpur



Environmental Impact Assessment Study
of
Narayanghat - Butwal Road (115 km)
Nawalparasi and Rupandehi Districts

Submitted to
Ministry of Population and Environment

Through
Ministry of Physical Infrastructure and Transport
Singhadurbar, Kathmandu

Submitted by:

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On behalf of Project Directorate
(ADB)
Department of Road
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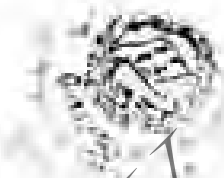


FOR REFERENCE ONLY

Abbreviations

AADT	—	Average Annual Daily Traffic
AC	—	Asphaltic Concrete
ADB	—	Asian Development Bank
ADF	—	Asian Development Fund
ADT	—	Average Daily Traffic
AIDS	—	Acquired Immune Deficiency Syndrome
Amsl	—	Above Mean Sea Level
AP	—	Affected People
ARI	—	Acute Respiratory Infection
Bikram Sambat	—	Bikram Sambat
CBO	—	Community-Based Organization
CBR	—	California Bearing Ratio
CBS	—	Central Bureau Of Statistics
CDMA	—	Code Division Multiple Access
CF	—	Community Forest
CFUG	—	Community Forest User Group
Ch	—	Chainage
CITES	—	Convention On International Trade In Endangered Species
CMVC	—	Classified Manual Vehicle Counts
CNP	—	Chitwan National Park
COI	—	Corridor of Impact
CR	—	Critically Endangered
CSC	—	Construction Supervision Consultant
DBST	—	Double Bituminous Surface Treatment
DCP	—	Dynamic Cone Penetrometer
DDC	—	District Development Committee
DFID	—	Department For International Development, UK
DG	—	Diesel Generating
DFO	—	District Forest Office
DH	—	District Hospital
DHO	—	District Health Office
DNVWC	—	Department of National Parks And Wildlife Conservation
DOF	—	Department of Forest
DOHM	—	Department of Hydrology And Meteorology
DOLIDAR	—	Department of Local Infrastructure Development And Agricultural Roads
DOR	—	Department of Roads
DUDBC	—	Department of Urban Development And Building Construction

EA	—	Executing Agency
EAG	—	Environmental Assessment Guidelines
EFDRP	—	Emergency Flood Damage Rehabilitation Project – ADB
EIA	—	Environmental Impact Assessment
EMG	—	Environmental Management Guidelines
EMP	—	Environmental Management Plan
EmoP	—	Environmental Monitoring Plan
EN	—	Endangered
EPA	—	Environment Protection Act
EPR	—	Environment Protection Rules
ES	—	Environment Specialist
ESMF	—	Environmental And Social Management Framework
EWB	—	East-West Highway
FGD	—	Focus Group Discussion
FM	—	Frequency Modulation
FS	—	Feasibility Study
FUG	—	Forest User Group
FY	—	Fiscal Year
GESU	—	Geo-Environmental And Social Unit
GHG	—	Greenhouse Gas
GON	—	Government of Nepal
HFT	—	Himalayan Frontal Trust
HH	—	Household
HMGN	—	His Majesty Government of Nepal
HIV	—	Human Immunodeficiency Virus
IA	—	Implementing Agency
ICIMOD	—	International Center For Integrated Mountain Development
IEE	—	Initial Environmental Examination
IUCN	—	International Union For Conservation Of Nature
LC	—	Least Concern
LR	—	Lower Risk
LPG	—	Liquefied Petroleum Gas
LMP	—	Land Resource Mapping Project
MCT	—	Main Central Trust
MFSC	—	Ministry of Forest And Soil Conservation
MHH	—	Midhill Highway
MoEST	—	Ministry of Environmental Science And Technology
MoPIT	—	Ministry of Physical Infrastructure And Transport Management



MRM	—	Mahendra Raj Marg
NAAQS	—	Nepal Ambient Air Quality Standard
NEP	—	Nepal
NGO	—	Nongovernment Organization
OHS	—	Occupational Health And Safety
PD	—	Project Directorate
PPE	—	Personal Protective Equipment
PIU	—	Project Implementation Unit
PPTA	—	Project Preparation Technical Assistance
RCC	—	Reinforced Cement Concrete
RCP	—	Road Connectivity Project – ADB
RCSP	—	Road Connectivity Sector Project – ADB
REA	—	Rapid Environmental Assessment
RIP	—	Road Improvement Project – DOR
RNDP	—	Road Network Development Project – ADB
ROW	—	Right-of-Way
RRRSDP	—	Rural Rehabilitation and Reconstruction Sector Development Project – ADB
RSDP	—	Road Sector Development Project – ADB
SASEC	—	South Asian Sub-regional Economic Cooperation
SC	—	Supervision Consultant
SD	—	Surface Dressing
SDC	—	Social Development Consultant
SPS	—	ADB Safeguard Policy Statement, 2009
SRIP	—	Strategic Road Improvement Project
SRN	—	Strategic Road Network
STD	—	Sexually Transmitted Disease
TA	—	Technical Assistance
TMO	—	Transport Management Office
TOR	—	Terms of Reference
TPPF	—	Transport Project Preparatory Facility – ADB
WECS	—	Water and Energy
UN	—	United Nations
UNESCO	—	United Nations Educational, Scientific And Cultural Organization
VDC	—	Village Development Committee
VU	—	Vulnerable
ZOI	—	Zone of Influence



EXECUTIVE SUMMARY

Introduction

The proposed SASEC Roads Improvement Project will finance improvements of two strategic high-priority highways in the central and western region of Nepal: i) Narayanghat – Butwal highway, and ii) Bhairahawa-Lumbini-Taulihawa feeder road. This Environmental Impact Assessment (EIA) report is prepared for upgrading of Narayanghat – Butwal (115km) road.

This report has been prepared based on the information and data available in the feasibility study, detail engineering designs, socio-economic and resettlement studies, field visits, public consultations and discussions, collection of primary and secondary information and data, and additional study and consultations carried out in October-November, 2016.

Rationality to Conduct EIA

According to the requirements of the Environment Protection Act, 1997 and Environment Protection Rules (1997) the Narayanghat-Butwal road requires a detailed Environmental Impact Assessment (EIA) study. This report has been prepared by the DoR to comply with the requirements of the Ministry of Population and Environment (MoPE).

This EIA report covers the Narayanghat – Butwal road is categorized as 'A' in accordance with Environment Protection Regulation of Nepal 2054, requiring the conduction of an environmental impact assessment (EIA) because:

- i) the road is located adjacent to the buffer zone (Schedule 2 K 3) of the Chitwan National Park (CNP) with the edge of the road on the left hand side forming the boundary of the buffer zone for about 24km from km 7+000 to km 20+530¹;
- ii) There will be loss of more than 5 ha of government forest (Schedule 2.A.4)

Description of the Project

The Narayanghat-Butwal road is part of NH II and AH1, the main lifeline of the western and far western territories. It also links to the Sanauli Border the second largest trading post of Nepal through the Bhairawa dryport. It is currently a bituminous surface with 7.0-8.0 meter carriage width, 26 crossing major rivers, 51 community forests, and several large settlements. Most pipe culverts are in poor condition and need to be maintained/rehabilitated/replaced. The existing road will be upgraded to an Asian Highway Class I (National Road Standard 2070- Class-II), 4-lane, Asphalt Concrete Pavement, 50 m right-of-way (ROW), 12 m formation width, 7m carriage way width, and 2.5m shoulders. The upgrading involves widening of existing road width to 43 m in Urban section, 23m in Rural and Jungle section and 12.5m (0.5 m for separating climbing lane) in Douane Hill sections to meet the design standards. Improvements will also include improvement in alignment, drainage, construction of new bridges, bridge approaches, traffic signs and safety, retaining structures, and junctions.

¹ The road ROW falls outside the buffer zone of the CNP

The Row of this road traverses 52 community managed forests, 3 religious and 1 sayhadari forest. A total of 42.8 kms of the proposed road section in north and 60.2km in north side passes through different type of forest area and 24 km section shares the border of the Chitwan National Park Buffer Zone which has its own community managed forest system of Community Forest User Groups (CFUGs). Forest types existing along the road is mainly Sal (*Shorea robusta*) with smaller portions of moist evergreen forest, dry deciduous forest.

This road is under the SASEC Roads Improvement Project (SRIP) with the objectives of the upgrading of 4 lane EWH Narayangadh-Butwal section, 115 km. The starting point of the proposed road is Gaidaxot Municipality and ends at the Butwal Chaudaha of Rupandehi District. There are 13 VDC and Municipalities of Nawalparasi District and 2 Municipality and Submetropolitan city Butwal in Rupandehi District. Road crosses the plain and steep slopes also. The Altitude ranges from 120 m to 550 m elevation level. This road falls under the tropical and subtropical climate.

Anticipated impacts and the mitigation measures

Benificial Impacts

The project, as is generally the case for all road projects will enhance economic development in the project area through employment generation, improved access, reduced travel time/cost, easier travel, enhancing tourism, opportunity to local industries and trade. Further the project will provide grant support for the habitat improvement of the wildlife as per biodiversity conservation strategy through better management of the CNP will be the major environmental benefit from this project.

Adverse Impacts

Socioeconomic Aspects

The environmental impacts of the proposed road upgrading include 1733 m² private land acquisition, disturbances on the public utilities like electric Poles (3684 in number), Telecom Poles (685) Transformer (26), Water Supply Pipes (58) and Passenger Shades(38) etc. The constraints during the construction period, and disturbance to road cross during the Operation stage are also included as the adverse impacts of the proposed project. Land use conversion particularly of residential areas and relocation of structures within the ROW will be implemented following a meaningful consultations and acceptable compensation and relocation agreements. Nuisance from dust, mud and obstruction of the existing route, night activities etc are the major hurdle for the local peoples along the road that will be managed through different means.

Biological Aspects

This project required to cut 9,027 trees from its right of way of the road for extension of the formation and shoulders. Total of 225,675 trees will be planted as per requirement of mandatory rate of 1:25 for compensatory plantation to remove government trees.

The project has been identified to affect movement of the Tiger and other wild faunas in the project area at CNP section that was recorded through camera trap performed by the study of WWF. Further the forest around the alignment could provide ranching area for the tiger and other wild animals hence four animals under pass are proposed for the easy access for wild life crossing.



Physical aspects:

It is anticipated that short-term deterioration of air quality will take place during construction phase due to increase in fugitive dust emissions and noise level from earthmoving, ground shaping, unpaved transport, and emissions from heavy equipment and other mobile sources. Water Sprinkling, use of clean fuels, changing the location and timing of construction activities and equipment will be imposed to minimize these impacts. Five crusher plants which are fixed for the construction materials will create some impacts related to the air quality, noise but the crusher plant could mitigate the impacts imposing the activities like provisioning wet sieving in the crusher, selecting proper location before installation of the crusher, fencing the area, planned location for raw materials and products etc. All borrow areas which are proposed will comply with national laws and regulations. Impacts from the establishment and operation of the construction camps like generation and disposal of solid wastes, sewage, potable water requirements, health/hygiene, and safety is part of the contractor's responsibility highlighting the need for compliance with applicable laws. A huge challenge during the construction period is existing traffic management in the road which will be managed by developing traffic management plan by the contractor before starting construction work and rerouting the vehicles. Excessive excavation of construction materials and storage will be minimized to decrease the volume of wastes and random scouring will be strictly prohibited. Traffic safety to workers and pedestrian, particularly to children is considered through the preparation and strict implementation of Traffic Control Plan prepared by the contractor in consultation with the affected communities and stakeholders.

Cumulative Aspects:

There are no other significant development projects or activities going on or planned for near future within the project area which could produce the cumulative environmental impacts. Therefore cumulative impacts of the project together with other activities or development projects in the project area are non-existent or insignificant. However, improvement of the road will certainly induce developments such as increase in agricultural trade, new development projects on agriculture, industries, health, education, tourism etc. All these changes and development can encourage people from urban centers or other areas to migrate or move back into the project area. While these developments will bring great socio-economic benefits for the road users and local communities, amplifying many negative impacts such as increase in problems of noise and air pollution and road accidents however these are more or less residual type. Mitigation measures to address these problems will be implemented through coordination with regulatory authorities, raising awareness on road safety and better vehicle management.

Analysis of alternatives:

This project is the upgrading of the existing highway in to 4 lane road. No project alternative is not to upgrade the project. However the existing traffic volume in the highway will not hold by the existing road. Growing population throughout the country and centralized population around the project vicinity and rapid increase in vehicular number essence to upgrade the road. Beside if the technology, timing and the width was also analysed. The best suited option that has applied in detail design report of the road has followed by the EIA study. Due to the geology and topography only three lanes has proposed for the Daunre section among them one will be for climbing lane for loaded vehicle (low speed vehicles) and two

lanes for general vehicles (speed vehicles). This is decided based on the alternative analysis.

Environmental Management Plan

An Environmental Management Plan (EMP) including activities related to addressing problems of air quality and noise, soil/erosion management, construction waste, compensatory afforestation, occupational health and safety, protecting common property resources and wildlife conservation activities in the CNP buffer zone has been prepared. An Environmental Management Plan (EMP) targeted at monitoring implementation of the EMP as well as conduction of environmental quality tests is also included in the project. The EMP will be included in the contract of the supervision consultants as they will play the key role in supervisory activities. Activities targeted at compensatory afforestation and wildlife conservation will be implemented in close coordination with the CNP and BZMC.

Procedures for addressing grievances under the project have been laid out, wherein aggrieved persons/parties can approach either of the project participants and issues can be addressed at the local level or higher project authorities level depending on the complexity as provided in grievance redress mechanism of the project. The total Environmental management cost for this project is NRs 222,104,250.00.

Conclusion

The Narayanghal-Butwal Road is facing a severe bottleneck and could be supported by the construction of road blocks due to heavy traffic in the country. Beside it this road has supports to connect the Belahiya customs of Nepal Government to the capital city. In this context this upgrading will increase economic activities of the country. This EIA have prepared an EMP for the environmental friendly pre-construction, construction and operation activities. The proposed activities in this assessment will provide a way out for the construction of the upgrading activities.

The total investment of the project in the social and environmental compensation and safeguard activity is less since the resettlement cost and other mitigation cost is very low. The potential adverse impacts for pre-construction, construction and operation stages are manageable and extent could be easily reduced to acceptable range smoothly. The EIA has proposed effective mitigation and monitoring frame for constructing this road in environment friendly manner through effective implementation of the provided EMP.



कार्यकारी सारांश

प्रस्तावित SASEC सडक सुधार आयोजना अन्तर्गत एशियाली विकास बैङ्कले नेपालको पश्चिम क्षेत्रका दुई वटा रणनीतिक सडकहरूलाई स्तरोन्नतिको लागि आवश्यक सहयोग गर्दैछ । यी दुई रणनीतिक सडकहरूमा क) नारायणघाट-बुटवल र। भैरहवा-लुम्बिनी-तौलिहवा सडक हुन् । यस अध्ययनले स्तरोन्नतिको लागि प्रस्ताव गरिएको सडक नारायणघाट-बुटवल (११५ किलोमिटर) सडकलाई प्रस्तुत गरेको छ ।

यो प्रतिवेदन नेपाल सरकार, वातावरण संरक्षण नियमावली - २०५४ को आवश्यकता पूरा गर्दै सो स्तरोन्नतनति कार्यको पूर्व निर्माण, निर्माण तथा सञ्चालनको चरणमा पर्ने सक्ने वातावरणीय प्रभावहरूको न्युनिकरण, निराकरण क्षतिपूर्तिको व्यवस्था गर्ने प्रस्ताव गर्नको लागि तयार गरिएको छ ।

प्रस्तावित सडक मध्ये २४ किलोमिटर सडक बाण्ड चितवन राष्ट्रिय निकुञ्जको मध्यवर्ति क्षेत्रको सिमाना हुँदै जाने भएको तथा कुल जंगल क्षेत्र मध्ये ५ हेक्टर भन्दा बढि क्षेत्रलाई भेग्न गर्न सक्ने भएको कारण वातावरण संरक्षण नियमावली २०५४ को अनुसूचिमा व्यवस्था भए बमोजिम वातावरण प्रभाव मूल्यांकन अध्ययन गर्नु पर्ने भएकोले यो अध्ययन प्रतिवेदन तयार गरिएको हो ।

यो प्रतिवेदन प्रस्तावित नारायणघाट-बुटवल सडक बाण्डको स्तरोन्नतिको लागि तयार गरिएको सम्भाव्यता अध्ययन, वस्तुगत प्रतिवेदन, सामाजिक, आर्थिक अध्ययन, अन्तर्गत अध्ययन, स्वामित्व तथा अन्य संरक्षकवालाहरू सम्वन्धी अन्तरक्रिया लगायत प्राथमिक तथा अन्य तथ्याङ्कहरू सङ्कलन, विश्लेषण तथा अध्ययन गरि तयार गरिएको छ ।

आयोजनाको परिचय

प्रस्तावित सडक पश्चिम क्षेत्रको मुल मार्ग हो । यो सडक बाण्डले नेपाल भारत सिमाना सुनौली एवं भैरहवा क्षेत्रलाई राजधानी काठमाडौं सम्वन्धी जोड्नेगरी सडक विस्तार गरिनेछ । हालमा ७-८ मिटरको विटुमिन्स पक्के सडकलाई आसीप तथा वन क्षेत्रमा ३० मिटर र बाहरी क्षेत्रमा सीमेस लेन सहित ५० मिटर सडक अविशुद्ध क्षेत्र हुने गरी निर्माण प्रस्ताव गरिएको छ ।

प्रस्तावित स्तरोन्नति कार्यमा १.५ मिटर फर्मेसन चौडाई ७ मिटर क्यारीडवे चौडाई तथा दुवैतर्फ २.५ मिटर सील्डर हुने छ । यो बाटोक ४७ वटा हाल सञ्चालित पुन सगै नयाँ पुनको प्रस्तावित गरिएको छ । सगसगी सडक, नालि, नयाँ पुल, ट्रफिक सङ्केत, सुरक्षण प्रविधि, सुरक्षण पथोन इत्यादिहरू विस्तृत परियोजना प्रतिवेदनमा समावेश गरिएको छ ।

आयोजना स्तरान्वती गढी ५१ वटा सामुदायिक वन, ३ वटा धार्मिक तथा १ सामुदायिक वनलाई संभावित असर गर्ने सक्छ । नारायणघाटबाट साँघा सडकको उत्तरतर्फ ६०.२ किलोमिटर तथा सडकको दक्षिण तर्फ ४२.८ किलोमिटर वन क्षेत्र भएर जान्छ । हालसम्मको अध्ययनमा ९०२७ टना काट्नु पर्ने देखिएको छ । सगसगी सडकले २४ किलोमिटर लेन चितवन राष्ट्रिय निकुञ्जको मध्यवर्ति क्षेत्रको सिमाना भएर जान्छ । कुल ५१ सामुदायिक वनहरू मध्ये २ सामुदायिक वन मध्येवर्ति क्षेत्र अन्तर्गत पर्नेछ । यसरी ८१ टा वन क्षेत्र भएर सडक निर्माण गर्नपर्ने देखिन्छ ।



आयोजनाको नाम	SASEC सडक सुधार आयोजना
सडकको नाम	नागधाराघाट-बुटवल स्तरमा प्रति ११५ किमीमिटर
शुरुको बिन्दु	गैडाकोट, नवलपरासी
अन्तिम बिन्दु	बुटवल धौला, रुपन्देही
असर पर्ने सडकको लम्बाइ	१५
खण्ड	समथर तथा भित्री
चौडाई	१२० मीटर-१२० मीटर
हावापानी	समशीतोष्ण, उष्ण

संभावित असरहरू तथा न्यूनीकरणका उपायहरू

प्रस्तावित सडक विभाजन गर्ने क्रममा सामाजिक तथा आर्थिक क्षेत्रमा हेर्ने हो भने २१ मिडि सरचना हटाउनुपर्ने हुन्छ जसको लागि आवश्यक क्षतिपूर्तिको व्यवस्था गरिएको छ । त्यस्तै एक गुन निर्माण को लागि १७३५.५ वर्ग मिटर भित्री जग्गा पहिचानगरी आवश्यक प्रकृषा अगाडि बढाइएको छ । सडक विभागले निर्माण लाग्ने आवश्यक जग्गा अगाडि नै अधिग्रहण गरिसकेको छ । सो अधिग्रहण गरेको क्षेत्रमा निर्माण गरिएका भित्री घर टहराहरूलाई सम्बन्धित समेतकारवासीले नै हटाउन सहमत छन् । सो क्षेत्रमा रहेका सावजनिक उपयोगिताका वस्तुहरूमा २२९३ चिजुलीका पोत, ६६५ टेलिफोनको टावर, १८ स्थानमा खानेपानीका पाइप, ३८ परिसरलय, पार्टी, चौताराहरूको कुल असर पर्ने संख्या पहिचानगरी सो क्षेत्रबाट सुरक्षित क्षेत्रमा बान्नेको लागि आवश्यक बजेटको समेत व्यवस्था गरिएको छ । सांस्कृतिक रूपमा तथा धार्मिक गढे, मन्दिर, नाने तथा बरुलाई पर्ने असर प्रतिचार गरि उचित व्यवस्थापन गर्नेको लागि बजेट फर्साइ गरिएको छ ।

जैविक रूपमा ११ सामुदायिक वन, २ धार्मिक वन र १ सामुदायिक वनबाट १,०२७ रुख काटिन सक्ने आकलन छ । त्यसको लागि २२५,२७५ विरुवा रोपी विरुवाहरूलाई ५ वर्ष सम्म हटाउने आवश्यक बाग सम्बन्धित वन निकायलाई दिइने छ ।

जंगली जनावरहरूको सहज हिडाईलाई सहयोग गर्ने जंगली जनावरको लागि सतहमुनी ४ यटा पुल Under Pass को व्यवस्था गरिएको छ । यस बाहेक सडक निर्माण को कारण राष्ट्रिय निकुन्त तथा अन्य क्षेत्र मा पर्ने सडक औषक असरलाई न्यूनीकरण तथा क्षतिपूर्ती को व्यवस्था गरिएको छ ।

निर्माणको प्रकृषा हुन सक्ने बाघ प्रदुषण धुलो नियन्त्रणको लागि नियमित रूपमा पानी छर्ने तथा कम बाघ धुलो पानी प्रदुषण गर्नु पर्ने व्यवस्था गरिएको छ । सडक निर्माणको क्रममा ट्रफिक व्यवस्थापनलाई मध्यमजर राखी सम्पूर्ण सडक क्षेत्रमा एकैपटक निर्माण कार्य नगरि खण्ड-खण्ड बालाउने तथा निर्माण सम्पन्न गर्ने गरि प्रस्ताव गरिएको छ । यसले वन क्षेत्रमा हुने जंगली जनावर आघत जाचतलाई पनि सहज बनाउँछ भने वायुप्रदुषणको प्रभाव समेत घट्न जान्छ ।



सडक निर्माणको क्रममा अरु भौतिक क्षति नहोस् भन्नाको लागि बग्यो इन्जिनियरिङ तथा रिट्रिभिङ पेशावरहरूको व्यवस्था गरिएको छ । संचालनको क्रममा पनि वार्षिक खेचमा ५०० डेढि ६०० मि को फरकमा ट्राफिक सकेत बत्ति सलितको कसिड प्रस्ताव गरिएको छ । सडक निर्माण को क्रममा निर्माण कार्य गर्ने भन्जपुरहरूलाई तिनिहरूको स्वास्थ्य र सुरक्षा को उपयुक्त व्यवस्थापना गर्नुपर्ने हुन्छ । त्यसकारण पनि स्वास्थ्य सुरक्षा उपकरणहरूको अभिवार्य प्रयोग गर्ने गरी व्यवस्था गरिएको छ । सडक सुरक्षा, ट्राफिक व्यवस्थापन, सलित यी सडकको वातावरणीय व्यवस्थापनका लागि अनुमति खर्च रु. २२२,१०४,३५०.०० छ ।

विकल्प विश्लेषण

सडक स्तरोन्नतिको लागि सलित र सर्वमान्य रूपमा कम वातावरणीय क्षति रहोस् भन्ने सोचका साथ आयोजना निर्माण तथा अन्य विकल्प, डिजाइनका विविध विकल्पहरूको सूक्ष्म विश्लेषण गरी प्रस्तावित सडक स्तरोन्नतिलाई प्रस्ताव गरिएको हो । विकल्प विश्लेषण अन्तर्गत प्राविधिक रूपमा सहल्यपूर्ण रहेको भुगर्भ तथा माटो को क्वालिटी र क्वालिटी सडकको सम्भावित क्षति को आकलन गरिएको थियो । आयोजना निर्माण नगरदा हुन सक्ने बत्तर र निर्माण गर्दा पर्ने सक्ने सडकप्रत्येक पक्ष को विश्लेषण गरिएको थियो । मूलतः दाउन्ने क्षेत्र भौगर्भिक रूपमा सम्बन्धित गरी भएको हुनाले पनि हाल प्रस्तावित चार लेन को सडक लाई यो क्षेत्रमा उपयुक्त हुने गरी ३ लेनमा घटाइएको छ । यो विकल्प विश्लेषण गर्दा संभावित क्षतिहरूलाई पनि विश्लेषण गरिएको थियो ।

वातावरणीय व्यवस्थापन योजना

सडक निर्माणको चरणहरूलाई पहिचान गरिएको छ । पूर्व निर्माण चरण, निर्माण चरण तथा संचालन चरण गरी विभक्त गरिएको छ । क्षेत्रलाई भौतिक वातावरण, जैविक वातावरण र सामाजिक-आर्थिक तथा सांस्कृतिक वातावरण गरी ३ क्षेत्रमा पर्ने सक्ने बत्तर र तिनीहरूको न्युनिकरण, निराकरण गर्नको लागि एक गतिशील वातावरण व्यवस्थापन योजना तयार गरिएको छ । सडक स्तरोन्नति कार्यमा यो वातावरण व्यवस्थापन योजना लागू भएको छ वा छैन भन्ने अनुगमन गर्ने योजना छ । प्रस्तावित वातावरण व्यवस्थापन योजना मा सामाजिक तथा आर्थिक रूपमा पर्ने सक्ने क्षति लाई न्युनिकरण को प्रस्ताव गरिएको छ । सडक निर्माण गर्नु पूर्व सम्बन्धित सरकारीवाला हरूको सिफारिस तथा सहमति एवं जानकारी गर्ने व्यवस्था गर्ने/गराउने व्यवस्था गरिएको छ ।

निर्माण चरण मा बाबत जाकेत मा पर्ने सक्ने बत्तर नपर्ने गरी निर्माण कार्य गर्ने , सांघर्षात्मक उपयोग को वास्तुगत जमी विद्युती को पोत , टेलिफोन को पोत , ट्रान्सफर्मर, घट , पाटी इन्धारी को व्यवस्थापना भनेर प्रस्तावित गरिएको छ । निर्माण चरण मा ट्राफिक व्यवस्थापना धान्नु पर्ने लाई न्युनिकरण बत्तर पर्ने गरी वातावरण व्यवस्थापन योजना कार्यान्वयन गर्ने प्रस्ताव गरिएको छ । जैविक वातावरण मा पर्ने सक्ने क्षति लाई न्युनिकरण गर्ने को लागि वृक्षरोपण, लगायत का कार्यक्रमहरू प्रस्ताव गरिएको छ ।

भौतिक रूपमा निर्माण सामाग्री को ढुवानी, धुना, पदपान, क्षती प्रदूषण पानी को स्रोत व्यवस्थापना, इत्यादी कुराहरू लाई पनि वातावरण व्यवस्थापन योजनामा समावेश गरिएको छ ।



वातावरणीय व्यवस्थापन योजनाले असर न्युनिकरण गर्ने निष्कास को हो, फल चरणमा गर्ने र कति क्षति सामने गरी सम्पूर्ण व्यवस्थापन गरेको छ ।

निष्कर्ष

यसरी तयार गरेको वातावरणीय प्रभाव मूल्याङ्कन प्रतिवेदनलाई कार्यान्वयन गराएको सङ्गठनमा सो सङ्घर्ष निर्माणले गर्ने सक्ने वातावरणीय असरलाई व्यवस्थापन गर्ने सकिनेछ । आयोजना ले वातावरण व्यवस्थापनको लागि २०६,०२९,८४२.०० रुपैया लाग्ने अनुमान गरेको छ । यस बाहेक आयोजनाले व्यवस्थापन को लागि सम्वन्धित को प्रस्ताव गरेको छ । विकासको कार्य गदा हरेक स्थानमा केही न केही असर हुन सक्ने कुरा लाई मनन गर्दै वातावरण व्यवस्थापन लाई अधिक महत्व का साथ राखेर निर्माण गर्ने प्रस्ताव गरेको छ ।



FOR REFERENCE ONLY



CHAPTER 1: INTRODUCTION

1.1 Background

The SASEC Road Improvement Project (SRIP) aims to facilitate the government's effort to implement the roads projects efficiently by advancing the preparatory activities in a systematic manner. The Project assist in identifying and prepare high priority projects for potential funding by the government and or by ADB or other development partners in the country, including feasibility studies, safeguard due diligences, detail engineering design, bidding documents, and procurement assistance for advance contracting if appropriate.

The Project has reviewed the government's Priority Investment Plan for development and management of strategic road network. It has made detailed design of about 105 km roads and 200 km roads for detail design from feasibility study from the priority road list of total length of about 405 km. The proposed road shall contribute in reducing the poverty and supporting economic development of rural communities through (i) improved connectivity and accessibility of markets, headquarters and other centers of economic activity; (ii) year round all weather road connections; and (iii) improving DOR capacity for managing road construction/ improvement and maintenance.

The road is the part of East West Highway which passes through Nawalparasi and Rupandehi district. The total length of the road is 115 KM and exists between Pulchowk of Narayangard (Chitwan district) to Chauraha of Butwal (Rupandehi district). The road passes through six municipalities and four VDC of Nawalparasi district and two municipalities of Rupandehi district. Among the municipalities of Nawalparasi district namely Gaidakot, Devchuli, Kawasoti, Madhyabindu, Baraghat and Surnawal and Rajahar, Naya Belhari, Dumkibas and Ramnagar VDC. Similarly Devdaha and Butwal municipalities are in Rupandehi district.

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

Meanwhile this EIA also includes the establishment of five crusher plants to supply the material required for the road construction only. Five crusher plants will be established as per the defined area.

1.2 Name of the Proposal

The name of the Proposal is 'Environmental Impact Assessment of Narayanghat-Butwal Road' in Nawalparasi and Rupandehi, Districts in Western Development Region of Nepal.

1.3 Name and Address of the Proponent

The Proponent is the Planning and Design Branch, Geo Environment and Social Unit, Department of Roads. The Department of Roads (DoR) is the leading agency for road development under Ministry of Physical Infrastructure and Transport (MoPIT) and is responsible for translating government policies for the road sub-sector into the provision of services. The services it provides include planning, design, upgrading and maintenance of the Strategic Road Network, and provisions to ensure a reasonable level of safety for all road users.

The address of Proponent is:

Planning and Design Branch
Geo-Environment and Social Unit
Department of Roads
Chakupat, Lalitpur, Nepal
Telephone Number: 5260505,
Fax: 5529106
Email: gesu.dor@gmail.com, gesunit@dor.gov.np

Consultant

The Consultant is MMM Group Limited, (Canada) in association with ITECO Nepal (P) Ltd., Total Management Services Pvt. Ltd, and Material Test Pvt. Ltd.

The consultant's address is hereunder:

PO Box 2147, Minbhavan, Kathmandu, Nepal
Phone No.: 4429030, Fax: +977-1-4429029
Email: mmm.ltppt@gmail.com, www.mmm.ca

1.4 Location of Project

The road section is one of the roads under the SASEC Roads Improvement Project (SRIP). It is located in Nawalparasi and Rupandehi districts in the Narayani and Lumbini Zone, Central Development Region and Western Development Region of Pradesh No 4 and 5 of Nepal. The road alignment passes through one Sub-Metropolitan City, 7 Municipalities and 5 VDCs in two districts. The road provides connectivity to settlements, market centres and agriculture production pockets and crosses the various forest areas as well as touches the Buffer Zone of Chitawan National Park. Total length of the road is approximately 115 km.

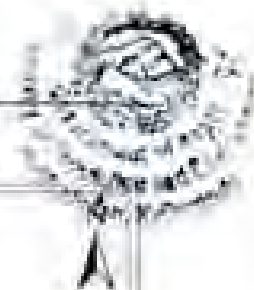


Figure 1.1: Project Location in Province Map of Nepal

1.4.1 Description of Proposed Road Alignment

The road starts from the Narayani River of Gaidakot Municipality. The elevation of the starting point is 192 m from the mean sea level height. The road starts from the settlement area called Pulchok. The road crosses the settlement like Bijayanagar, Suryanagar, Jwanelar, area and follows the Narayani River up to its Chainage 7+000. The road enters to the forest area and reaches up to the Prasuji and Bhedabari with Chainage 11+000. Then the road starts to cross the settlement area. This area was Amarapuri VDC previously but recently the Gaidakot Municipality includes the Amarapuri VDC and reaches up to the existing Rajahar VDC. The chainage for the Rajahar VDC is the 18+000.

The road follows then Dibyapuri and newly declared Pragatinagar Municipality. This area also densely populated area. The densely populated area exists up to the chainage of 26+000. Then the alignment reaches to the forest area. The forest area exists up to the chainage of 31+000. Nawalpur, Kawasoti Municipality starts from the 31+000 and reaches the settlement up to Danda with chainage 35+000.

From the 36+000 the road again enters in to the forest area and this forest area reaches to the Gader Khola with chainage 43+000. The road crosses the Khola and again enters in to the forest area of Prasauni VDC of Nawalparasi District. This forest area ends to the Arun Khola of chainage 50+000. After crossing the Arun Khola the forest area exists up to the chainage of 75+000 with the VDC Dumkibas.

From the chainage 75+000 the road enters to the settlement area with the VDC Titakpur and Ramnagar. This area reach up to the chainage of 94+000. The road then enters to the forest area of Sunwal. The alignment crosses the small patch of Sal Forest up to the Sunwal and



Devdaha having chainage 105+000. After crossing the Rohini Khola of chainage 106+000 the road enters to the Butwal Submetropolitan City of Rupandehi District.

Narayanghat – Butwal section of East West Highway, designated as a National Highway, H01 as per SSRN/DoR and AH02 as per Asian Highway network starts from Pulchowki/Narayanghat of Chitwan District, Narayani Zone, Central Development Region at about km 473+280 of East West Highway (109 m amsl) and passes through mostly plain and rolling sections of Nawalparasi and Rupandehi Districts except Daune hills of Nawalparasi district and ends at Lakhan Chowk, Butwal, at about Km 587+280 (187 amsl) in Rupandehi district.

The Narayanghat-Butwal road is part of NH1 and AH2, the main lifeline of the western and far western territories. It also facilitates to the Sunauli Border the second largest trading post of Nepal through the Bhairawa dryport. It is currently a bituminous surface with 7.0-8.0 meter carriage width, crossing numerous rivers, community forests, and several large settlements. Most pipe culverts are in poor condition and need to be maintained/rehabilitated/replaced.

The existing road will be upgraded to an Asian Highway Class I, 4-lane, double bituminous surface treatment (DBST) pavement, 50 m right-of-way (ROW), 12 m formation width, 7m carriage way width, and 2.5m shoulders (Daune Section). The project also includes improvements in alignment, drainage, bridge approaches, traffic signs and safety, retaining structures, and junctions. A total of 47 new bridges will be constructed along the stretch crossing significant rivers like Jayashree, Kunkini, Beldiya, Jharahi, Mukunde, Baulaha, Laukaha, Kawaswoti, Murali, Girwan, Arun, Binal, Jyamini, Bhalehi, Bhumahi, Sonnathi, Turiya, Kachrar, Ghodaha, Bhalubai, Rohini, and Sukhaura.

The 115-km section of the AH-2 passes through the following political divisions: Gaidakot Municipality, Rajahar VDC, Devchuli Municipality, Kuresoti Municipality, Parsauni VDC, Madhyabindu Municipality, Naya Belhahi VDC, Dandkash VDC, Bardaghat Municipality, Ramnagar VDC, Tilakpur VDC, Sunawal Municipality of Nawalparasi District and Devdaha Municipality, and Butwal Sub Metropolitan City of Rupandehi District.

About 24.00 km of the existing road forms the boundary of the buffer zone of the Chitwan National Park (CNP). However the road right of way (ROW) falls outside the buffer zone. The Project road runs across a number of wild animal crossing points between Mukundapur (km 07+000) and Kawasoti (km 31+000). The wild animals include the Bengal Tiger (*Panthera tigris*) which is classified as endangered under the IUCN red list and is listed as protected under the National Parks and Wildlife Conservation Act of Nepal, 1973.

1.5 Relevancy of the Proposal

The integration of EIA in development projects was made legally binding through enforcement of the Environmental Protection Act, 2053 (EPA) and the Environmental Protection Regulation, 2054 (EPR) for environmental conservation due to any development activities. Since the enforcement of EPR in Nepal (with the first amendment in 2055), all major projects are now being considered for the application of EIA. Each project under consideration is screened, and it is determined whether it should undergo an Initial Environmental Examination (IEE) or the full EIA process (Schedule-1 and Schedule-2) of EPR.



The proponent should prepare the Scoping and TOR documents. According to ESEA (amended 2055) both of these documents should be submitted to the Ministry of Population and Environment (MoPE) for approval.

From the criteria of Forest area clearance, Schedule 2 (pertaining to Rule 3) Clause A Forest Sector No.4, "Any proposal requiring clearance of over 5 hectares of forest area" requires an EIA. This proposed road alignment requires clearance of more than 5 ha of forest area. Thus this criterion also makes the EIA of this proposal mandatory.

Together with this the proposed road goes via the boarderline of the Chitwan National Park Buffer zone area. Almost 24 km road goes through the bufferzone area of CNP. The EPR Schedule 2 K.3 requires an EIA for this project.

1.6 Objectives of the EIA study

The specific objective of the EIA is to assess and inform decision makers by identifying the potentially significant environmental effects and risks of the proposed project and to suggest appropriate mitigation measures to mitigate and/or minimize the adverse impacts so that the project is implemented in an environmentally sound manner. The general objectives of the EIA are:

- Identify and document the existing physical, biological, socio-economic and cultural baseline condition in the project affected areas.
- Analyze and determine the potential positive and adverse impacts of the project in terms of both direct and indirect impacts, including definition of their extent in the context of areas affected and whether these are temporary or permanent.
- Identify the critical environmental problems that require further studies and/or monitoring.
- suggest mitigation measures for adverse impacts and enhancement measures for beneficial impacts.
- Formulate and propose practical mitigation measures for adverse impacts, enhancement measures for positive impacts and to incorporate necessary safeguards in project design, construction and operation plans.
- Outline requirement to minimize risks of environmental damage and of environmental risks to the project or other resource management entities operation in the area and to determine the potentials for improvements to natural resources and environmental management and socio-economic benefits to communities in the project area and its surroundings.

1.7 EIA study Methodology Adopted

The EIA study has followed the basic steps outlined in EPA/EPR-1997 and EPR-1998 (check please), and National EIA Guidelines-1993. Necessary information was collected through review and field works. Secondary information was collected through published reports and interpretation of maps and photographs. Primary information was collected through questionnaire, checklist, measurement and consultation. Furthermore, local people were contacted and interviewed to solicit information. A number of Focus Group Discussions (FGD) was held in the project areas. The principal steps undertaken in the EIA methodology to accomplish the assignment were:

- Literature review and map interpretation
- Preparation of questionnaire and checklists
- EIA scoping and preparation of ToR for approval
- Site inspection and field study to collect primary information on physical, biological, socio-economic, cultural and historical issues
- Verification of secondary information through cross-check of data, interview and participatory discussion with local people
- Preparation of Draft EIA Report
- Public hearing to disseminate the project related information and to incorporate the public interest and aspirations
- Preparation and submission of final EIA report

1.7.1 Literature Review and map Interpretation

Relevant information for the study was collected through extensive review of literature. Relevant documents and reports were collected and reviewed to detail out the nature of the project and identify the preliminary list of potential environmental impacts. The detail review of 'Draft Report on Detail Design Study of proposed road alignment section was done extensively.

In order to develop checklist and questionnaire, this study has also reviewed extensively, the National Environmental Impact Assessment Guidelines (NIAG) 1993, the EIA guidelines for Forestry Sector 1995, Environmental Management Guidelines 1999, and Environmental Assessment in the Road Sector (A Policy Document of January 2000). ADB Safeguard Policy Statement 2009 and ADB Environmental Assessment Guidelines 2003 were also thoroughly reviewed to include the construction related environmental issues in this report.

After the review of literature and documents, the Study Team delineated the areas, where the Project is expected to have positive and negative impacts. Maps were interpreted; location map was prepared showing potential development areas, natural resources and possible impacts on them from project activities. Based on this information, a base-map of the Project area was prepared to be carried during for the site walkthrough survey.

1.7.2 Map Interpretation

In conjunction with these reports, 1:25000 topographic maps, geological maps and Google maps of project area were collected and information from Central Bureau of Statistics etc. were collected and reviewed.

1.7.3 EIA scoping and Preparation of ToR for Approval

EIA scoping was undertaken in accordance with the EPA/EPR-1997 EPA-1997 and EPR-1998 to inform stakeholders about the proposed project and to received their comments on relevant environmental issues and identify priority issues for environmental assessment. Scoping exercise, besides review of project feasibility report and other project related literature, included publication of 15 days Public Notice inspections of project construction site, and discussions with local people, stakeholders and concerned government officials. The environmental issues of priority concerns in the scoping document were based on the experiences of the consultants on the similar type of projects incorporating the concern



received during formal and informal deliberations with local people and other concerned stakeholders.

The issues identified in the scoping document were incorporated in the ToR. The ToR was prepared as per the Schedule-4 of EPR1997 pertaining to Rule-4 and Rule-5. The EIA is focused on the detailed analysis of the environmental issues mentioned in the approved ToR.

1.7.4 Site Inspection and Field Study

Concomitant to and after the approval of Scoping document and ToR, field studies were conducted in the project site areas in an extensive manner. A team of the professionals led by the team leader, an environmental engineer and socio-economist visited the site. The objective of this visit was to collect the overall basic information regarding the project site area and to collect the site-specific information. The data collection and field study was carried out in May – December 2016.

1.7.5 Field Study and Collection of Baseline Data

The detail field study was conducted to generate information on physical and biological resources and social status in October and November 2016. The field study has focused to generate information along the proposed road alignment and RoW only by considering the direct impact area.

Information on major flora and fauna species was collected through alignment walk and interacting with the local people. Loss of agriculture land and forest area was calculated from cadastral survey prepared by Social Survey Team. The study team also discussed with the officials of the district organization, local bodies, and district forest office and personnel to verify the information and collected their concerns and opinions.

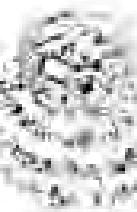
1.7.6 Questionnaire and Checklists Preparation

As part of desk study, a checklist was developed to gather the information on physical and biological parameters. A structured household survey questionnaire was prepared to solicit information of socio-economic, cultural and historical environment. Consultant collected household level socio-economic information by employing structured questionnaires to generate socio-economic and cultural information on potential impacts of the Project activities. The information has been extensively used to prepare this report.

Furthermore, Focus Group Discussion (FGD) are organized in each municipalities/VDC to crosscheck and verify the information. Local people who are likely to be directly affected by the Project were consulted to solicit their concerns and expressions about the project. The study has also focused to documents community services along the road alignment and right-of-way (RoW). Greater emphasis was given to collect information for the direct influence area, i.e. along the road alignment and RoW. The questionnaire used during the field study is included in Annex.

1.8 Physical Environment Survey

Field observation and walk-through survey was adopted to verify information on drainage system, land stability and soil type, hydrological study of area, water sources (type, quality, and quantity), solid waste management system/ spoil disposal and construction materials.



storage sites, ground water condition, landslide prone/ swampy area, work camp and labor camp, and other construction related environment issues. Checklist was used to generate information on water drainage and insulation problem, erosion problem and possible accumulation of construction waste in the natural resources including agricultural land. Similarly, baselining data on air, water and noise quality were also recorded.

1.9 Geological Survey

A geological survey has been done at the proposed road alignment by the design team. The various geological types, soil types and other data regarding the stability of the side, topographical data etc have been identified during the geological survey of the road alignment.

1.10 Biological Environment Survey

A checklist was used to generate field level information on major plant species, mammals and birds, forest condition, forest types and status and occurrences of other wildlife. Local people were also contacted to collect and verify the information to value their experiences on likely environmental impact and practical mitigation measures due to proposed project activities. A data sheet was used to document DBH (Diameter at Breast Height) and height of each tree and shrubs species along the road alignment and the RoW.

1.11 Sampling and Data Collection

Sampling of vegetation was done on the basis of belt transect method as well as the quadrat method. A twenty-five meter by twenty-five meter wide Quadrangle plot was laid down in each forests types. DBH, height (total height and timber height) were measured on the basis of standard format. All the species encountered were recorded and listed in standard data sheet.

Tree and shrubs along the road alignment and right-of-way was counted and height of timber tree which are found along the proposed alignment was measured to calculate standing wood volume and calculate possible loss of trees during the widening of this road project as a part of site clearance. A Quadrat method of having $25 \times 25 \text{ m}^2$ area have been used to identify the tree numbers along the road and around the road side. The quadrato method have been used to calculate the tree numbers. While for the accuracy of the tree number there three number of quadrato along the 500 meter of length have been laid down. A a DBH tape was used to measure the girth at (breast height, 1.4 m) and height of each species was noted. Vegetation and wildlife occurrence in adjoining forests was also noted in the structured data sheet.

Besides reviewing the available literature and tree inventory within the RoW, local people and concerned authority personnel from the respective forest office were contacted to collect information on the occurrence of the plant species and status of wild mammals, birds and reptiles with focus on their movement and distribution using the parameters like, common, fair, sparse and rare. During the forest walk-through survey, wildlife seen in the Buffer area of Wildlife Reserve and other forest were noted.



1.12 Socio-economic and cultural Survey

The study team visited each household along the road alignment and the RoW during the social survey. An informal group discussion (GD) was organized at each Municipalities and VDCs along the road corridor. Municipality and VDC officials were also contacted to verify the socio-economic information. General level of socio-economic conditions of the local people was obtained by asking the likely affected people. The household survey was carried out to collect the baseline information on social, economic, cultural and historical aspect of the area. The structured questionnaires were provided to local people and concerned stakeholders and the questionnaires include the questions of demography, economic status, literacy, ethnicities, religion, views regarding the project, expectations from project, historical and archaeological significance of project area etc.

Possible loss of land and property was calculated through map interpretation after central line survey. Community social service structures including the location of temples and other historical and archeological structures were demarcated in the map and possible impacts predicted through methods as outlined in the environmental impact assessment guidelines implemented in Nepal. To carry out this socio-economic and cultural survey, the methodology includes social impact assessment followed by a census of potentially affected persons and verification of their affected assets.

Social Impact Assessment

The Social/Resettlement Team carrying out the research activities based on social safeguard policy of Asian Development Bank (ADB) and World Bank. The Consultants visited the affected VDCs, identified and consulted key stakeholders and also identified affected families, following which they began conducting a combined Census, inventory of losses and socio-economic survey of all households to be affected by land acquisition for this road project. The social impact assessment was undertaken as a part of resettlement impact assessment. The study identified the following key social issues for investigation:

- Loss of private property and other assets (land and houses) and compensation modalities for these losses
- Economic condition of project affected people
- Identify PAFs and vulnerable group along the proposed road corridor

The objectives of the socio-economic survey are to prepare profile of affected persons, assess incomes, identify productive activities and plan for income restoration, develop relocation options and develop social preparation phase for vulnerable groups (if required). These social survey have been done in close coordination with the social team of the project).

1.12.1 Data Processing

Primary and secondary information were analyzed and processed. Information on physical environment was processed based on secondary information and group observation. Quantification in terms of numerical strength (number of individuals) volume and bio-mass was done based upon the literatures.



1.2.2 Identification

Existing flora was studied on the basis of field visit. Samplings were made. The botanical characteristics were found out on the basis of discussion with the local people and traditional healers. Majorities of the species encountered were identified in the field and remaining unidentified specimens were collected as herbaria. They were identified in National Herbarium, Godawari, Kathmandu, Nepal. Literatures like Flowers of Himalaya (Stanton and pollunin, 1992); Dictionary of Nepalese Plants Name (Shrestha, 1998), Press et.al. (2000), APROSC IDRC (1991) were used for identification of plants species.

Local people were interviewed to get valuable information regarding species encountered and their preferred habitat in the project area.

Socio-economic and cultural information were cross checked, analyzed and thoroughly edited. All data were analyzed using computer-spread sheet. Processed information are incorporated and illustrated adequately with tables and maps at appropriate places in the text.

Public Hearing:

As per the EPR 1997, the proponent should conduct a public hearing after the preparation of the draft report. The issue and suggestions were collected through the Public hearing in this project also.

As per the provision mentioned in the EPR of Nepal, after the approval of the scoping and ToR from the Ministry of Population and Environment, and preparation of Draft EIA report there was number of Public Hearing was conducted, and the numbers of stakeholders presents in the public hearing are as follows:

SN	Date	Venue	No of Participants
1	2073/08/25	Rajhar, Nuwakot	77 persons
2	2073/8/29	Bharat and Parsauri	53 persons
3	2073/8/30	Dumkesh	33 Persons
4	2073/8/30	Madhyabindu	32 Persons
5	2073/9/1	Derechuli	47 Persons
6	2073/9/2	Gaidakot	119 Persons
7	2073/9/6	Sunwal	95 Persons
8	2073/9/8	Bardaghat	46 Persons
9	2073/9/8	Ramnagar	40 Persons
10	2073/9/9	Kawasoti	58 Persons
11	2073/9/10	Parsani	18 persons
12	2073/9/13	Tiakpur	73 Persons
13	2073/9/15	Shaharagar, Deldaha	34 Persons
14	2073/9/15	Burwal	42 Persons

The notice which published to call for participation and the detail minutes have been attached as an Appendix I.

The issues raised during the public hearing are summarized as below:



1. Before the construction of the road the ROW of the road should be marked clearly with coordination with District Survey office because cadastral map is not clear at some areas of Nawalparasi and Rupandehi along the road. The Survey departments have already started the cadastral mapping.
2. The construction should be completed within the prescribed time period. This issue has addressed in whole report. Since the project period is also the concern of technical issue. This issue is the major concern of the project. Hence International Contract Bid has awarded to accompanied the task in prescribed time frame. The penalties mechanism have been included in BOQ and contract which could ensure the timely completion of the project.
3. The construction should be done stretchwise manner. So that the potential impacts during the construction period could be mitigate. This issue has addressed in Chapter 6.2.2.1 Section of the report.
4. The main impacts during the construction period are dust and water pollution so effective measures should implement while the construction. This issue has addressed in Chapter 6.2.2.1 Section of the report.
5. The traffic management during construction period may get severely affected. So effective and proper diversion plan should be develop to manage road traffic while construction. This issue has addressed in Chapter 6.2.2.1 Section of the report.
6. The proper and reliable crossing should be constructing for operation stage of the project. The road has been designed with full care of road safety. The Zebra crossing have been designed in detail design. The flyover and under pass have not been proposed. This issue has addressed in Chapter 6.2.2.1 Section of the report.
7. Under pass and flyover are better way to cross the road during the operation stage. So for the settlement area the flyover and underpass should be construct. This issue has addressed in Chapter 6.2.2.1 Section of the report.
8. Water sprinkling and other mitigative measures should be implemented. This issue has addressed in Chapter 6.2.2.1 Section of the report.
9. Affected community forest user groups were asking for the arrangement of compensatory plantation for the DF. This issue has addressed in Chapter 5.3 Section of the report.

Before collection of the issues, suggestions and comments the Environmental and social as well as the engineering parts were dealt from the side of design team.

1.12.3 Project Area Delineation

Direct Impact Area (DIA):

This project impact area includes all the areas where activities related to the road alignment upgrading will take place. This area shall be studied in greater detail regarding the impacts on physical, biological as well as socio-economic and cultural environment. The area within the RoW of proposed road alignment is 25m on either side from the centre line of the road. However 25 m on the either side from the centre line of the road is referred as Direct Impact Area (DIA) in this Report.

Indirect Impact Area (IIA):-

In this area, physical and biological environment will probably experience minimal impacts. However, influx of labor from these areas may affect the socio-economic and cultural environment of the project area. The concerned Municipalities/VDCs and areas within 2 km from the centre line of road alignment on either side are referred as indirect impact area (IIA) in this study.

Zone of Influence (ZoI):-

The zone of influence of this road project consists of Municipalities and VDCs falling within its alignment, which are:

- Nawalparasi
- Rupandehi

1.12.4 Draft Report Preparation

Based on the processed information, a draft EIA report was prepared with detailed level of site-specific baseline information and alternative route analysis. All identified and predicted likely environmental impacts were included in the draft report, which also contained Environmental Management Plan (EMP). EMP focused on mitigation measures, environmental monitoring and auditing including implementation responsibilities, staffing, and budget and co-ordination aspects. An intra-agency consultation meeting was organized to solicit comments and suggestions on the draft report.

1.12.5 Final Report

The final EIA report has been prepared incorporating all suggestions and comments received during the public hearing. The final EIA report was prepared by incorporating all suggestions and comments received during the public hearing and intra-agency consultation meetings. The final report has been formatted in such a way that it minimizes duplication in write-ups, makes the report a concise and easily understandable form and does not omit issues and concerns mentioned in Schedule 6 of EPR, 1997 and the approved ToR. The final report contains information on baseline environmental conditions & review of environmental related policies, legislation, and guidelines. As a part of EIA report, alternatives were evaluated and environmental impacts of best option were identified, predicted and evaluated. In order to ameliorate the beneficial impacts and minimize the adverse impacts, this EIA report also contains elaborated benefits augmentation measures and mitigation measures, monitoring parameters, methods & schedules and also a framework for environmental auditing as a part of the EMAP. Eventually, the final report was submitted to MoPE through Ministry of Physical Infrastructure and Transport as per the rules recommended by EPA-1997 and EPR-1997.

1.12.6 Limitations

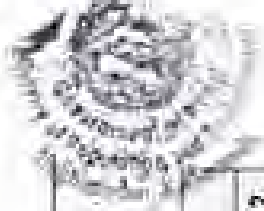
This study has followed the basic concept of EIA as to make the EIA report site-specific; to the extent possible. Hence, this study limits information generation along the road alignment and the Right-of-Way (RoW) (i.e. within 25m on either side of the road alignment for physical, biological and socio-economic and cultural information. Information on possible acquisition of land and property has also been limited to road alignment and required RoW. However,



emphasis has been given to generate Socio-economic information for each adjoining settlements to relate impacts with the settlement activities.

With a view to make the report comprehensive and not repetitive in writing, environmental management plan (EMP) include implementation plan for mitigation measures, monitoring and auditing along with staff and budget, reporting requirements and coordination aspects. By doing so, the spirit of the EPR and the TOR is fully respected and reflected.

FOR REFERENCE ONLY



1.12.7 The time frame of the EIA

S.N.	Activities	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Desk Study, Mobilization of Study Team, Literature Review	■											
2	Preparation and Approval of Scoping Document and TOR		■										
3	Publication of Public notice			■									
4	Field Study and Investigation			■	■								
4.1	Interaction with Stakeholders and Collection of Suggestions and Comments			■	■								
4.2	Baseline Survey			■	■								
5	Analysis and Prediction of Impacts					■							
6	Development of Mitigation and Enhancement Measures and Preparation of Monitoring plan and EMP					■	■						
7	Draft Report Preparation and Presentation							■					
8	Submission of Draft Report to DOR								■				
9	Comments on EIA Report, Public Hearing and Publication of Public notice									■	■	■	
10	Submission of Final EIA Report, and Approval of the EIA Report by MOPE											■	■



1.12.8 Compilation of Baseline Information, Impact Identification, Prediction and Evaluation

Based on the primary and secondary information, the baseline information related to the issues as indicated in Scoping Document and Term of Reference were compiled and are presented in Chapter 3 of this EIA study report. The possible environmental impacts were identified considering proposed project action and its interaction with surrounding environment in time and space and accordingly the impacts were evaluated and presented in Chapter 4.

Evaluation of Impacts

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

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

Quantitative data on number of trees to be felled and number and area of land and house affected are used as the basis of determining the Magnitude of the impact. In the absence of quantitative data, the environmental study team's experts' judgment has been for determining the Magnitude-based primarily on experiences from similar projects.

Magnitude of Impact:

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

High/Major Magnitude	The magnitude of impact is considered to be serious of a major adverse impact cannot be mitigated. A major adverse impact would affect the potential substance, recreational and commercial use of biophysical resources, with the result that the value of resource would be reduced far below publicly acceptable level.
Medium Magnitude	Moderate to major unmitigated impacts of a similar nature would make the resources still usable but at some inconvenience to the public.
Low Magnitude	Lower impacts and could be mitigate by using the mitigation measures.

Extent of Impact:

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

National	If the resources are affected at nation scale, it is known as a national impact.
Regional	An impact area considered to be of regional level if it extends beyond the Direct Impact Area to a larger region.
Local	If the impact of the proposed project is limited to the Direct Impact Area alone, it is called a local impact.
Site Specific	If the impact is confined to the Project site alone, it is a Site-Specific impact.



Duration of Impact:

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

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

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

Magnitude	High/Major = 60	Medium = 20	Low = 10
Extent	Regional = 60	Local = 20	Site-Specific = 10
Duration	Long-Term = 20	Medium-Term = 10	Short-Term = 5

The total scores of impacts of over 75 is considered Very Significant, impacts having 50 to 75 are considered Significant, and impacts having total scores of less than 50 are considered Insignificant for this Project. However, some of the impacts whose total score exceeds 50 may not be significant in view of the nature of the predicted impacts. Some impacts having less than 50 score could also be considered significant. For example, impacts likely to occur outside the project's core area and of indirect nature may not be significant although the total score exceeds 50.

1.12.9 Prescription of Mitigation and Monitoring

The mitigation and monitoring prescription was developed considering the identified impacts, their nature, extent and complexity. While recommending the mitigation option, a realistic approach was applied such that the measures could be employed in the local context. Monitoring Plan is formulated to assess the effectiveness of the mitigation measures and the status of their implementation.

1.12.10 Proposition of Mitigation and Enhancement Measures

The pragmatic, appropriate and implementable mitigation and enhancement measures were proposed in order to ameliorate the beneficial impacts and avoid or mitigate the adverse impacts identified during the EIA exercise.

1.12.11 Preparation of Environment Management and Action Plan

Environment Management and Action Plan (EMAP) is prepared to ensure and evaluate the effectiveness of each of the mitigation and enhancement measures adopted to minimize the environmental impacts and to ameliorate the overall environmental conditions within the region of influence. The basic objectives of EMAP are that it clearly spells out the environmental concerns of the project and prescribes a systematic environmental management system to be followed to attain the environmental improvements in and around the project vicinity.



Monitoring plan is formulated to assess the effectiveness and implementation status of mitigation and benefit augmentation measures. Auditing plan was also designed to verify the past and current environmental performance.

1.12.12 Public Consultation

During the field study, study team contacted with the local people to offer their concerns and opinions on physical, biological, socio-economic, cultural and historical aspects. The public input have been well documented in this report, at appropriate places.

1.12.13 Organization of the EIA Study Report

This EIA Study Report has Nine Chapters and Annexes. The Chapters have been arranged following the provision of Schedule 6 related with Rule 7 of Section 2 of the Environment Protection rule, 1998 (first amendment 1999). It also included an Executive Summary in English as well as Nepali at the beginning of the Report. The Chapters and Annexes are as follows:

- Chapter 1 – Introduction
- Chapter 2 – Description of the Proposal
- Chapter 3 – Existing Environmental Condition
- Chapter 4 – Environmental Impact Identification, Prediction, and Evaluation
- Chapter 5 – Alternative Analysis
- Chapter 6 – Impact Mitigation Measures
- Chapter 7 – Review of Policies, Legislations Standards, Guidelines & Related Institutions
- Chapter 8 – Environmental Management Plan
- Chapter 9 – Conclusion

ANNEXES

CHAPTER 2-PROJECT INTRODUCTION AND DESCRIPTION

2.1 Introduction of Project

Narayanghat – Butwal section of East West Highway, designated as a National Highway, H01, as per SSRN/DoR and AH02 as per Asian Highway network starts from Fulchowkin/Naraynghat of Chitwan District, Narayani Zone, Central Development Region at about km 473+280(0+000) of East West Highway (189 m amsl) and passes through mostly plain and rolling sections of Nawalparasi and Rupandehi Districts except Daunne hills of Nawalparasi district and ends at Lakhan Chowk, Butwal, at about Km 587+280(115+000) (167amsl) in Rupandehi district.

The Narayanghat-Butwal road is part of NH1 and AH2, the main lifeline of the western and far western territories. It also links to the Sanauli Border the second largest trading post of Nepal through the Bhairawa dryport. It is currently a bituminous surface with 7.0-8.0 meter carriage width, crossing numerous rivers, community forests, and several large settlements. Most pipe culverts are in poor condition and need to be maintained/rehabilitated/replaced.

The existing road will be upgraded to an Asian Highway Class I, 4-lane, double bituminous surface treatment (DBST) pavement, 50 m right-of-way (ROW), 12 m formation width, 7m carriage way width, and 2.5m shoulders. The project also includes improvements in alignment, drainage, bridge approaches, traffic signs and safety, retaining structures, and junctions. A total of 47 new bridges will be constructed along the stretch crossing significant rivers like Jayashree, Kichkini, Beldiya, Jharahi, Mukunde, Badaha, Laukaha, Kawasoti, Murali, Girwari, Arun, Binal, Jyamire, Bhaluhi, Bhumati, Somnath, Turiya, Kachrar, Ghodaha, Bhalubai, Rohini, and Sukhaura.

The 115-km section of the AH-2 passes through the following political divisions: Gaidakot Municipality, Rajahar VDC, Devchuli Municipality, Kawasoti Municipality, Parsauni VDC, Madhyabindu Municipality, Naya Belhani VDC, Dumkibash VDC, Bardaghat Municipality, Ramnagar VDC, Tilakpur VDC, Sunwal Municipality of Nawalparasi District and Devdaha Municipality, and Butwal Sub Metropolitan City of Rupandehi District.

Situated at an elevation of 120 m to 550 m from mean sea level, the Narayanghat - Butwal Road a part of EWH is located in Chitwan, Nawalparasi and Rupandehi districts in the Narayani and Lumbini Zone, Central and Western Development Region of Nepal respectively. The road alignment passes two Sub-Metropolitan Cities, seven municipalities and six VDCs in three districts as listed in Table 2.1 below. The road provides connectivity to major settlements, market centres and agriculture production pockets and crosses the various forest areas as well as touches the Buffer Zone of Chitwan National Park. Total length of the project road section is 115 km. The alignment map below presents the project road alignment.

Table 2.1: List of Districts, Municipalities and VDCs in the Project Area

Districts	Municipality	VDCs
1. Nawalparasi	1. Gaidakot	1. Rajahar
	2. Devchuli	2. Parsauni
	3. Kawasoti	3. Naya Belhani



Districts	Municipality	VDCs
	4. Madhyabindu	4. Dumbutresh
	5. Bardaghat	5. Rannagar
	6. Sunawal	6. Talepur
2. Rupandehi	1. Devdaha	
	2. Tiktana	
	3. Butwal (Sub-metropolitan city)	

• Characteristics of the Existing Road

Narayanghat – Butwal Section of East West Highway, designated as a National Highway, H01 as per SSRN/DoR and AH02 as per Asian Highway network starts from Pulchowk in Narayanghat of Chitwan District, Narayani Zone, Central Development Region at about km 473+280 of East West Highway (189 m amsl) and passes through mostly plain and rolling sections of Nawalparasi and Rupandehi Districts except Daune hills of Nawalparasi district and ends at Lakhani Chowk, Butwal, at about Km 587+280 (167amsl) in Rupandehi district. This section of East West Highway was constructed with UK Assistance in 1972 as bituminous road. The project road crosses twenty one major rivers excluding Narayani River and 26 minor rivers. Under the present scope, road upgrading work starts from right bank of Narayani River (km. 00+650).

Section1: Gaidakot – Jyamire khola Bridge Section (Km 0+650 to Km 60+500). The road section was opened as bituminous paved surface with the width of 7m. The alignment initially traverses from the right bank of Narayani Bridge passing through Gaidakot Bazaar up to Km 4 + 000. Then the road passes through rural settlement up to km 07+200 and enters into forest area and continues up to km 11+300. After km 11+300 road passes through Mukundpur Bazaar, Beldhiya Bazaar, Rasihat etc up to km 20+260 and again road passes through rural settlement up to km 22+050. From km 22+050, road traverses through Daidale bazaar up to km 25+900.

The road traverses through forest area from km 25+500 to km 30+530 and again from km 36+000 to km 43+300 near Chormara village. From this road passes through settlement area and again starts passing through forest from km 44+100 up to Arun Khola at Km 50+290. After crossing around 100m settlement area than again road passes through Forest section up to km 59+500. And then the road traverses through settlement area and ends at Dumbutash about km 60+500 just after the Jyamire Khola Bridge. Throughout the section the alignment runs along the west side from start point. In this section there are 121 number of Hume pipe culverts, 87 number of Slab and Box Culverts, 7 numbers of minor bridge and 12 numbers of major bridge. The road in this section passes through six forest patches, of which two patches are only towards northside of the road (5.8 km) whereas rest four patches (27.12 km) along the both sides of the road.

Section2: Daune - Bardaghat Section (km 60+500 to Km 75+000). The road section was opened as bituminous paved surface with the width of 7.0 m. Due to the drainage problems in many short stretches the road has been rehabilitated with concrete pavement in most critical sections by DoR. The alignment starts ascending towards Daune hill with average gradient of 6.5% up to Km 67+800 and then starts descending with average gradient of 6.0% and ends at km 75+000. In this section the alignment crosses Siwalik Hills with two sharp curves with mild grades. Throughout the section the alignment runs along the west

side from start point, in this section there are 10 Hume pipe culverts, 105 Slab and Box Culvert, 4 minor bridges. Almost whole section of the road passes through the forest (about 15 km) except short span in Daunna-bazaar area.

Section3: Bardhaghat - Butwal Section (Km 75+000 to Km 115), the road section was opened as bituminous paved surface with the width of 7.0m. This section starts from the junction at Triveni, Susta and the alignment traverses through the Bardhaghat Bazaar up to km 77+000 and then passes through the rural section up to km 83+400 along the paddy field and rural settlements and reaching to Bhumali Bazaar and meets the Junction to Sunauli Boarder at km. 85+500. After km 87+500, the road traverses through forest section up to km 91+000 and enter into Sunwal Bazaar, Nuwalparasi. After Sunwal, the alignment crosses the rural settlement and mostly forest section up to km 98+500 and reaches to Bhaluhi Bazaar at km 105+000. After Km 105+000 to 110+400 road passes through forest section and reaches the Butwal Bazaar at Km 110+400 and the section of road ends at Lakhari Chowk of Butwal at km 115+000. Throughout the section the alignment runs along the west side from start point. In this section there are 159 nos. of Hume-pipe culverts, 30 nos. of Slab and Box Culvert, 15 nos. of minor bridge and 9 nos. of major bridge.

The alignment passes through hanumber of built-up areas as listed below in Table 2.2.

Table 2.2: Major Settlements along the Road Corridor

Number	Location	Chainage	
		From	To
1	Gaidakot, Bijayanagar, Suryanagar	00+000	07+000
2	Mukundapur (Previously)	07+000	11+400
3	Museni, Harkapur	11+400	15+300
4	Dibyapuri, Rajahar, Pragatinagar	15+500	26+000
5	Kawasoti Area	31+000	36+400
6	Naya Belhori and Dumechales	50+400	59+300
7	Panchanagar, Tilauri area	75+000	87+500
8	Rampur, Sunwal	91+000	95+000
9	Pipaldada, Sitahagar	98+500	100+500
10	Bhedani	105+000	109+000
11	Butwal area	109+300	112+300
12	Core Butwal area	112+300	115+000

Source: Consultant Report, 2018

The detailed characteristics of the road are presented in the succeeding Table 2.3.

Table 2.3: Identification of Upgrading Requirements (Km. 0+000 – Km. 115)

Section and Chainage	Description of Existing Situation	Identification of Upgrading Requirements	Type of Upgrading Works
Gadakhori Jyamtire Khola Bridge Section (Km. 0+650 to Km. 80+500)	The existing condition of pavement of this section is fairly good having average width of 7m including shoulder. The most pipe culverts are in poor condition and need to be maintained/rehabilitated/replaced. This section comprised of 23.24km urban section, 4.59km rural section and 32.62km Jungle Section having the inadequate drainage system in urban section. In this section there are 121 nos. of Minor pipe culverts, 87 nos. of Slab and Box Culvert, 7 nos. of minor bridge and 12 nos. of major bridge which includes Jyoti Shree Khola, Beldiya Bridge, Jyamtire Khola, Mukunda Bridge, Baulaha Khola, Lohaha Khola, Kawashori, Murali Khola, Pattnay Khola, Girwan Bridge, Arun Khola, Benai Khola, Jyamtire Khola.	Geometry: Improvement and Widening to Four Lane as per Asian Highway Standard and relevant Nepal Road Standard. Drainage Pavement Junctions/Intersections Bridges Animal Passage Structures	Earthworks for widening including alignment improvement and formation widening, raising/reshaping, grade adjustment as needed Completion/improvement/replacement of existing pipe culverts by box culverts, construction of New Slab culverts, box culverts to fit for the extended width including extension and replacement of existing drainage (side drain) at selected markets/built-up areas on urban section, Junctions improvements at various locations and AC surfacing on Main Carriage way and Shoulder. BEST surfacing on Service lane for Urban section with provision of footpaths, Traffic signs and provision of adequate safety measures; Construction of New Double Lane Bridge across major bridges adjacent to existing bridge (15no.) Replacement of existing minor bridge by New 2 nos. Double Lane Bridge to serve four lane highway (12no.) 3nos. of Animal Passage Structure in between section (7+000 to 11+000)
Daurvire Section (Km. 50+500 to Km. 75+000)	The existing condition of pavement of this section is fairly good having average width of 6m including shoulder. The most pipe culverts are in poor condition and need to be maintained/rehabilitated/replaced. This section comprised of 14.60 km hilly/steep forest section. In this section there are 10 nos. of Minor pipe culverts, 105 nos. of Slab and Box Culvert, 4 nos. of minor bridge.	Geometry: Improvement and Widening to Double Lane as per Asian Highway Standard and relevant Nepal Road Standard. Drainage Pavement Slope Stabilization	Earthworks for widening including alignment improvement and formation widening to fit the double lane standard of Asian Highway, raising/reshaping, grade adjustment as needed, Completion/improvement/replacement of existing pipe culverts by box culverts, construction of New Slab culverts, box culverts to fit for the extended width including extension and replacement of existing drainage (side drain) on hill slopes and valley and on selected sections AC surfacing on Main Carriage way and Shoulder, Traffic signs and provision of adequate safety measures, Adequate bio-engineering measures for slope stabilization work.



Section and Chainage	Description of Existing Situation	Identification of Upgrading Requirements	Type of Upgrading Works
Bardaghat - Butwal, Section (Km 75+000 to Km 113+535)	The existing condition of pavement of this section is very good having average width of 8m including shoulder. The most pipe culverts are in poor condition and need to be maintained/rehabilitated/replaced. This section comprised of 15.75km urban section 8.95km rural section and 13.90 km jungle. Section having the inadequate drainage system in urban sections. In this section there are 189 nos. of Roma pipe culverts, 30 nos. of Slab and Box Culvert, 15 nos. of minor bridge and 9 nos. of major bridge which includes Sonswari, Tuliya Khola, Kachhar Khola, Ghodara Khola, Bhalsaba Khola, Rohini Khola and Sukhaura Khola.	Geometry, Improvement and Widening to Four Lane as per Asian Highway Standard and relevant Nepal Road Standard. Drainage Pavement Junctional Intersections Bridge	Earthworks for widening including alignment improvement and formation, widening, raising, reshaping, grade adjustment as needed, Completion/Improvement, replacement of existing pipe culverts by box culverts, construction of New Slab culverts, box culverts to fit for the extended width including extension and replacement of existing drainage (side drain) at selected markets/built-up areas on urban section. Junctions improvement at various locations and AC surfacing on Main Carriage way and Shoulder. DBST surfacing on Service lane for Urban section with provision of footpaths. Traffic signs and provision of adequate safety measures. Construction of New Double Lane Bridge across major bridges adjacent to existing bridge (Sno.) Replacement of existing minor bridge by New 2 nos. Double Lane Bridge to serve four lane Highway (150m.)



The summary of existing and proposed drainage and retaining structures of the proposed project are presented in the succeeding Table 2.4.

Table 2.4: Summary of Existing and Proposed Works

No.	Particulars	Gaidakot - Jyamire Khola Bridge Section (Km 0+050 to Km 60+500)	Daunne Section (Km 60+500 to Km 75+000)	Bardhaighat - Butwal Section (Km 75+000 to Km 113+535)	Total
Existing Road Details					
1	Side Drains (m)	5830	16500	1905	24,035
2	Cross Drainage Structures				
	Pipe Culverts (no)	121	10	159	290
	Slab/Box Culvert (no)	87	105	30	222
	Minor Bridge (no)	7	4	15	26
	Major Bridge (no)	12	0	9	21
3	Retaining Structures				
	Retaining Structures (alltypes) (m)	2,500	5,851	200	8551
Proposed Works for Road Widening and upgrading including extension, replacement, new construction of drain and cross drainage structure					
1	Side Drains,(m)	51,950	14,500	31,500	112,450
	Side Drains in Service Lane,(m)	44,480		30,500	75,080
2	Cross Drainage Structures				
	Pipe Culvert (no)	50	4	36	90
	Box/Slab Culvert (no)	228	114	207	549
3	Bridge				
	Minor Bridge (no)	7	4	15	26
	Major Bridge	12	0	9	21
4	Retaining Structures				
	Retaining Structures (alltypes) (m)	2,000	14,500	500	17,000

m=meter, no= number

Source: Detail Design Report, 2016

2.2 Project Salient Features

The detail description of proposed road alignment is described below in the Table 2.5

Table 2.5: Salient Features of the Road Project

Name of the Project	SASEC Transport and Trade Facilitation Sector Development Programme
Name of the Road Section	Upgrading to 4 lane EWH Narayangadh-Butwal Section /115 km
LOCATION	
Start Point	Gaidakot Municipality of Nawalparasi District
End Point	Butwal, Butwal Sub metropolitan City, Rupandehi District
VDCs	Gaidakot Municipality of Nawalparasi District, Rajahar VDC, Dwechuli Municipality, Kawasoti Municipality, Parsuni VDC, Madhyabindu Municipality, Naya Bazar VDC, Durnibesh VDC, Bardhaighat Municipality, Ramnagar VDC, Trafapur VDC, Sunarwa Municipality of

		Nawalparasi District and Devdaha, Tilotama Municipality and Butwal Sub Metropolitan City of Rupandehi District. As per new federal structure Gaidakot Municipality, Devchuli Municipality, Bardaghat Municipality, Madhyabindu Municipality, Ramgram Municipality, Sunawal Municipality and Binayi Municipality Sarawal Rural Municipality and Butwal Sub Metropolitan City.
GEOGRAPHICAL FEATURES		
Section	Plain Section Km 473+570 to Km 534+270; Km 549+270 to Km 588+570	Steep Section (i) Km 534+270 to Km 549+270
Terrain	Plain	Mountain/Steep
Alignment	Plain	Steep
Altitude	From 120m to 550 m (amsl)	
Climate	Subtropical/Tropical	Subtropical/Tropical
Road Type		
Classification of road	Asian Highway Class I	Asian Highway Class II
Length of Road	100 km	15km
Type of Pavement	Asphalt Concrete	Asphalt Concrete
Standard of Pavement	Overseas Road Note 31 (RN 31) and/or AASHTO design method	
Design Parameters		
Design Speed	100 km/hr	40km/hr
No. of Lanes	Four Lane	Double Lane and provision of climbing lane
Right of Way	50 m	50m
Median Width	4 m	NA
Carriageway Width	14m	7m
Total Formation (Road Way) Width	25.50m	12.00m
Shoulder Width	3.75m	2.50m
Camber of Carriage way	2.5%	2.5%
Camber of Shoulder	3%	3%
Minimum Horizontal Curve Radius	350m	50m
Gradient		
Maximum Gradient	4 %	7%
Minimum Value of K** for summit curves, m/%	427	29
Minimum Value of K** for valley curves, m/%	236	17
Maximum Gradient at Bridge Approach	4%	4%
Maximum Maximum Vertical Length, m	600m	300m
Horizontal Bends		
Design Speed	NA	40 km/hr
Min. spacing between centers of bends	NA	200 m
Maximum Gradient	NA	4%
Minimum Gradient	NA	0.5 %
Maximum super elevation	NA	7%



Minimum Radius of Curve	NA	50 m
Extra widening	NA	1.50m
No. of Major Bridges	21 no	
No of Minor Bridges	28 no	

Source: SABEC Road Project Report, 2018

2.3 Construction Planning

A. Upgrading Activities

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

The sub-project involves key construction activities including geometry improvement, pavement upgrade/widening, drainage construction, retaining structures, slope protection/stabilization, other off-road works, and works on traffic management and road safety. There will be six lane in the settlement and market area. And four lane on main track and service road on either side. Technically the key upgrading activities include widening and improvement of existing double lane highway to four lane highway as per Asian Highway Standard including geometry improvement to suit the standard, pavement construction, drainage system improvement, retaining structures, slope protection/stabilization, other off-road works, and works on traffic management and road safety measures. The road pavement activities involve strengthening and new construction throughout the sections with AC surfacing on Carriageway with sealed Shoulder. Drainage improvement comprises construction of sidedrains, improvement of existing natural drainage systems, Maintenance/Replacement/Rehabilitation and addition of culverts (including new construction), and side drains along service lane in urban section.

The upgrading involves widening of existing road width to 43m in Urban section, 23m in Rural and Jungle section and 12m in Daulim Hill sections to meet the design standards. The road pavement work will involve strengthening, resurfacing, and partial reconstruction of existing sections, new construction on re-aligned sections, shoulder improvement, and sealing of shoulder on hill roads. Drainage improvement comprises lining of side drains, improvement of existing natural drainage systems, culverts and causeways (including new construction), and side drains along main market fronts. The summary of existing and proposed drainage and retaining structures of the proposed project are presented in the Table 2.5.

Table 2.5: Details of Road Section and List of Road Widening at Markets and Built-up Area

SN	Damage		Description of Sections	Length	Pavement Top Width including Median	Remarks
	From	To				
1	0+000	0+650				
2	0+650	4+000	Gaidakot Bazaar	3,350.00	23m Main Road and 6m Service Lane both side	Median 3m
3	4+000	7+200	Rural Side	3,200.00	23m	
4	7+200	11+300	Jungle	4,100.00	23m	
5	11+300	20+200	Bhedhatoli Beldhrya	8,900.00	23m Main Road and 6m Service Lane both side	

SN	Chainage		Description of Sections	Length	Pavement Top Width including Median	Remarks
	From	To				
			Amarapur, Rajhar			
6	20+250	22+050	Rural Side	1,790.00	23m	
7	22+050	25+900	Daidala	3,850.00	23m Main Road and 6m Service Lane both side	
8	25+900	30+530	Jungle	4,630.00	23m	
9	30+530	33+900	Kawasab	3,370.00	23m Main Road and 6m Service Lane both side	
10	33+900	43+000	Jungle	9,100.00	23m	
11	43+000	44+100	Chormang area	1,100.00	23m Main Road and 6m Service Lane both side	
12	44+100	50+250	Jungle	6,150.00	23m	
13	50+250	50+900	Arun Khola area	610.00	23m Main Road and 6m Service Lane both side	
14	50+900	59+500	Jungle	8,600.00	23m	
15	59+500	60+500	Dumkibare	1,000.00	23m Main Road and 6m Service Lane both side	
16	60+500	75+000	Jungle Daunne	14,500.00	12m	
17	75+000	77+000	Bardaghat Area	2,000.00	23m Main Road and 6m Service Lane both side	
18	77+000	83+400	Rural Side	6,400.00	23m	
19	83+400	87+500	Harkatta, Shanti Tole	4,100.00	23m Main Road and 6m Service Lane both side	
20	87+500	91+000	Jungle	3,500.00	23m	
21	91+000	93+000	Sunwal, Rampur	2,000.00	23m Main Road and 6m Service Lane both side	
22	93+000	95+500	Rural Side/Jungle	2,500.00		
23	95+500	98+500	Jungle	3,000.00	23m	
24	98+500	102+000	Khairani	3,500.00	23m Main Road and 6m Service Lane both side	
25	102+000	105+000	Jungle	3,000.00	23m	
26	105+000	106+000	Bhaluni	1,000.00	23m Main Road and 6m Service Lane both side	
27	106+000	110+400	Jungle	4,400.00	23m	
28	110+400	113+650	Bulwal Area	3,150.00	23m Main Road and 6m Service Lane both side	

Road safety measures include provision of signs, delineators, crash barriers, Jersey Barriers and pavement markings, minor alignment at identified black spots including pedestrian footpaths in urban section. The project has proposed for installation of 1840 traffic signs posts and 2000 delineators, 200m crash barrier for this road section.

21 major bridges (2 lane single in number in addition to the existing one) and 25 minor bridges (2 nos double lane side by side) will be constructed under the project. Minor bridges are those that are 6 – 25m in length while major bridges are those that are longer than 25m. Existing minor bridges will be fully dismantled.

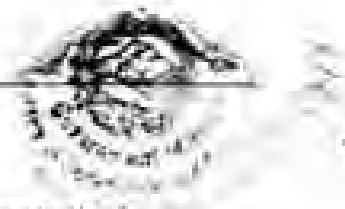


Table 2.7: Proposed Bridges to be Constructed and Upgraded

SN	Chainage	Name of River	Type of Bridge	Length	Span	District
1	005+065	Jaya Shree Khola	Steel Truss and RCC Deck (composite)	32	1.00	Nawalparasi
2	016+420	Beldiya Bridge	Steel Truss and RCC Deck (composite)	32	1.00	Nawalparasi
3	017+835	Jharahi Khola	RCC Bridge	100.8	5.00	Nawalparasi
4	020+870	Mukunde Bridge	Steel Truss and RCC Deck (composite)	32	1.00	Nawalparasi
5	023+150	Baulaha Khola	Steel Truss and RCC Deck (composite)	66.05	2.00	Nawalparasi
6	026+175	Lokaha Khola	Steel Truss and RCC Deck (composite)	32.8	1.00	Nawalparasi
7	034+215	Kawashoti	RCC Bridge	103.55	4.00	Nawalparasi
8	036+058	Pattihar Khola	Steel Truss and RCC Deck (composite)	12.07	2.00	Nawalparasi
9	043+468	Giwari Bridge	Steel Truss and RCC Deck (composite)	184.25	2.00	Nawalparasi
10	050+375	Arun Khola	Steel Truss and RCC Deck (composite)	216	4.00	Nawalparasi
11	059+575	Birai Khola	Steel Truss and RCC Deck (composite)	245	4.00	Nawalparasi
12	060+510	Jyamire Khola	RCC Bridge	47.4	4.00	Nawalparasi
13	083+345	Bhaluh Khola	Steel Truss and RCC Deck (composite)	63	2.00	Nawalparasi
14	085+830	Bhumahi	Steel Truss and RCC Deck (composite)	65	2.00	Nawalparasi
15	090+770	Sannath	RCC Bridge	57.31	4.00	Nawalparasi
16	093+203	Tunya Khola	RCC Bridge	68.4	5.00	Nawalparasi
17	098+260	Kacharar Khola	RCC Bridge	46.6	3.00	Nawalparasi
18	100+948	Ghodaha Khola	RCC Bridge	81.4	4.00	Rupandehi
19	104+937	Bhalubai Khola	RCC Bridge	82.45	4.00	Rupandehi
20	105+887	Rohini Khola	RCC Bridge	31.4	1.00	Rupandehi



SN	Chainage	Name of River	Type of Bridge	Length	Span	District
21	110+134	Sukhaura Khola	RCC Bridge	26.7	2.00	Rupandehi

Source: Detail Design Report, 2016

2.3.1 Description of Proposed Road Alignment

The road starts from the Narayani River of Gaidakot Municipality. The elevation of the starting point is 192 m from the mean sea level height. The road starts from the settlement area called Pulchok. The road crossed the settlement like Bijayanagar, Suryanagar, Jwanetar, area and follows the Narayani River up to its Chainage 7+000. The road enters to the forest area and reaches up to the Pitaui and Bhedabari with Chainage 11+000. Then the road starts to cross the settlement area. This area was Anarapuri VDC previously but recently the Gaidakot Municipality includes the Anarapuri VDC and reaches up to the existing Rajahar VDC. The chainage for the Rajahar VDC is the 18+000.

The road follows then Dityapuri and newly declared Pragatinagar Municipality. This area also densely populated area. The densely populated area exists up to the chainage of 26+000. Then the alignment reaches to the forest area. The forest area exists up to the chainage of 31+000. Nawalpur, Kawaoti Municipality starts from the 31+000 and reaches the settlement up to Danda with chainage 35+000.

From the 36+000 the road again enters in to the forest area and this forest area reaches to the Gadar Khola with chainage 43+000. The road crosses the Khola and again enters in to the forest area of Prasauri VDC of Nawalparasi District. This forest area ends to the Arun Khola of chainage 50+000. After crossing the Arun Khola the forest area exists up to the chainage of 75+000 with the VDC Dumkibas.

From the chainage 75+000 the road enters to the settlement area with the VDC Talakpur and Ramnagar. This area reaches up to the chainage of 94+000. The road then enters to the forest area of Sunwal. The alignment crosses the small patch of Sai Forest up to the Sunwal and Dawdaha having chainage 105+000. After crossing the Rahini Khola of chainage 106+000 the road enters to the Butwal Submetropolitan City of Rupandehi District.

8. Road Construction This involves construction of road with road way width as stipulated in the table above to meet the design standards. It includes roadway cutting, filling, embankment filling, pavement work, including sub-base construction, base construction, wearing course, and the construction for the geometric stability and. This will enhance serviceability of road, additional width for hard stand to parking/stopping vehicles and better drainage management.

Pavement Construction

The road pavement activities involves strengthening and new construction throughout the sections.



Drainage construction

As the proposed 4-lane highway construction will require a separate 2-lane bridge, all cross drain structures including slab culverts will be constructed new. The pipe culverts of diameters larger than 900mm and the box culverts will be extended on both sides to cover the full length of the highway, if they are in good serviceable condition as reported in the inventory survey. As the most part of the highway will be in embankment, it will not have any side drain except some embankment toe protection works, wherever deemed necessary. However, at all commercial areas covered and properly lined drains of adequate capacity will be provided on both sides of the highway. These drains will be discharged at proper natural drain channels without any adverse impacts on local hydrological regime. Apart from market area, open drains of adequate capacity will be provided in the hilly cut areas (Daunne section) at the foot of the hill slope, and on both sides on box cut sections.

Retaining Structures

This involves construction of new retaining structures: breast wall (gabion, RCC, Stone Masonry, Geo-grid, and Revetment etc.)

Slope Protection/Stabilization: This involves landslide/Erosion stabilization and slope protection activities. Both civil engineering and bioengineering activities including gabion wall will be under consideration.

Road Safety Measures: This includes provision of traffic signs, delineators, barriers and pavement markings, Steel Barrier, including pedestrian foot paths in market and areas and road marking including Zebra Crossing, road informatory signs and warning signs.

Bridge Up gradation: For this proposed road project two lane road 47 bridges are proposed. The standard of the bridge is as the standard Highway.

Bridges: Construction of 47 bridges is proposed under this project. The major Bridges are as described in Table 2.6.

2.4 Materials Required for Implementing the Road Project

Engineering survey has identified the following sources of construction materials:

The detail of the material required for the Road upgrading work is presented in the Table 2.8 below.

Table 2.8 Construction Materials Required for the Road Upgrading Work.

S.No.	Chainage	Type of material	Equipment used for materials Extraction	Resources Ownership
1	Banra Khola (34+000)			
	Darda/Kawaawati Khola Bank, Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 225,500 m ³	i. Boulder	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC)
		ii. Sand and Course Aggregate		
		iii. Sub-base		
		iv. Base Course(CSB)		
		v. Pavement seating Aggregate		

S.No	Chainage	Type of material	Equipment used for materials Extraction	Resources Ownership
2	Girwan Khola (ch 43+000)		Excavator, Bulldozer, Tipper, Loader, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC)
	Girwan Khola Bank. Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 205,000m ³	i. Boulder ii. Sand and Coarse Aggregate iii. Sub-base iv. Base Course (CSB) v. Pavement Aggregate		
3	Arun Khola (50+000)		Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC)
	Arun Khola Bank. Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 194,475m ³	i. Boulder ii. Sand and Coarse Aggregate iii. Sub-base iv. Base Course (CSB) v. Pavement sealing Aggregate		
4	Binaya Khola (57+000)		Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant	District Development Committee (DDC)
	Binaya Khola Bank. Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 118500m ³	i. Boulder ii. Sand and Coarse Aggregate iii. Sub-base iv. Base Course (CSB) v. Pavement sealing Aggregate		
5	Eraware Quarry (Tinsu Khola)		Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC) and Private land deposited gravel.
	Tinsu Khola. Alluvial deposit of boulder, cobble, gravel and sand quartzite and Schist with Sandy River gravel, away about 12 km from project and point Butwal towards Bhairahawa. Estimated available Qty = 329,375m ³	i. Boulder ii. Sand and Coarse Aggregate iii. Sub-base iv. Base Course v. Pavement Aggregate		

Table 2.9: Proposed Location of Borrow area/quarry for embankment fill material

S. No.	Chainage	Location/Offset EW-Highway	Length (m)	width (m)	Height (m)	Estimated Volume (m ³)	Type/ Ownership of Location	Equipment applicable for material extraction	Remarks
Government/Community Land									
1	7+000	Borrow pit quarry, Thumla	300	60	3	54,000	Community Forest/District forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	RHS Hill side of EW-Highway, Colluvium and residual deposits comprising of boulders, cobbles, gravels and silt/clay
2	25+800	Borrow pit quarry, Lakshna Khola approach immediately after stream at RHS	300	150	2	90,000	Community Forest/District forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	RHS Hill side area of EW- Highway, Colluvium and residual deposits comprising of boulders, cobbles, gravels and silt/clay.
3	35+400	Pit quarry, Panthar Khola side	300	100	2	60,000	Community Forest/District forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	RHS Hill side area of EW- Highway, Colluvium and residual deposits comprising of boulders, cobbles, gravels and silt/clay.
4	37+200	Pit Quarry	800	100	3	90,000	Community Forest/District forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	Community Forest area, Colluvium deposited red soil
5	55+200	Dry Stream 500m RHS	600	50	3	90,000	Community Forest/District forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	Alluvial deposits comprising of gravel and sand.
6	60+400	Dunkhola (yamare), RHS	630	100	5	150,000	Community Forest/District forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	DFO/Community Forest area, Colluvium deposited red soil.
7	74+300	Bardaghat, LHS & RHS, Turning improvement	300	250	5	375,000	Community Forest/District forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	DFO/Community Forest area, Colluvium deposited reddish- brown soil
8	85+440	Pit quarry, Bhumish, RHS	450	100	4	180,000	Community Forest/District	Excavator, Bulldozer, Loader	DFO/Community Forest area, Colluvium deposited brownish

S. No.	Chainage	Location/Offset EW/Highway	Length (m)	width (m)	Height (m)	Estimated Volume (m ³)	Type/ Ownership of Location	Equipment applicable for material extraction	Remarks
8	52+400	Pit quarry, Sonaul Chok RHS, 1.5 km	400	100	4	160,000	Community Forest/District Forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc	soil
10	53+500	Turiya River LWS 1.5 km	300	200	2	42,000	River bed deposited/District Development Committee (DDC)	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc	DDC, Alluvial river gravel deposited comprising of gravel and sand
11	59+500	Pit quarry, Davedara, RHS, 2 km from EW highway road head	300	200	3	180,000	Community Forest/District Forest Office and local Committee	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc	DDC/Community Forest area, Colluvium deposited brownish soil
Estimated available Quantity: m ³							1,471,000.00	Visually estimated quantities.	
Private Land:									
12	4+300	Gadukot, EW- Highway, Masu Khola (14 km far away to North)	Two spots of different length	Two spots of different width	0.75	147,000.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc	Private land soil
13	33+000	Danda, EW- Highway South (5 km far away)	do	do	0.75	68,250.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc	Private land soil
14	44+100	Chomara, Masu ghat, EW- Highway North (5 km far away)	do	do	0.75	105,000.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc	Private land soil
15	44+100	Chomara, Basag khor, EW- Highway South	do	do	1.0	220,000.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks	Private land soil

S. No.	Chainage	Location (Offset EW-Highway)	Length (m)	Width (m)	Height (m)	Estimated Volume (m ³)	Type/ Ownership of Location	Equipment applicable for material extraction	Remarks
15	50+000	Arum Kondia Drain East-West Highway North (0Km faraway)	do	do	0.75	183,750.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	Private land soil
17	77+000	Bandaghal EW- Highway South (3-4km faraway)	do	do	1.0	300,000.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	Private land soil
18	83+000	Sunaul area EW-Highway South (3-4km faraway)	do	do	0.75	157,500.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	Private land soil
20	105+000	Bhaluh area EW-Highway South (4km faraway)	do	do	0.75	157,500.0	Personal	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel etc.	Private land soil
Estimated Available Quantity, m ³						1,227,000.00			

Source: Detail Design, 2016

Beside the Project has proposed for the following sites as the source of construction materials:

1. Rivers materials from all the rivers along the road alignments as construction materials like: Jayashree, Kichkin, Beldiya, JharatMukunde, Baulaha, Laukaha, Kawaswoti, Murali, Gwari, Arun, Bhaluh, Jyamini, Bhaluh, Somnath, Turiya, Kachhar, Ghodaha, Bhalubal, Rohini, and Sukhaura
2. The construction materials from the approved sites of DDC Nawalparasi and Rupandehi DDC.
3. The nearabout river materials from the Narayani and its tributaries river as construction materials
4. The filling materials from the nearabout private lands where available





CHAPTER 3: EXISTING ENVIRONMENTAL CONDITION

In order to make the EIA report more site-specific and implement environmental protection measures accordingly, the baseline description of the environmental condition within the road alignment and its RoW is presented under Physical, Biological and Socio-Economic and Cultural Characteristics in this Chapter.

3.1 Physical Environment

3.1.1 Political Boundaries of the Project District

The project road is located in Nawalparasi and Rupandehi districts. Nawalparasi district covers an area of 2,162 sq.km, which is 1.5 % of total area of Nepal. Its altitude ranges from 91m to 1,936 m. The north-south length of district is approximately 85 km whereas breadth is 10 to 37 km. About 16% of the total area comprises Mountainous region and the remaining land include Churia, Terai, and Inner Terai. Hilly region comprises of the Mahabharata range from the south of which, the Churia range starts and end up to the bank of Narayani River. The latter two regions have gentle slopes up to 150, while the Mahabharata and Churia range has steep slopes of 15-500. Of the total area of 20,1567 ha forest coverage is 110,765 ha and cultivated land coverage is 70,149 ha.

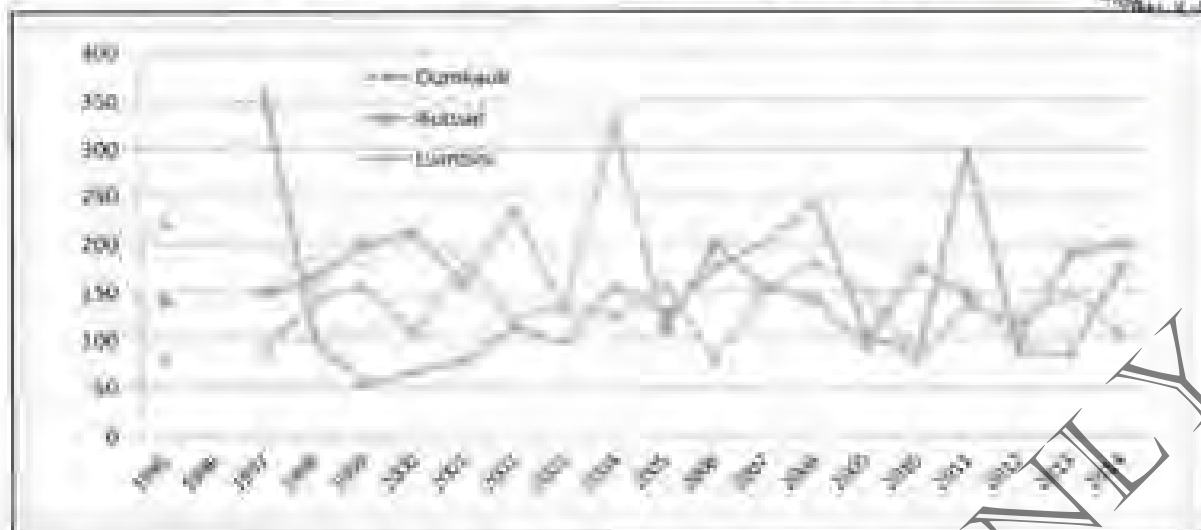
Rupandehi district lies on the southern and western part of Nepal. It shares border with Nawalparasi District in the east, with Kaptiavastu in the west and with India in the south. The elevation of the district lies between 100 m to 1,229 m above mean sea level. The total area of the district is 1,360 km² with 16.1% in Churia Range and rest in the Terai region. Most of the area in Rupandehi has loamy soil. Area near Chure area is made up of highly sensitive and easily erodible sandstone, siltstone, shale and conglomerates. None of these unstable areas exist along proposed road alignment.

3.1.2 Climate and Precipitation

The altitude of these project districts varies from 91 meter to 1,936 meters hence the micro-climate varies along the project road alignment. Climatologically, Nawalparasi district can be divided into lower tropical (55.2%), upper tropical (34.9%) and subtropical (5.7%). Rupandehi district can be divided into lower tropical (89.3%), upper tropical (10.5%) and subtropical (0.2%). Most of the road length passes through tropical climate particularly along the rivers and streams with some subtropical climate in the section falling inside the Dunanne and Chure region.

Precipitation in Rupandehi and Nawalparasi district is predominantly led by monsoon (80%) and western disturbances (20%). As per the Department of Hydro Meteorology (DoHM) the average annual precipitation of the Nawalparasi district is 2,145 mm and Rupandehi is 1,808.33 mm. lowest precipitation is 1081.60 mm which occurred in 2005-2006 and a maximum of 2,797.4mm in 1998 for Rupandehi. The monsoon generally starts from June and ends in August which accounts for about 80% of the total monsoon precipitation creating floods along the seasonal rivers and streams that cross the road alignment.

The average annual rainfall recorded in different meteorological stations under DoHM from the year 1995 to 2014 is presented in the succeeding figure.

Figure 3.1: Average annual rainfall (1995-2014)

Source: DoHM (1995-2014)

3.1.3 Temperature and Humidity

According to DoHM records, April to July are the months with hot temperature, whereas November to February are the colder months. The average temperature in the project area ranges from 15.22 °C to 29.90 °C.

Figure 3.2: Mean monthly temperature (°C)

Source: TPPF, Hydrological Study Report, 2015

Both project districts have high humidity year-round, often reaching 100% in the early morning during the monsoon, and during December-January when heavy fog covers the lower half of the region for several days. Warm dry winds from the west and southwest cause a rapid decrease in humidity from February through March, when humidity reaches a low level of about 45%. Humidity and cloudy weather increases rapidly as the monsoon approaches with the change to easterly and south-easterly winds. Humidity reaches its peak in July and remains fairly steady during the monsoon season near about 85%, which declines slightly through January.

3.1.4 Air Quality and Noise Level

Limited secondary information is available on the air quality of the sub-project road². There are no major industries and the current traffic volume is not very high through most of the road alignment. However, there are many commercial and residential built up areas. Hence the ambient air quality exceeds the National Ambient Air Quality Standards (NAAQS) of Nepal for TSP, PM₁₀ and SO₂. The main source of pollution in the built up area is dust from the road. Outside the built up areas, the land use is dominantly agricultural with associated residential land use and forest land use where the air quality is pristine.

Table 3.1: Baseline Ambient Air Quality (µg/m³)

City	TSP	PM ₁₀	SO ₂	NO ₂
Narayanghat (Project road starting point)	658.5	572.93	81.02	17.61
Butwal (Project road ending point)	1,158.83	1,066.88	133.1	23.95
Bhairahawa (~28km from Butwal)	840.76	776.56	106.5	22.68
NAAQS	230 (24 hr ave)	120 (24 hr ave)	70 (24 hr ave)	80 (24 hr ave)
WB Guideline Values	none	Interim target 75 - 150 (24 hr ave) Guideline: 50 (24 hr ave)	Interim target 50 - 125 (24 hr ave) Guideline: 20 (24 hr ave)	Guideline: 200 (1 hr ave)

Note: The baseline values are for 8-hour average concentrations.

Source: Country synthesis report on urban air quality management IUCN (2004).

Noise level measured along the project road is provided in the succeeding. The standards for noise under the World Bank Environmental Health and Safety (WB-EHS) Guidelines and national standards are provided in the

Table 3.2: Noise level recorded at different locations along the road alignment

Location	Noise Level dB (A)			GON Noise zones/ standard	WB Noise Zones/ standard
	Minimum	Maximum	Average		
1. Start Point (Gadokot)	61	83	67	New residential area (62 dBA)	Residential (50 dBA)
2. Buffer Zone Area (Forest area)	59	79	61	New residential area (62 dBA)	
3. Pragatinagar (Kawasot)	48	79	54	New residential area (62 dBA)	Residential (50 dBA)
4. Daurne Area	41	74	56	Forest Area (None)	
5. Bardaghat	54	79	64	New residential area (62 dBA)	Residential (50 dBA)
6. Butwal Bazar (End Point)	58	83	68	Commercial cum residential Area (72.75 dBA)	Commercial (70)

Source: Field Survey, 2018.

² It was not possible to collect primary data on air, noise and water quality due to lack of expertise in Nepal.



Table 3.3: World Bank Noise Guideline Values/standards

Receptor	World Bank		GON	Receptor
	Daytime	Nighttime	Daytime (average) Ldn, dBA	
	7:00-22:00	22:00-7:00		
Residential	55	45	66.28	Old Residential Area
Institutional, educational			62	New Residential Area
Industrial	70	70	72.75	Commercial Cum Residential Area
Commercial			69.25	Commercial Cum. Tourist Area
			74.36	High Traffic Area
Silence Zone	None	None	None	None

The noise zones of the WB-EHS guidelines and the National Ambient standards for Government of Nepal is quite different as can be seen in table 15. Hence it was a challenge assigning the locations within the project road into the different noise zones of WB-EHS and GON and comparing between them. Within these constraints it was seen that noise levels exceeded the GON standards at 2 locations (1 and 6) and the WB-EHS standards at 3 of 4 locations with suitable WB-EHS noise zones.

3.1.5 Topography and Soils

The road alignment passes through the Siwaliks and Terai regions. Elevations of the Terai region range from 60 to 330 metres, with general slope gradients of 2 to 10 metres per kilometre. Whereas the Siwaliks region has undulating to steep slopes with weak consolidated layered bedrock, which tend to invite severe surface erosion in spite of the generally thick vegetative cover. A wide range in colors of soils is found in the Siwaliks, reflecting parent material mineralogy. As a whole, the Terai region has flat terrain and hence there is a gentle slope from Siwaliks in the north to Terai in the south. The highest peak in Nepal's Churia range, Mt. Devchuli 1,937 metres (6,355 ft), is in this district.

Elevation of the project affected districts ranges from 91m at Butwal to 1937 m at Devchuli. Daunedanda has divided the district into two parts lies at Terai and inner valley. Both the parts are almost equal in area. Nawalpurasi district is divided into three physiographic areas: hilly, mountain, and terai regions. However, all the road alignment at Rupandehi lies in the terai plains.

- (i) **Hilly Region:** Altitude of this region varies from 500m to 1936m a.m.s.l and mostly includes the Churia range. The major peaks located in these regions are Devchuli, Budchuli, Minalokhan and others. This region mostly comprises deposits of clay soil as well as soil with lime concentration. Most of the road alignment is surrounded by forests however the land mass at Daunedanda is quite unstable and has small and huge scars created by land movements even though it has good coverage of forest.
- (ii) **Inner Valley Region:** The region is located at an elevation of 300m to 500m a.m.s.l surrounded by the Churia remains at foothill of Chure. This land area is almost plain area covered with forest, agricultural land and settlements.
- (iii) **Terai Region:** The region is located from 91m to 300 m from msl. All parts of Rupandehi district lies in Terai region from Sitainagar area to Barghat. This range



also includes some rivers originating from Churiya which carry heavy sediment loads like the Dunda and Arunkhola Rivers

3.1.3 Land Use Patterns

Total land area of Nawalparasi district is 219,510 Ha. Out of which, majority of the area of the district is covered by forest (47.81%) and followed by agri land/urban area (41.20%) and others. The detail of land use pattern of the district is presented below.

The total area of Rupandehi district is 136,000 ha. Out of which, majority of the area of the district is covered by agricultural land (58.45%) and followed by forest land (22.64%) and others. The detail of land use pattern of the project districts is presented below.

Table 3.4: Land Use Pattern of Project Districts

S. No.	Types of Land	Nawalparasi		Rupandehi	
		Areas (Ha)	Coverage in %	Areas (Ha)	Coverage in %
1.	Agri land/urban area	90,448	41.20	87,024.80	63.43
2.	Forest	104,942	47.81	30,790.40	22.64
3.	Chitwan National Park	11,607	5.29	-	-
4.	Shrub and Grass	5,816	2.65	8,540.80	6.28
5.	River and Khola	6,689	3.05	2,366.40	1.74
6.	Others	-	-	6,577.60	4.91
	Total	219,510	100%	136,000	100%

Source: District Profile of Nawalparasi & Rupandehi Districts, 2011 and Field Survey, 2016

Land use patterns of the direct corridor of impact (CoI) i.e. 50 meter (25m on either side from the centerline of the road) was observed and noted during alignment walkover survey. The major land use patterns include forests, cultivated land and settlements/bazaar including river stream and rivulet channels. The corridor is rich in low land ecological resources. There is dense Sal (*Shorea robusta*) forest along the road intersected by scattered as well as dense settlements including cultivated land and barren areas. Details of the land use along the road alignment along with chainage has provided in table 3.5 below.

Table 3.5: Land Use Pattern along the Road Corridor

Chainage		Land Use Type	Remarks
From	To		
00+000	07+000	Settlement area	Gaidakot, Bijayanagar, Suryanagar
07+000	11+400	Forest Area + Agricultural Land	Mukundapur (Previously)
11+400	15+300	Settlement Area + Agricultural Lands	Musemi, Harkapur
15+300	15+500	Baldiya Khola	
15+500	25+000	Agricultural Land + Settlement	Dibyapuri, Rajatar, Pragatinagar
25+000	31+000	Forest Area, Community Forest	Community Forest
31+000	36+400	Settlement Area	Kawasoti Area
36+400	36+700	Dunda Khola	Bridge
36+700	43+300	Forest Area	Tamsanya Forest area
43+300	44+200	Gadar Khola	Bridge
44+200	50+000	Forest	Prasuni Community Forest
50+000	50+400	Arun Khola	Bridge

Chainage		Land Use Type	Remarks
From	To		
50+400	59+300	Forest Area	Naya Belhari and Dumkibas
59+300	59+800	Bina Khola	Bridge
59+800	75+000	Dense Forest area	Dumkibas forest area
75+000	87+500	Settlement and Agriculture land	Panchanagar, Tilakpur area
87+500	91+000	Forest area	Small patch of forest
91+000	95+000	Settlement Area	Rampur, Sunwal
95+000	98+500	Forest area	Sal Wood Forest
98+500	100+500	Settlement Area	Pipaldada, Sitalnagar
100+500	105+000	Agricultural Land	Khet land (Paddy-wheat/pulses)
105+000	105+000	Settlement Area	Bredani
105+000	105+300	Rohini Khola	Bridge
105+300	112+300	Settlement and Agricultural Land	Butwal area
112+300	115+000	Settlement Area	Core Bazar area start

Source: Field survey, 2016

3.1.7 Landslides and Slope Stability

Slope stability depends on the existing geological structures, lithology of the rock units, soil type, topography, and hydrological condition (active seepage and spring). The active gully and rills in the colluvium surface exhibits high mass waste phenomena because these deposits are very loose with no calcareous materials. The slope with loose colluvium soil is highly susceptible to sliding due to increased driving force exerted by the pore water.

Failures have occurred in the in the colluvial deposits because of the highly active seepage seen from Dumkibas to Barghat areas specifically along the 20 km stretch of the project road. Furthermore, there several springs along the project area that is responsible for land movement. The road project alignment is highly susceptible to landslides.

Potential erosion and land slide prone area. The alignment has the following landslide and erosion prone area:

Along the whole alignment area only 15 km alignment falls under the hilly especially Churiya range. This churiya range is young and vulnerable for the erosion and landslide. The entire Churiya alignment is prone to the landslide especially the Daureni Section is much vulnerable.

Further more following river area is prone for the embankment erosion and water induced disasters.

Table 3.6: Major Rivers with the potential landslide along the road alignment

SN	CHAINAGE	Name of Rivers
1	0+000	Narayani Rivers
2	4+080	Jayshree River
3	15+180	Baidaha River
4	17+490	Jhorahi River
5	20+250	Mukunda River
6	22+944	Baidaha River
7	35+902	Lokhana River

SN	CHAINAGE	Name of Rivers
8	33+850	Kawasoti River
9	35+875	Pathar Khola
10	42+940	Girwan River
11	49+800	Arun Khola River
12	58+950	Birai Khola
13	61+700	Jhymire Khola River
14	72+200	Bhardaghat River
15	75+482	Bhardaghat River
16	78+320	London River
17	83+300	Bhalu Khola River
18	85+720	Bhumahi Khola
19	90+560	sornath khola River
20	92+895	Turia Khola River
21	88+410	Badera River
22	87+680	Durga tola River
23	93+950	Kajara Khola River
24	100+340	Godaha Khola River
25	104+250	Baluhi Khola
26	105+202	Rohani Khola
27	108+300	Suknauta Khola

Source: Field Visit, 2016

3.1.8 Hydrology and Drainage

Surface Water. Surface water of the project area includes rivers, streams and lakes. Major rivers in Nawaparas district are Narayani, Turiya, Jharahi, Vinayi, Arun Khola, and Dhaniwa. There are presence of some of the major lakes and include Nandan, Gaidatal, Thulo Ghol, Piprapati Nala, Butaha Tal and Sushihawa Tal. Major rivers of Rupandehi districts are Tinau, Rohini, Daanav, Kothi, Mahav, Baghela, Danda, Ghagara, Koyilung. The rivers flow through 52 VDCs providing access to some forms of irrigation to the farmers while also putting them at the risk of flooding.

Irrigation infrastructure is developed in the district through various projects. Currently, more than 180 km of irrigation channels provide irrigation facilities to 13406 ha of land in 25 VDCs. List of major rivers and rivulets (Kholas and Kholsies) crossed by the road alignment enumerated below.

Table 3.7: Major Rivers and Streams along the Road Alignment

S.No.	Location	Name of Bridge / Khola
1	003+770	Kichkimi Khola
2	007+232	Sahu khola
3	008+609	Kharure Khola
4	009+613	Smiti Khola
5	010+576	Gahri Khola
6	011+520	Jhampari Khola



S.No.	Location	Name of Bridge / Khola
7	012+314	Harbade Khola
8	022+050	RC Slab Bridge
9	043+200	Murari Khola
10	045+040	Khajuri Khola
11	046+682	Gadai Khola
12	049+778	RC Slab Bridge
13	050+028	RC Slab Bridge
14	051+264	RC Slab Bridge
15	051+875	Sanu Khahare
16	053+050	Khahare Khola
17	054+463	Thulo Khahare
18	054+818	RC Slab Bridge
19	054+841	RC Slab Bridge
20	067+273	RC Slab Bridge
21	067+535	RC Slab Bridge
22	072+043	Khorsani - 2
23	072+090	Khorsani - 1
24	075+052	T.S.N Khola
25	075+369	Baaya
26	075+903	Khahare 1 (Marcha) Khola
27	076+380	Khahare 2 (Chisapani) Khola
28	077+124	Alaula Khola, London bridge
29	086+500	Hardiya Khola 3 (Badera Khola)
30	087+850	Hardiya Khola 2 (Bridge No. 14, Badera 2)
31	088+050	Hardia Khola 1 (Kirtipur Bridge.)
32	093+970	Dry Nala (Badakatta)
33	095+040	Ansiheri Tapahu Khola
34	096+720	Bridge No. 12
35	099+910	Samatola Khola
36	097+382	Sanu Khola
37	099+891	Khairani Khola
38	102+112	Jalake Khola
39	103+550	5 No. Khola
40	109+170	Unknown
44	575+350	Bhalubai Khola
45	576+270	Rohini Khola
46	579+542	Unknown
47	580+547	Sukhauna Khola

Source: Field survey, 2016

Although secondary information on water quality of these rivers and rivulets are not available, it is assumed that the quality is up to the prescribed standards as there are no major industries or sources of pollution along the river courses. The important physico-chemical characteristics of water samples from 12 locations in between Sikrauli to

Biosprings of western branch of Narayani River along the Nawalparasi district were determined to establish the status of river water quality and presented in the succeeding table. From the table it can be seen that the water quality is good and well within the national standards for aquatic ecosystems and irrigation.

Table 3.8: Water Quality Parameters of Narayani River (March 2012)

Parameters	Unit	Average Value	Nepal Water Quality Guidelines for the Protection of Aquatic Ecosystem	Nepal's Drinking Water Quality Standards & Water Quality for Irrigation
Temperature	°C	24.83		
pH		8.05	6.5-8.5	6.5 – 8.5
Electrical Conductivity	µS/cm	211.33		1500
Turbidity	NTU	60.87		5 (10)
Total Suspended Solid	mg/l	193.33	1500 (or less than 10% of the background TSS concentration)	1000 (dissolved solids)
Dissolved Oxygen	mg/l	7.26	90-120% of saturation value (9.17) at 20°C (7.335-11)	
Chloride	mg/l	5.33		250
Ammonia	mg/l	0.13	<7	1.5
Nitrate	mg/l	1.23		50
Orthophosphate	mg/l	0.08		
Biochemical Oxygen Demand (BOD ₅)	mg/l	7.50		
Chemical Oxygen Demand (COD)	mg/l	21.70		

Source: Investigation of Population Status and Habitats of *Lutrogale perspicillata* in Narayani River, Chitwan National Park, The Rufford Small Grants Foundation, UK

Ground Water. The project road lies in the Siwalik and Terai regions. The Siwaliks region is known to have limited groundwater availability due to fast movement of surface runoff during rain. However, the Terai region has bountiful ground water resources to supply for drinking and other domestic purposes. The seasonal range of depth to water table in the Terai varies from 0 to 10 meter below ground surface. But from a study of Neupane in 2009 identify the chitwan area have the ground water table in 3-15 m from the land-area. The project area is also with the same setting. Ground water contamination due to presence of arsenic and other minerals have caused restriction of ground water use for drinking and domestic purpose.

3.1.9 Geology/ Lithology

Geologically Nepal can be divided into the following five major tectonic zones from south to north, each zone characterized by their own lithology, tectonics, structures and history. The geological map presented in the succeeding Figure shows the following zones: Terai, Churia zone/Siwaliks (Sub Himalaya), Midland and Mahabharat zone (Lesser Himalaya), Higher Himalayan zone, and Tethys zone.

Geologically, Nepal can also be divided into four transverse zones: Eastern, Central, Western, and Far-western Nepal each of them separated by a major river. These transverse

zones have distinct stratigraphy, structures, and tectonics. This study focuses on the Terai and the Churiya region where the project road passes through.

The project area is comprised of recent alluvial and colluvial deposits and sedimentary rocks of the Siwaliks. The road alignment encounters siwaliks from Dumkibas and extends to Bandaghat at Terai region of Nawalparasi district. In the south bordering the Gangetic Plain, the Siwalik rocks form a distinct foothill zone containing conglomerates, soft mudstones, and sandstones. Generally, the Main Frontal Thrust (MFT) marks the southern boundary of the Siwaliks. The northern border of the Siwalik Range is sharply marked by the Main Boundary Thrust (MBT) separating it from the Lesser Himalayan Zone.

About 85% of the Narayanghat-Bulwal road section passes through recent deposits followed by the rocks of Lower Siwaliks (7%) and 7% of the road section lies on Middle Siwaliks (MS1=4% and MS2 = 3%) and less than 1% of the section runs through the rocks of Upper Siwaliks (US).

The Siwalik Group is divided into three major units, viz. the Upper, Middle, and the Lower Siwaliks. The Lower Siwaliks (LS) consist of irregularly alternating beds of fine-grained, grey-coloured sandstones, variegated mudstones, and pseudo-conglomerates. Sandstones are moderately indurated, and cemented mostly by calcite. The upper part of this unit is composed of sandstones and variegated mudstones in roughly equal amounts. Thickness of individual beds of sandstones and mudstones varies from 1-10 m and 1-2 m, respectively. The Middle Siwaliks is further subdivided into two subunits - the Lower Member (MS1) and the Upper Member (MS2). The Lower Member (MS1) is represented by fine- to medium-grained thick-bedded compact fairly hard, greenish grey to light brownish grey micaceous sandstones interbedded with greenish grey or brownish yellow to purplish grey mudstones and shales. The Upper Member (MS2) is composed of medium- to coarse-grained pebbly sandstones with rare grey to dark grey mudstones and occasionally silty sandstones and conglomerates. The rock is loosely packed and consists of pebbles of quartzite, dolomite, marble, limestone, granite and Lower Siwalik sandstone and shale. The matrix is calcareous or clayey.



Figure 3.3: Geological map of Nepal

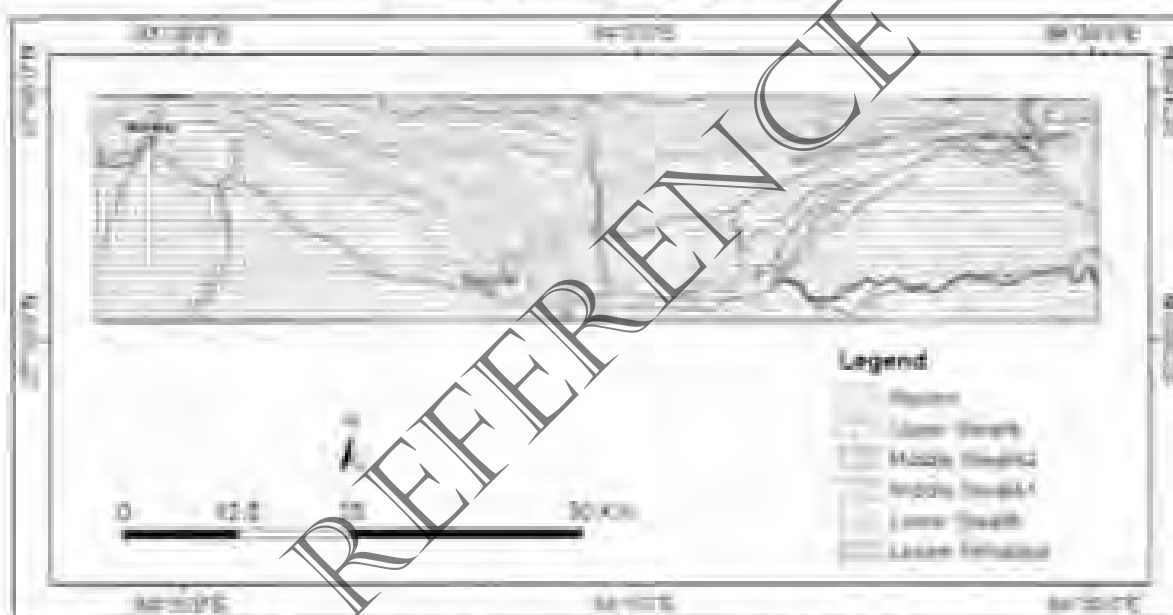


Figure 3.4: Geological map of the Narayanghat-Butwal Road area

Road alignment is dry (in general) and in some sections Upper Siwalik to Lower Siwalik ranges small gullies are developed and soil is moist. Slope is more or less stable along the road alignment, except some stretches around Daunne hill. There is series of remarkable unstable slope along the road alignment within hill area of Daunne. The stereographic projection of the discontinuities of the rock mass along the road alignment shows slightly unstable condition along the Daunne hill. The main causes for occurrence of the cut slope failure are due to steep slope, unfavourable dipping, loose/weathered materials, poor water management (erosion) and undercutting of slope and road in weathered rocks of saltstone.

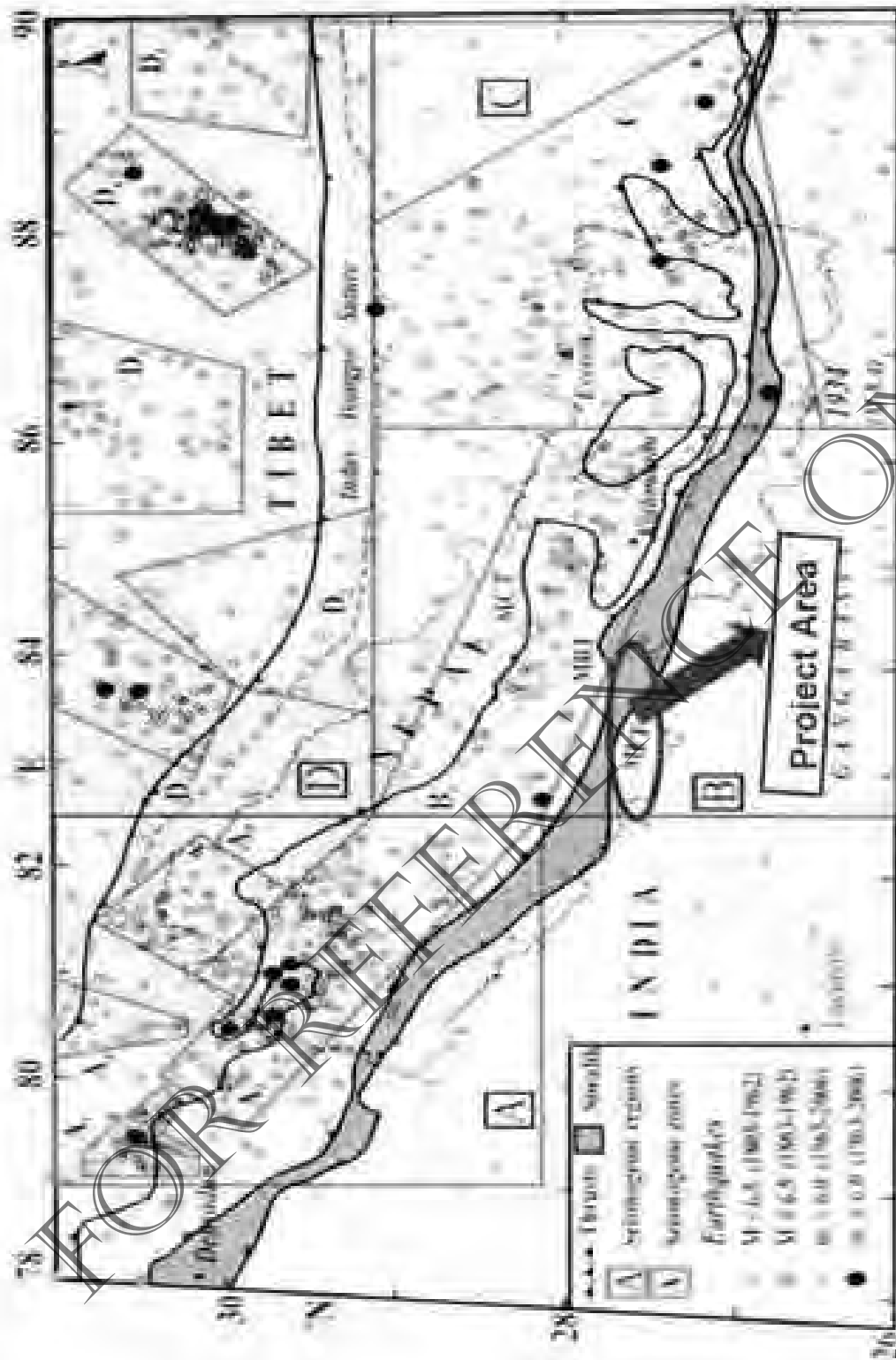


3.1.10 Seismicity

Nepal is a seismically active country lying between collisions of the Indian and Eurasian plates and moving continuously resulting in frequent and often devastating earthquakes within the region. Nepal has experienced catastrophic earthquake damages in 1934, 1988 and recently in 2015. Recently tremor of earthquake having epicenter at Barpak of Gorkha and Sindhupalchok in 2015 and its aftershock has caused loss of several thousands of peoples and damaged tremendous value of infrastructures.

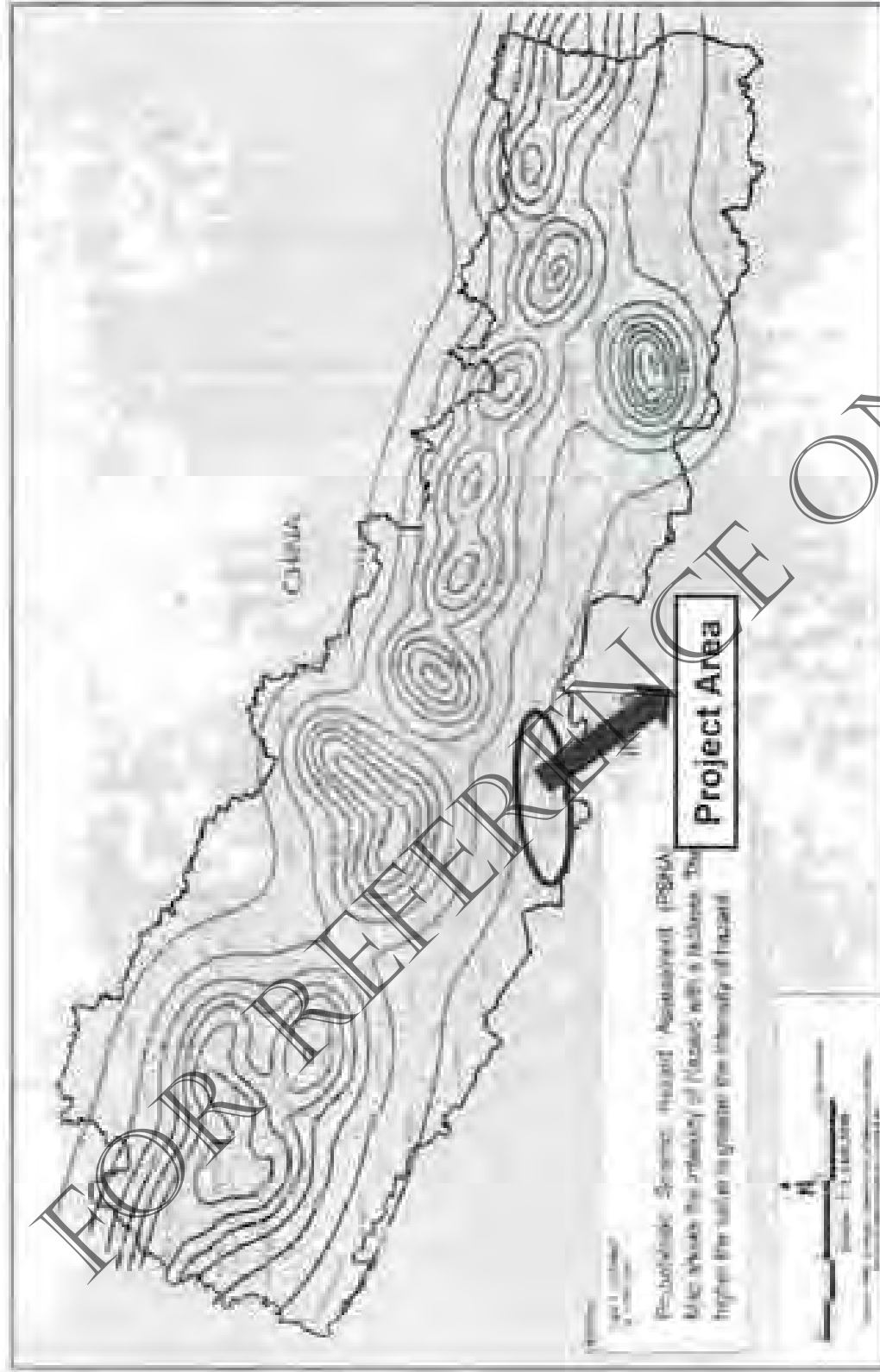
The proposed project road falls under the Seismic Zone IV, which is susceptible to major earthquakes as per the seismic zone map of Nepal, shown below in Figure 14.

FOR REFERENCE ONLY



Source: D. Shaller et al. Discontinuity on Seismotectonics of Nepal Himalaya and Vicinity-Appraisal to Earthquake Hazard, Geosciences, 2011

Figure 3.5: Seismicity map (1803-2006) of Nepal and its adjoining region in the Central Himalaya.



Source: National Seismological Centre, Department of Mines and Geology, Nepal

Figure 3.6: Probabilistic Seismic hazard map of Nepal

3.2 Biological Environment

3.2.1 Forests

The project road traverses several community managed forests in Nandan, Kalikote, Janajagaran, Pitaui, Laligurans, Durga, Hariyali, New Hariyali, Pitaui, and Mukundasan as listed in . A total of 47.5 km of the proposed road section passes through these community forests and National Forest. A 24 km section shares the border of the Chitwan National Park Buffer Zone which has its own community managed forest system or Community Forest User Groups (CFUGs). Forest types existing along the road is mainly Sal (*Shorea robusta*) with smaller portions of moist evergreen forest, dry deciduous forest and Khair - Sisoo (*Acacia catechu-Dalbergia sissoo*) Simal-Bhellar (*Bombax ceiba-Trewia nudiflora*), Satia (*Dalbergia latifolia*), Boldhayera (*Amoglossus latifolia*), Panchphal (*Dillenia indica*) and Dabdabe (*Garuga pinnata*). Khair-Sisoo (*Acacia catechu-Dalbergia sissoo*) associations predominate on recent alluvium deposited during floods and in lowland areas that escape the most serious flooding, with under storey shrubs Dhuchamla (*Callicarpa macrophylla*), Bhanti (*Clorodendrum viscosum*) and Amala (*Phyllanthus emblica*), represent a later stage in succession.

Three species namely, *Shorea robusta*, *Bombax ceiba* and *acacia catechu* are protected tree species required to fell, transportation and export are subject to strict rules under the Forest Regulations, 1995 (amended in 2001). Further, *Acacia catechu* falls under the threatened category of IUCN status. The vegetation along the road-right-of particularly in Ruphanedi has already been cleared as part of road maintenance activities. Major tree species found along the road corridor is presented in table 3.9 below. Different types of forest managed by different stakeholders that lies along the RoW of the road alignment has provided in table 3.10 below.

Table 3.9: List of Major Tree Species Found Along the Project Road Corridor

Local name	Scientific Name	Family
Amala	<i>Phyllanthus emblica</i>	
Aamp	<i>Mungifera indica</i> L.	Anacardiaceae
Badsheer	<i>Artocarpus lakoocho</i> Wall	Moraceae
Bakenu	<i>Melia azadirach</i> L.	Meliaceae
Dhuchamla	<i>Callicarpa macrophylla</i>	Psacae
Banjh	<i>Quercus lanata</i> Sm.	Fagaceae
Bar	<i>Ficus bengalensis</i> L.	Moraceae
Bel	<i>Aegle marmelos</i> (L.)	Rubiaceae
Engalao	<i>Rhus javanica</i> L.	Anacardiaceae
Bel Dhayaro	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae
Dabdabe	<i>Garuga pinnata</i> Roxb.	Burseraceae
Dhanyaro	<i>Woodfordia fruticosa</i> (L.)	Lythraceae
Orderi	<i>Passiflora integrifolia</i> L.	Verbenaceae
Haude	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae
Hallundi	<i>Liriodendron coromandelica</i> (Houtt. Men)	Anacardiaceae
Jamun	<i>Syzygium cumini</i>	Myrtaceae
Kalma	<i>Adina cordifolia</i>	Rubiaceae
Kabro	<i>Ficus lacor</i>	Moraceae
Kadimi	<i>Anthocephalus chinensis</i>	Rubiaceae



Local name	Scientific Name	Family
Kumbi	<i>Cochlospermum religiosum</i>	Cochlospermaceae
Kusum	<i>Carthamus tinctorius</i>	Compositae
Kyamun	<i>Hedychium ellipticum</i>	Zingiberaceae
Oghai	<i>Abelmoschus pungens</i>	Malvaceae
Pipal	<i>Ficus religiosa</i>	Moraceae
Pikhar	<i>Trewia nudiflora</i>	Euphorbiaceae
Sai	<i>Shorea robusta Gaertn</i>	Dipterocarpaceae
Saj	<i>Terminalia alata Hayne ex Roth</i>	Combretaceae
Samal	<i>Bombax ceiba L.</i>	Bombacaceae
Sakhuva	<i>Shorea robusta Gaertn</i>	Dipterocarpaceae
Sais	<i>Albizia lebbek</i>	Mimosaceae
Sesau	<i>Dalbergia sissoo</i>	Leguminosae
Sani	<i>Ficus benjamina L.</i>	Moraceae
Tatar	<i>Dikema porphyria Roxb.</i>	Dilleniaceae
Sagvan	<i>Tectona grandis L.f.</i>	Verbenaceae
Thukal	<i>Argemone mexicana L.</i>	Papaveraceae
Tuna Tun	<i>Toona ciliata</i>	Melaceae

Source: Field Study, 2016

Table 3.10: Community Forest in the Project area

S.N	Name of Community Forest	SN	Name of Community Forest
1	Hathiyani Mandir Religious Forest, Gaidakot-6 (S)	29	Janajagan Community Forest Nayatreharu-7, 4 (Both)
2	Hathiyani Community Forest, Gaidakot-5, 7, 1	30	Anurkhol Community Forest Nayabafuni-8 (Both)
3	Narayan Community Forest, Gaidakot-8, 7, 9 (N)	31	Nawa Buddha Community Forest Dumbkash-Botside
4	Mukundaram Community Forest Gaidakot-10 (S)	32	Pahelbhatta Community Forest Dumbkash-1, 2 Both Side
5	Pithau Community Forest, Gaidakot-10 (S)	33	Bharaya Community Forest Dumbkash-1, 9 Both Side
6	Siddhanti Durga Mandir Religious Forest-5, Gaidakot-6 (N) 2	34	Gheskhola Community Forest Dokabain-1, 2, 5 Botside
7	Maharaja Community Forest, Gaidakot-10 (N)	35	Daurnadari Tapoban Religious Forest Dumbkash-5 (Both side)
8	Shank Madhyabarti Community Forest, Kawasot-13 (S)	36	Sayapath Community Forest area Bardaghat-2 (Both)
9	Shiva madhyabarti Community Forest, Kawasot-2 (N)	37	Chisapani Community Forest area (North)
10	Mansukumar Madhyabarti Community Forest Kawasot-8 (S)	38	Manshik Community Forest area (North)
11	Ankur Adarsha Madhyabarti Community Forest, Kawasot-16 (Green N)	39	Somakoti CF (north)
12	Sayapath Community Forest Kawasot-10 (2km Both)	40	Paraj Community Forest area
13	Madhyabindu Hathiyani Community Forest, Kawasot-16 (2km Both)	41	Hathiyani Community Forest Tilapur (North)
14	Rajdahi Community Forest Kawasot	42	Badera community Forest Ramnagar-2, 3, 4 (North)
15	Rajdahi Community Forest	43	Devadaha Sahadan Forest (S)
16	Madhyabindu Community Forest, Madhyabindu-7 (2km Both)	44	Janaudaya Community Forest, Sonauli (North)
17	Madhyabindu Laligara Community Forest Madhyabindu-7 (Green both)	45	Mulpani Community Forest Sunawal, Botside
18	Biyaya Community Forest Madhyabindu-7 (green both)	46	Janapriya Community Forest Devdaha-10, 11
19	Lohokanthana Community Forest, Madhyabindu-8	47	Pragat Community Forest Devdaha-7



S.N	Name of Community Forest	S.N	Name of Community Forest
	(Greenbelt)		
20	Basanti Community Forest Madhyabindu-7,8,9 (Greenbelt)	48	Buddhanagar Community Forest Devdaha-10
21	New Hariyali Community Forest Madhyabindu-7,8,9 (Greenbelt)	49	Brjuna Community Forest Devdaha-5,8
22	Durga Community Forest Madhyabindu-7 (Greenbelt)	50	Smriti Community Forest Devdaha-4,8,9
23	Janiyatala Community Forest Madhyabindu-6 (Greenbelt)	51	Milan Community Forest Devdaha-9,10
24	Ranjar Community Forest Madhyabindu-6 (Greenbelt)	52	Sukthara Hariyali Tibotama 13,14 (200m)
25	Kalkote Community Forest Pratauni-5,9 (Greenbelt)	53	Kamalya Community Forest Tibotama-11
26	Dharapani Community Forest Pratauni-4 and 5 (Greenbelt)	54	Shankarnagar Community Forest Tibotama-1,6 (South)
28	Amrtesa Community Forest Area	55	Shivanagar Community Forest Tibotama-8,10 (1 Km North)
27	Jagriti Community Forest Pratauni-1 (Greenbelt)		
29	Chhahan Community Forest Pratauni-1 (Greenbelt)		

Source: Field Survey, 2016

3.2.2 Wildlife

Significant wild life are found around the project area and the Buffer Zone of Chitwan National Park. Some of these species were the Royal Bengal Tiger, Rhinoceros, Spotted deer and Hog deer and Slopes with Sal supports Sambhar, Gaur and Barking deer, Monkey, and Jackal. The forest north of Gaidakot town is contiguous to the forest that joins with Barandabhar corridor forest from north-east, joins with Narayani river and continues with the forest of Chitwan district towards Nagarban area in south-east. Both the forests support tiger and one-horned rhinoceros. The list of mammals that are found in and around the project corridor is presented in Table 3.11. Details on the landuse type and wildlife activity found along the project road during field surveys has provided in table 3.12.

Table 3.11: Mammals found around the project area

Name			CITES	IUCN	Forest Act
Local	English	Scientific			
Bhaghi	Tiger	<i>Panthera tigris tigris</i>	Appendix 1	Endangered (EN)	Protected
Gaida	One horned rhinoceros	<i>Rhinoceros unicornis</i>	Appendix 1	Vulnerable (VU)	Protected
Harin	Barking Deer	<i>Motacilla mulljak</i>	-	-	-
Jungali Bandar	Wild Boar	<i>Sus scrofa</i>	-	-	-
Sambar	Sambar	<i>Cervus unicolor</i>	Appendix 2	Vulnerable (VU)	-
Gaur	Gaur	<i>Bos gaurus</i>	Appendix 2	Vulnerable (VU)	-
Banjar	Monkey	<i>Macaca Assamensis</i>	Appendix 2	Vulnerable (VU)	Protected
Chitwa	Common Leopard	<i>Panthera Pardus</i>	Appendix 1	Lower Risk/Near Threatened (LR/nl)	-
Bhali	Sloth Bear	<i>Melursus ursinus</i>	Appendix 1	Vulnerable (VU)	-
Syal	Indian Fox	<i>Vulpes bengalensis</i>	Appendix 3	-	-
Syal	Jackal	<i>Canis aureus</i>	-	Least Concern (LC)	-
Nyaun Musal	Common Mongoose	<i>Herpestes edwardsi</i>	3	-	-

Source: Field Survey, 2016 and Consultation with Department of National Parks and Forests and Wildlife Experts

Table 3.12: Land Use Pattern and wildlife along the Road Corridor

Chainage		Land Use Type	Land use type and location	Wildlife and their movement
From	To			
07+000	11+400	Forest area towards N of highway	Mukundapur (Previously) from Jhetea to Kotham	2 tigers were recorded. Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur, Tigers could potentially come from south of highway across Karayam river in search of food and expand the territory.
26+000	31+500	Forest Area both side of highway except about last 2 Km (only towards S of Highway). Community Forest: open woody forest dominated by sal	Community Forest	Higher probability of tiger occupancy (Figure 24). Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur. Wildlife is crossing due to forest habitat both side of the highway.
36+700	43+300	Forest Area both side of highway, dense forest mainly sal towards S of highway and open woody sal in S of highway	Tamrasahi Forest area	Higher probability of tiger occupancy (Figure 24). Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur. Continuous forest both side of the highway allows the movement of the wildlife.
44+250	50+000	Forest both side of highway	Prasuni Community Forest	Higher probability of tiger occupancy (Figure 24). Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur. Continuous forest both side of the highway allows movement across to use habitat and water sources.
50+400	59+300	Forest area in south section-eastern half is open sal forest and western half is dense sal forest. In North section-dense sal forest. This forest patch is contiguous with the park forest and forest towards south west.	Kalya Gharia and Dumbkasi forest area	Higher probability of tiger occupancy (Figure 24). Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur. Rhino has been recorded using this forest.
59+800	75+000	Dense Forest area both side of the highway	Dumbkasi forest area	Higher probability of tiger occupancy (Figure 24). Rhino, Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur. Water source and continuous forest allows the movement of wildlife.
87+500	91+000	Forest area mainly open sal towards N of highway	Small patch of forest	Higher probability of tiger occupancy (Figure 24). Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur.
85+000	88+500	Forest area both side of highway	Sal Wood Forest	Higher probability of tiger occupancy (Figure 24). Common leopard, Sambar, Barking deer, wild boar, sloth bear, Rhinoceros macaque, Langur.

Source: Field survey, 2015 supplemented by Chakrabarti et al. 2014 for tiger record and probability of tiger occupancy.



Birds: The commonly found birds in the sub-project area are presented in the succeeding Table. Some of the birds species are protected under the National Parks and Wildlife Conservation Act, 1973 and listed under various CITES appendices.

Table 3.13: Commonly found birds species along the road corridor

Name			CITES	IUCN	NPWC Act
Local	English	Scientific			
Bhangura	Sparrow	<i>Passer domesticus</i>	-	-	-
Huchil	Barn Owl	<i>Tyto alba</i>	2	Least Concern (LC)	Protected
Kag	Crow	<i>Corvus splendens</i>	-	-	-
Koli	Asian Koel	<i>Eudynamis scolopacea</i>	-	-	-
Lunche	Jungle Fowl	<i>Gallus gallus</i>	-	-	-
Kalo Sarus	Black Stork	<i>Ciconia nigra</i>	2	-	Protected
Seto Sarus	White Stork	<i>Ciconia ciconia</i>	2	-	-
Raj Dhanesh	Giant hornbill	<i>Buceros bicornis</i>	1	Vulnerable (VU)	Protected
Dhukur	Laughing Dove	<i>Streptopelia senegalensis</i>	3	-	-
Bakula	Cattle egret	<i>Bubulcus ibis</i>	3	-	-
Kalo Kag	Indian Jungle Crow	<i>Corvus macrorhynchos</i>	-	-	-

Source: Field Survey, 2016

Reptiles: The project area contains diverse species of reptiles. The common reptiles found in the project area are land tortoise, cobra and common rat snake.

Table 3.14: Reptiles found in the sub-project area

Name			CITES	IUCN	NPWC Act
Local	English	Scientific			
Kachhuwa	Land tortoise	<i>Testudinidae</i> species	1	-	-
Gorani	Cobra	<i>Naja naja</i>	2	-	-
Raj Gorani	King Cobra	<i>Ophiophagus hannah</i>	2	-	-
Dhaman	common rat snake	<i>Psas rufocoxus</i>	2	-	-

Source: Field Survey, 2016

Aquatic Biology and Fisheries: Narayani River is one of the major river systems of Nepal which is belongs within this area. The rivers along the project are are the tributaries of Narayani River. Narayani and its tributaries are rich in wild fish population. Some important fishes occurring in the Narayani and Tinau River are carps, catla (*Catla catla*) and Rohu (*Labeo rohita*) are common in this area. Some other noteworthy fishes found in the Narayani River are Fresh Water Eel (*Anguilla bengalensis*), Puffer Fish or Pokcha (*Tetraodon lineatus*), Gainchi (*Macropodus opercularis*), Pabala (*Ompok bimaculatus*), Buhari (*Wallago attu*), Kanti (*Mystus seenghala*, *Rita rita*), etc. The fishes such as Aila (*Schizothorax progastus*), Barn (*Anguilla bengalensis*), Buduna (*Gerrhonotus*) are common in the tributaries of the Narayani River as reported by the local people during discussions in the project area. However, the fish population is declining rapidly due to increased harmful fishing practices including use of pesticides and other sources of pollution. Tinau River is banned for the collection and utilization of sand, stone and etc and good condition on aquatic ecosystem.

Table 3.15: Fish Species found in the sub-project area

Name			CITES	IUCN	NPWC Act
Local	English	Scientific			
Catla	Catla	<i>Catla catla</i>	Least Concern	–	–
Rohu		<i>Labeo rohita</i>	Common	–	–
Raj Goman	Fresh Water Eel	<i>Anguilla bengalensis</i>	Endangered	–	–
Pokcha	Puffer Fish	<i>Tetraodon lineatus</i>	Vulnerable	–	–
	Pabda	<i>Ompok bimaculatus</i>	Common	–	–
Buhari	shasfishes	<i>Wallago attu</i>	Common	–	–
Kanji	Long-whiskered fish	<i>Mystus singhala</i>	Threatened	–	–
Asla	Moon Fish	<i>Schizothorax prokistius</i>	Threatened	–	–
Bam	Indian eel	<i>Anguilla bengalensis</i>	Threatened	–	–

Source: DNPWC, 2010

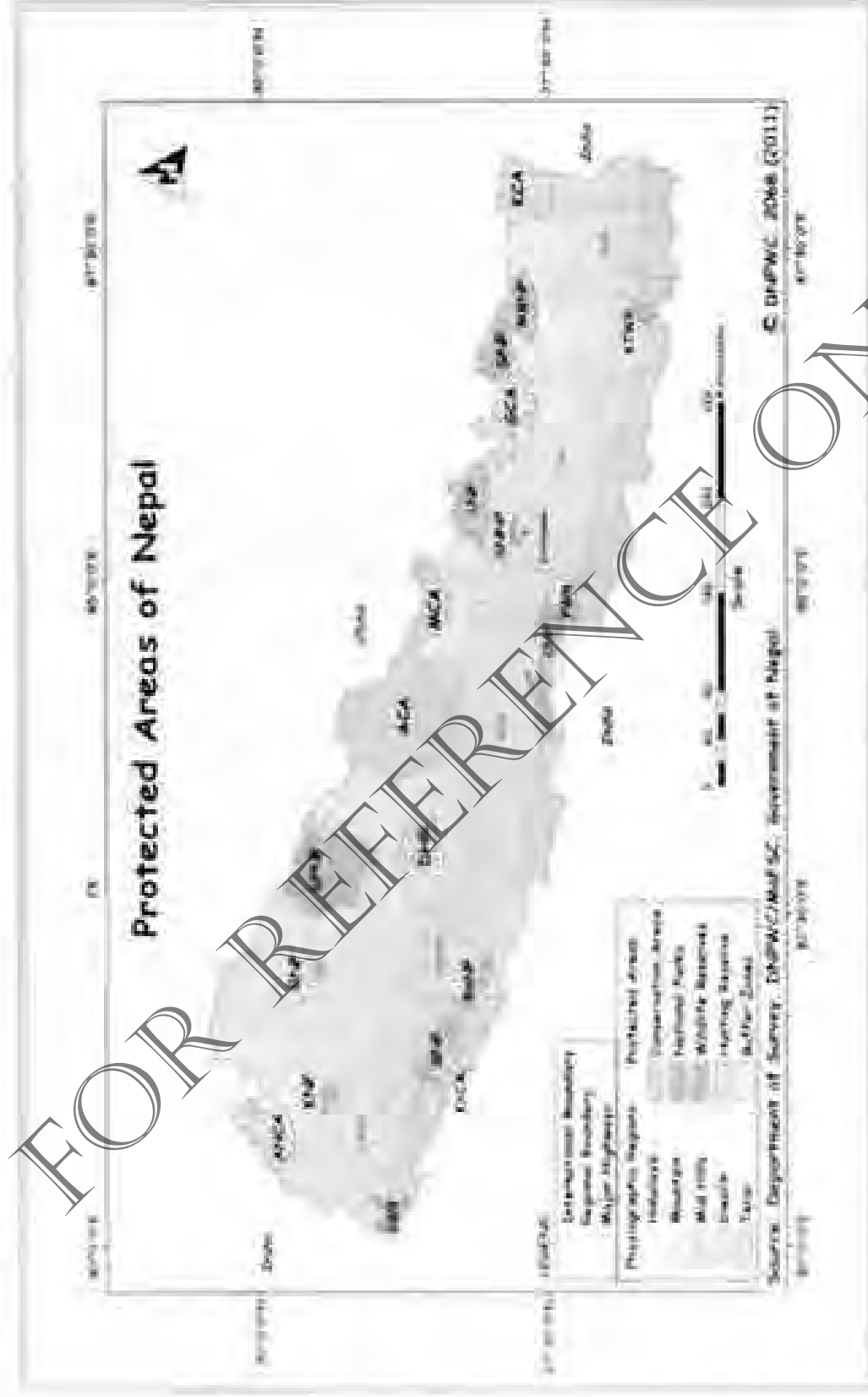


Figure 3.7: Map of Nepal showing Barandhabar & other park areas



3.2.3 Non Timber Forest Products

It is found that there are very few NTFPs that are strictly tropical in nature. However the following species occur in up to 1000 in altitude. They include: Sikatka (*Acacia rugosa*), Simal (*Bombax ceiba*), Bel (*Commalainbl*), Sugaraha kokila (*Eudynamis scolopacea*), Muli (*Chlorophytum borivilianum*), Tendu (*Diospyros monon*), Pangra (*Entada phaseoloides*), Bitane (*Orestia fryxio*), Thatal (*Pithecellobium hirsutum*), Pipili (*Piper longum*), Kantakari (*Solanum surduleria*), and Guno dino (*Sporos sinensis*).

Likewise, species such as Amala (*Phyllanthus emblica*), Arjuna (*Terminalia mexicana*), Bano (*Terminalia chebula*), Bel (*Aegle marmelos*), Bhoda (*Bowditchia vohila*), Bisara (*Podium vulgare*), Tejpat (*Cinnamomum lamala*), Harro (*Albizia lebbek*), Kachur (*Cassia zedoaria*), Palmaribed (*Bergeria ciliata*), Punarilawa (*Boerhaavia diffusa*), Sindura (*Mallotus philippensis*), Sal (*Shorea robusta*), Thatal (*Argemone mexicana*) are found to the surrounding area of the road side.

3.2.4 Endangered Species in the Project Area

Tiger

The main endangered species in this area is Tiger. The tiger movements have been identified during the camera trapping of the Chitwan National Parks. Tiger, Bengal tiger (*Panthera tigris*) is one of the 26 mammal species which is protected under the National Parks and Wildlife Conservation Act 1973. It is listed as endangered under IUCN and under appendix 1 of CITES.

3.2.5 Protected Areas

Nepal is rich in biodiversity and coverage of protected area is very high, 23.31% of the country's geographical area. Nepal is signatory to Ramsar convention, CITES Convention, world heritage convention that has direct link to the conservation of biodiversity. Of the many protected areas the Chitwan National Park is located in the project area. About 24 km of the road from km 7+000 to km 31+530 passes forming the boundary of buffer zone of CNP. The approximate location can be seen in figure 1 (Annex.6) below.

Chitwan National Park (CNP), a world heritage property, is the hotspot for the biodiversity conservation in Nepal. The park, which constitutes an important component of Terai Arc Landscape, is among the best managed parks in the world. It has Boeshazari Lake, a Ramsar enlisted site in its buffer zone (BZ). The park is home to second largest population of Greater One-horned Rhinoceros (*Rhinoceros unicornis*) in the world, a prime habitat for the viable source population of Royal Bengal Tiger (*Panthera tigris*) which is among few sites that holds more than 100 individuals and a refuge for the remnant population of critically endangered Gharial Crocodile (*Gavialis gangeticus*).

3.3 Socio Economic and Cultural Environment

3.3.1 Demographic Status

The road alignment passes through nine municipalities and four VDC's of Nawalparasi and Rupandehi districts. The total population of project road is 672,895 in which the female population is higher than male population.

Table 3.16: Total population of project VDC/municipality

District	VDC/Municipality	HHS	Male	Female	Total Population
Chitwan	Bharatpur municipality	50449	97197	10287	199867
Nawalparasi	Gaundakot municipality	13624	26550	28655	55205
	Devchuli municipality	6630	14495	16989	31484
	Bardaghat municipality	7795	15724	16693	34417
	Madhyabindu municipality	6795	4984	16532	101879
	Sunawal municipality	8639	18325	21518	39843
	Kawasoti Municipality	12865	26091	30579	56768
	Rajapur VDC	2428	5108	6011	11119
	Dumkibas	2379	4906	6084	11060
	Ramnagar	3315	7103	8503	15606
	Narya Bithari	2555	5374	6914	12288
Rupandehi	Devdaha Municipality	9567	19683	23270	42953
	Butehal Municipality	34097	68288	70454	138742
Total		161067	313818	358877	672695

Source: CBS 2011

3.3.2 Education status

The overall literacy rate of the households is 95 % in the project area. About 19.5% of the population has attended primary level, 30% have reached higher school and about 15% had graduate or above graduate level.

Table 3.17: Literacy Status

S.N.	Education Status	Sex				Total	
		Male		Female		Total	
		Number	%	Number	%	Number	%
1	Illiterate	72	3.88	298	6.16	370	6.72
2	Literate (up to class 5)	362	19.48	719	19.69	1081	19.62
3	Class 5 to 10	557	29.98	1009	30.10	1656	30.06
4	SLC to Class 12	552	29.71	994	27.23	1546	28.06
5	Graduate and above	315	16.95	541	14.82	856	15.54
	Total	1858	100.00	3651	100.00	5509	100.00

Source: Baseline Survey, November 2015

3.3.3 Health and Sanitation

About 95 % of the sampled household reported that at least one family member has fell sick last year. The prominent diseases seen in the project influence area are diarrhea, asthma, and skin disease. No HIV/AIDS positive person has been reported during community consultation. More than 96 % of the households were aware of HIV/AIDS and human trafficking.

Those household that reported a member fell sick reported they visited a doctor at the time of illness. About 28% visited government hospital while 22% consulted private clinics.

In the survey, access to toilet was considered as an indicator of sanitation. In the project influence area 719 (99.58%) of the households have private toilets. Majority of the

population (75%) has piped water service from community water, 23% from tube well, and about 2% relies on well/spring for drinking water.

3.3.4 Economic profile

Households were found to depend on more than one occupation in each settlement. Almost all reported that they have involved in different occupation. The major occupation of the households is agriculture which comprises 31.46 % of the total household's members. About 17.68% depend on trade and business where 8.81% are service holders and about 8% population is engaged in foreign employment. It is also to note that about 5.7% population are unemployed. Similarly, the main source of income of the people relies on trade and business, services (government and non-government organizations), and remittances.

Majority of the sampled households or about 21.75 % along the highway earn more than Rs. 500,001 per year and about 17.59 % of the households earn between Rs. 300,001 to 400,000. An individual is considered poor if his/her per capita total annual consumption is below Rs. 19,261 (NLSS, 2011).¹ Accordingly, the income required for providing adequate calories (2,220 kilocalories) for an average Nepali to be active is Rs. 11,929² and for non-food items an average income required of is Rs. 7,332. Nepal Living Standard Survey conducted by CBS in 1995/96, 2003/04 and 2010/11 revealed that between the three surveys there had been substantial decrease in the poverty in Nepal.

The socio – economic survey of the households shows that about 18.84% of the sampled household's per capita income is less than Rs. 130,000, where as 5.26% household per capita income range from Rs. 50, 000 to Rs. 130,500. This shows that nearly 18.84% of the population lives below the poverty line.

According to socio-economic survey, more than 85% of the sampled households in all the settlements have Pakki (brick walls, cement floor, RBC/RCC roof), 10.66% Semi-Pakki house (made with stone/brick with mud mortar), and about 4.16% households have Kacchi (rural hut made of wood, bamboo or stone with mud mortar and thatched roof).

3.3.5 Existing/Potential Area for Tourism, Religious and Historical Places

Nawalparasi district is very famous for religious, tourism and historical place. Existing/potential area for tourism, religious and historical areas in Nawalparasi district are shown in following table.

Table 3.18: Existing and Potential Tourism Development Centers and Religious Development Area

S.N.	Name	Location/VDC	Significance
1	Tribenidham	Tribeni Susta	Historical/Religious/ Tourism
2	Pathi Bhagawati	Pathi	Historical/Religious
3	Ramgram Stupa	Ramgram Municipality	Tourism
4	Daurine Devi	Dumkibas	Historical/Religious/ Tourism

¹ For the food item only, this has been calculated as NRs 11, 929 per person per year (National Planning Commission of Nepal, Nepal Living Standard Survey 2010/2011). The poverty line for Nepal, at average 2010/11 prices has been estimated at Rs. 19,261 (NLSS). On this baseline and calculating price inflation of Nepal Roads Bank, and considering the average HH size of 4.5 (national standard of CBS 2011) for whole project roads, the poverty line for the project has been assumed as Rs. 130,500 per household of a year.



S.N.	Name	Location/VDC	Significance
5	Maula-kailash mandir	Gaidakot	Historical/Religious/ Tourism
6	Dev chuli		Tourism
7	Panditpur	Banjariya	Historical/Religious/ Tourism
8	Shivapuri gadhi	Tribeni Susta	Religious/ Tourism
9	Tharu Village	Kumarbati	Religious/Tourism
10	Madarthan Rupola		Religious/Tourism
11	Rudrapur gadhi	Dhauwadi	Religious/ Tourism
12	Barda gotha Kuti	Ram nagar	Religious/ Tourism
13	Kailash Ashram	Mukundpur	Religious/Tourism
14	Laxmi sriragh Dhya Dham	Devghat	Religious/ Tourism
15	Akala Devi	Dedgau	Religious/Tourism
16	Kamdhenu	Chumanghat	Religious/Tourism

Source: District Profile Nawalparasi -2007/2008

Following are the notable events and attractions in Rupandehi district.

Lumbini (Birth place of Gautam Buddha)

Lumbini is the birthplace of Lord Buddha on whose teachings Buddhism was founded. It is granted World Heritage status by UNESCO in 1997. Thousands of Buddhist monks, pilgrims and tourists visit Lumbini annually. The ongoing up-gradation of Gautam Buddha Airport into international airport is expected to increase the number of visitors.

Siddha Baba Temple

This is a temple dedicated to Lord Shiva situated in border between Palpa and Rupandehi. There is a belief that Lord Shiva grants the wishes of the devotees who visit the temple. Interestingly, there are two Siddha Baba Mandir adjacent to each other. One lies within Rupandehi and another in Palpa. Nonetheless, both temples are regarded as pilgrimage of equal importance.

Satiya Mai Temple

This is a temple dedicated to Devi Satiya situated in Paskhauri VDC, near Rohini Khola in Rupandehi district. There is a belief that Real Lady grants the wishes of the devotees who visit the temple. Interestingly, there are A real Maya Devi Mandir and other a modified Temple adjacent to each other. One lies within Rupandehi and another in Palpa district. Nonetheless, both Mandir are regarded as pilgrimage of equal importance.

Manimukunda Sen Park

Once a winter palace of King Manimukunda Sen, Manimukunda Sen Park is another major attraction in Rupandehi. The palace is not in shape but the ruins and antiquities of the majestic palace can still be found. It is situated in Barwal City and is popular for the picnic spots, zoo and the gardens inside the park. The greenery and the view of Rupandehi, Palpa and Kapilvastu districts is also another attraction in the park.

Parroha Bol Bam Dham

It is the oldest Bol Bam Dham (pilgrimage and festival) in Nepal. The pilgrimage is dedicated to Lord Shiva located in Samamaina Municipality. Thousands of Lord Shiva's devotees from

various parts of the country and from neighboring States of India visit to worship the Shivalinga inside the Bol Bam Dham. The major inflow of pilgrims occurs during the Bol Bam. Bol Bam is an annual pilgrimage glorifying the Lord made in Shrawana in which devotees travel barefooted wearing saffron robes in routes to the dham.

Shankar Nagar Ban Bihar and Research Center

Shankar Nagar Ban Bihar and Research Centre, simply referred as Ban Balika by locals is a popular attraction in Tlottama Municipality. The Centre is maintained inside Shankarnagar Community Forest. It is popular for its picnic spots, zoo and garden.

Marchwari Devi Temple

Marchwar Devi Temple lies in Bogadi VDC of Rupandehi. It is a historical temple among the 24 previous VDC. The area surrounding this temple (now 18 VDCs) are named after this temple as Marchwar. The local people and peoples from INDIA, Uttar Pradesh visit there on specific occasions to celebrate child birth, engagement and marriage ceremonies. Temple is located in a peaceful area.

3.3.6 Energy Used

The proposed project area is within the urban areas of Nepal. So the urban flavor of energy used could be seen. There is no use of traditional firewood. The peoples are using the LP gas and electricity for their daily use. Nepal Electricity Authority have given the electricity for the project whole area.

3.3.7 Health and Sanitation

In comparison of the other part of the country the project area is well facilitated for the health facility. Bharatpur area is taken as the medical city of the country. This area is near to the project starting point. Bharatpur also have the Medical college and well facilitated regional hospital which is near to the project end point. The project area is served by the many private hospitals.

The overall sanitation condition of the project area seems good.

3.3.8 Urbanisation Trend/Settlement Growth

Due to the various types of Facilities in the project area, the urbanisation trend seems fast growing. The immediately growing urbanization areas are Devdaha, Khairahani, Sunaul, Bardaghat, Rajauri, Kawasoti, Pragatinagar, Chennara Bazaar area, Gaidakot area, but the whole road alignment area is emerging for the further in the whole community. The peoples from the various nearby areas are rapidly migrated to the project sites. The area is also an economic circuit for Nepalese economy so urbanization is being rapid in the area. Similarly the settlement growth rate is higher.



CHAPTER 4: ENVIRONMENTAL IMPACTS PREDICTION AND EVALUATION

The implementation of any infrastructures project is likely to produce both beneficial and adverse impact on existing natural settings and the indigenous rural society. Environmental Assessment is therefore conducted to reduce the possible negative impacts within the area from the project.

This Environment Impact Assessment for this Road Project considers positive and negative impacts in the construction and operation phases of the project. This chapter highlights significant impacts of the project on physical, biological and socioeconomic and cultural environment during different phases of the project. The project however will not induce major environmental problems but will of course experience medium level of environmental impacts from the construction of the project.

4.1 Beneficial Impacts

The project activities are likely to generate employment opportunities, promote trade and business, ultimately a main road of the country for the economic activities, increase agricultural and livestock production, enhance social service and help in conserving biological resource in the Buffer Zone of Chitwan National Park reserve and other forest area along the alignment.

Importantly, it will provide the easy, fast and reliable transportation facility to the local people and encourage them in accelerating economic activities along the Road corridor. The following section details the beneficial impacts during the construction and operation stages.

4.1.1 Construction Stage

During the construction phase of the proposed Road alignment, the following beneficial impacts are likely to occur in qualitative terms.

i) Employment Generation and Increase in Income

One of the beneficial impacts of the road during the construction stage is the creation of employment opportunity. Based on preliminary estimate, to upgrade and widen 115 km of road, to Four lane road width, 3,331,300 unskilled and 75,000 skilled and unskilled manpower is estimated to be necessary.

The surrounding areas of Project site can provide a major portion of the manpower required. The Contractor of works should give first priority to local workers from the surrounding areas when hiring the workers. While employing the local people, priority should be given to the project affected families/people and the employment should be given in the gender-balanced manner to the extent possible. However, some skilled labors and technicians would be still required from outside.

The opportunity for the local workers to engage in the construction works shall not only give them opportunity to generate income but also a feeling of attachment to project.

ii) Skill Enhancement of Local Manpower

The local manpower will have ample opportunity to develop and enhance their skills on construction methods for roads as well as other civil structures. This would be a valuable benefit for the local manpower which they can use for generating income after the completion of the project works.

iii) Increase in Enterprise Development and Commercialization

A large number of workforces of different categories will reside for the considerable period of time at different locations of the project area during the construction period. Since, the workers will have good purchasing power, they will regularly demand for different types of food, beverage and other daily necessary items. To meet these demands, many local and outside people may operate a number of shops and restaurants around the vicinity of the construction sites. This will increase local trade and business in the area. As a result of increased trade and business, local people conducting these businesses shall significantly benefit from the project.

There will be significant increase in local demand for various food products such as vegetables, meat and dairy products during the construction period. This will motivate peoples to produce increased quantities of these products. The people of the surrounding areas shall be significantly benefited by the increase in demand for agri-products.

iv) Community Development and Income Generation Plans

The majority of local unskilled manpower comes from vulnerable communities who have very limited agriculture land and other sources of income. These groups should be targeted for employment as local unskilled manpower so that they can get some income generation opportunities. Social organizations could be mobilized for the conduction of other micro-income generation plans to utilize the earnings from the labor income. In addition, community development schemes such as health facilities, sanitation facilities etc. should be encouraged in the backward areas.

v) Development of Social Services – Enhancement Issues

Increased employment opportunities, trade, business, and agricultural income directs a considerable amount of money into the local economy in the area. This will logically increase the income level of the individual household and the local body of the area. In the situation when the sizeable amount of resources is at their disposal, it is possible that some money may be spent by individuals as well as local bodies to improve the present state of social service such as education/school, healthcare services, water supply, bus terminals, bus stops, bus waiting booths, parking space etc.

4.1.2. During Operation and Maintenance stage

The qualitative beneficial impacts that are likely to occur when the project road is in operation are as follows:

i) Improved Transportation Facility and Decrease in Transportation Cost and Time

The most important beneficial impact of the road after its improvement is the benefit it provides to all its users. Since the Narayanghat-Butwal Road is a important value of



transportation sector in Nepal. This road also connects the Lumbini Area with the capital city of Nepal. Beside it Nepal and India Business also increase through the Bhairahawa and India.

The improvement of the road will make the transportation of people and goods significantly more safe, smooth and fast. The improved road will make the journey more comfortable, vehicle fuel consumption and wear and tear will be reduced. Thus the access improvement is a major and most important operational stage impact of this project.

This road will open a new economic opportunity for the peoples of western part of Nepal.

ii) Enhancement in Economic Activities, Trade and Business

The improvement of the access will have a significant impact on the overall enhancement of the economic activities within the immediate influence areas, wider influence areas and in the regional area. The economic activities include mainly the transportation of produce, especially Industrial products from the Butwal and Bhairahawa as well as the business from India (agricultural products, from rural areas to more urban areas. The beneficial impacts to the economic activities are also a major significant impact that affects the socio-economic condition of the people within the influence area.

The improved road surface will ensure continuous and smooth flow of products and commodities. It is envisaged that trade and business activities will be further promoted not only in this area but also expanded to other areas having links to this road.

iii) Enhancement of the Social Service Facilities

This project will increase the availability of safe and quicker access, development of economic center, and increase in the economic level which improve school education and promote higher education outside the project area. Similarly, the local people may spend more on health care, sanitary facilities, education facilities and other social services.

iv) Appreciation in Land Value

Four-lane road will increase the land value in the entire locations, since the road will provide easy movement as well as easy access to the country's strategic road network. Business and industrial expansions will be likely which also increase the land value of the region. This road will be a main road to connects the capital city of Nepal to India boarder via Bhairahawa.

v) Increase crop productivity, promote trade for agriculture products and endogenous products due to easier market access

Floriculture product including cut flower and foliage are the suitable enterprises for the different watershed area along the proposed road alignment. Vegetable cultivation, especially off-season vegetables are suitable in flat are of Terai along with the normal season vegetables. The product is expected to substitute the huge volume of vegetables being supplied from other parts of the country and import. A large part of off-season vegetable will be sold to other parts of Terai and Indian market where there is no local production of vegetables including cabbage, cauliflower, radish, carrot and tomato during summer.

Among the fruits and vegetable and pulses beans are being produced successfully and can be commercialized with introduction of modern technology and assured market.

vi) Impact due to increase in income and living standard of people

After the operation of Road, it will enhance economic activities within the area through the increase of employment opportunities and income level. The service sector will equally benefit from improved access, and will include the setting up new educational facilities in private and public sector and implementation of health, hygiene and drinking water programs by government and NGOs.

Flow of goods from the project influence area will be a continuous process benefiting local producers with the transportation of local products for its promotion. The local agricultural and horticulture products that used to go rotten and waste previously can be processed and transported. Thus an improved access linkage with other markets opens potential opportunities for the production of off-season vegetables. The operation of road will also contribute to raise quality services in social sector as more competent agencies and people will enter into the area to provide the services. Road transportation will also encourage students to enroll in higher grades at campus level on far distance, which will become possible after the operation of regular vehicles. Students can attend classes even in distant areas after efficient transportation service. Qualified doctors and other service providers will be encouraged to stay in the area.

vii) Empowerment of local women

Road transportation will benefit local women by providing improved access to market facilities. Mobility will considerably increase while more efficient road transportation systems will be in place. Women, in specific, may therefore get into a better position to attend various service agencies such as hospitals, health clinics, training institutes, women development programs etc. More frequent visit to such organizations will increase women's knowledge and awareness level. Girl students will be encouraged to go to schools that will become easier accessible.

In Nepal, any development in rural areas will thus contribute to women's empowerment and facilitate their struggle in escaping widespread discrimination and economic disadvantages. The operation of road not only improves the income and living standard of people but also empower the local people. Empowering local people means having: Access to information, inclusion and participation, Accountability, Local organizational capacity. Informed citizens are better equipped to take advantage of opportunities, access services, exercise their rights, negotiate effectively, and hold state and non state actors accountable. Participation addresses the question of how they are included and the role they play once included. Accountability refers to the ability to call public officials, private employers or service providers to account, requiring that they be answerable for their policies, actions and use of funds. Local organizational capacity refers to the ability of people to work together, organizing themselves, and mobilizes resources to solve problems of common interest.

4.2 Adverse Impacts

Environmental impacts anticipated during the project construction and operation phase is discussed in this section. The up gradation of proposed Road Project will directly affect and will eliminate all the existing ambient environment and physical structures situated within the

15m either side of the road alignment width. Environmental impacts upon Physical, Biological, Socio-economic and cultural environment are discussed below whereas mitigation measures will be required in order to avoid, reduce or minimize significant adverse environmental impacts. Similarly, augmentation measures will be required in order to enhance beneficial environmental impacts with the implementation of project.

The major activities during construction phase are site clearance, earthworks, blasting, stockpiling and disposal of construction materials and spoil and other civil works etc. Civil works and other activities will create dust, noise and vibration rendering likely impact of slope instability and landslides. Haphazard stockpiling and disposal of spoil in the nearby private lands, cultivated lands and water bodies will further affects the physical environment of the project area. Biological issues relate to removal of forests, impact upon wildlife, aquatic habitat and avian fauna will be the major issues due to the implementation of the project. Similarly social issues such as acquisition of private property and land and its compensation and resettlement related issues will also be significant during pre-construction and construction phases. Moreover, direct influence upon existing infrastructures such as water supply pipelines, electric poles and irrigation facilities existed within the proposed road alignment will also be a remarkable issue.

4.2.1 On Socio-economic and Cultural Environment

4.2.1.1 During Pre- Construction Stage

Land Acquisition and Compensation

Very small land area in comparison of road size i.e. 1.734 sq m near to the bridge at Deychul area required to acquire. This is near to the bridge side. The RAP team have already approached the land owner and the required cost have been allocated.

i) Relocation of Common Property Resources and Public Utilities Relocation of Common Property Resources and Public Utilities

The proposed road upgrading project will required to relocation of the public utilities. These are within the ROW of the proposed road upgrading. The following table is the summary of the existing public utilities

Table 4.1: Utilities at the Road side

S.No.	Electric Pole (No)		Telecom Pole (NO)		Electric Transformer (no)		Water supply Pipe line (location)		New Construction of passenger shade (No)
	Left	right	Left	Right	Left	Right	Left	right	
	224	140	381	284	63	33	47	11	38
Total	364		665		96		58		

Source: Resettlement Plan of Narayangadh-Bulwal Road, 2016

ii) Possible social conflict and social pollution; impact on social, cultural and religious practices due to in-migration of people

Immigration of people from other areas and influx of workers are inevitable during the time of construction of any project. The increase in competition for existing resources are likely that can put the indigenous people at a disadvantage, especially when the settlers introduce ecologically inappropriate and unsustainable production systems. Physical conflicts are likely to break out between settlers and the host communities when the latter try to reclaim

their heritage and traditional rights. This sort of conflict is likely to change social, cultural and religious practices of local community.

Cash flow into the area as labor forces' wage will escalate price of essential commodities, causing market inflation during road constructions. This increases public life including alcoholism, gambling, sex life etc., and causes it as a source of conflict between local people and in-migrant as labor force. Similarly, there is the possibility of degradation of sanitation and hygiene condition due to outsiders.

iii) Impacts due to establishment of labor/contractor camps

The labor/contractor camp will be established near to construction site. If such work camps are situated near to settlement areas, it is likely that social problems will arise, such as, social conflicts, crimes, prostitutions, and spread of communicable diseases. The outside workers are more likely to create social conflicts and cause a sense of insecurity and unsafety among the local people. In addition, environmental problems due to generation of wastes and ill sanitary conditions may also arise. The tentative location of labor camps is given in the table below:

Table 4.2: Possible location of contractor camp

SN	Location/Chainage	Geomorphology	Stability condition
1	21+000~21+500	Plain area	Stable slope
2	26+000~26+450	Plain area	Stable slope
3	44+300~44+675	Foot Hill Plain area	Stable slope
4	46+700~46+900	Hill side Slope	Stable slope
5	73+7000~74+000	Plain area	Stable slope

Source: Field study, 2016

iv) Occupational health and safety condition at site during construction

As labor forces requires to undertake works especially in rock cutting, hazardous materials handling, heavy equipment operations, tree felling, transporting and translocation of heavy construction materials etc. they are prone to various risks and health hazards in absence of works undertaken without adequate safety measures. Other potential impacts to health are respiratory, eye disease due to exposure to dust, gas emissions during pavement works especially in bitumen works.

Occupational Health and Safety of labors during construction of the proposed road will be significant issue. Working safety measures will be executed by the contractor to workers providing ample numbers but not limited to helmets, boots, rubber gloves, and masks as required. Life of worker will be ensured by maintaining Life insurance of each worker of the project. First aid facilities for the workers will be provided at working sites as well as at labour camp sites. If possible, one qualified nurse or first aider will be present at all times. Routine checkups of labours will be performed; this will be at least once per week for each labour workers. Similarly, Health and Safety of the local people will be another significant issue during construction stage of the project.

Awareness programs to local people will be provided regarding environment health and safety. Furthermore, handling, transportation, storing and use of different Machines, equipment and petroleum product will be other issues of safety during construction. It is recommended that contractor will further comply with the Safety Plan developed in the detailed design stage. During construction, existing local tracks and vehicle tracks will be



affected and may need to be either closed temporarily or synchronize with the construction vehicles. Construction activities on the project site are likely to cause hindrance to pedestrian and existing traffic flow if not managed properly. Although, this is not likely to be a major problem, it could affect the passage of the existing traffic. Therefore a Construction Traffic Management Plan will be developed in the detailed design stage that will comply by contractor to maintain flow of construction vehicles without hampering good flow of passenger vehicles.

Road safety issues during construction works will be significant to construction workers, passenger vehicles etc. Safe handling of construction vehicles and equipments during construction phase will be an important issue for contractor. Collection and transportation of construction materials, disposal of spoil from excavation will be executed smoothly during construction. Existing East-West highway and other Highway will not be disturbed during the time of construction of this road. Road safety of the highway will be ensured by managing existing traffic properly.

v) Gender Involvement and child labor during construction

Accordance with the socio-economic condition and the phase of development, women involvement differs in comparison to the male workers. The Discrimination against women starts from family and is widespread in society. Workplace is not an exception. Socio-economic relations are reflected even in the laws and hence the entire legal structure is full of gender bias provisions. Lack of parental property rights for women is one of the examples in this regard. It is also because of the fact that political parties are less gender sensitive, which is directly reflected in policies-programme-plans of the government and election manifestos.

Child labour' as 'work that deprives children of their childhood and their dignity, which hampers their access to education and the acquisition of skills, and which is performed under deplorable conditions harmful to their health and their development." Child work, on the other hand, includes all paid and unpaid work for the household or for the market, whether it is full-time or part-time should be avoided strictly.

vi) Impacts due to pressure on social services facilities due to Influx of workers

The existing drinking water facilities will more or less meet the local demand for drinking water. At present, there are natural water sprouts and shallow well and tube wells that are functioning at numerous places along the road and are a main source of water supply for drinking as well as day uses and the local people are depended to such sources.

In addition, the existing drinking water facilities will be inadequate for large number of workforce in the vicinity during the construction phase. During the construction period, a large number of construction workers need to be mobilized. Water is required for water sprinkling during construction of road pavement works to avoid excessive dusts and for compaction of pavement layers, in large quantities.

Road construction site is nearby densely populated areas and there will be extra pressure on drinking water and the sanitary facilities. If the proper sanitary condition is not maintained in the work camps, water may get contaminated and water borne diseases may increase. In addition, water quality may get degraded if the construction materials such as bitumen cement slurry, oil, diesel etc. are leaked into the water bodies.

At present, there are tube wells are functioning and are a main source of water supply for drinking as well as daily uses and the construction works will not affect them. Road construction site is nearby densely populated areas and there will be extra pressure on drinking water and the sanitary facilities. If the proper sanitary condition is not maintained in the labour camps and work camps, water may get contaminated and water borne diseases may increase.

The water quality may get degraded if the construction materials such as bitumen, cement slurry, oil, diesel etc. are leaked into the water bodies. Similarly, the construction activities may require some hazardous material, which will be stored in the proper place and disposed off safely after usage. Furthermore, haphazard disposal of solid and liquid wastes from the construction camps will likely degrade the soil and water quality.

It is likely the earth work in embankment may affect the ground water flow of the springs and /or wells in the vicinity of the construction area.

The haphazard disposal of construction waste will adversely affect the sanitation environment in the area and this problem need to be minimized through regulatory measure and public awareness programs.

The existing educational institutions are not located within the ROW but some schools are located near to the ROW. Even though the project does not directly cause inconvenient to the schools, their access may be inconvenient when construction work is in progress and safety to school going children will be very sensitive.

vii) Impact due to unsocial activities due to outside workers

Impact due to deprive from their economic activities during road construction and possible impact on people's cultural behavior and local economy due to alter in economic activities. Improved accessibility and connectivity following construction completion, triggers socially unacceptable activities. Public life associated with alcohol, gambling etc also leads to social conflict especially among the local people and immigrant people.

Conflict between workers and local people is likely during the time of construction. Conflict is likely as there could be a struggle between local people and labor workers for same commodity and natural resources. Such impacts are likely through the entire road length during the time of construction, especially at market places and at community forest area where workers and local will be interacted directly.

Cultural behavior and economic activity of the local people will be changed due to the implementation of project in project Municipalities/VDCs. Influx of outside people, change in livelihood, change in consumption of food pattern will likely to be change in cultural and economic behavior of the local people.

4.2.1.2 During operation stage

In general, the road will provide significant benefit in the long term. It is considered as a key to the socio-economic development of the country. However, the road may pose some adverse impacts on the environment at the operational stage, such as increase in air and noise pollution and danger of traffic accidents.

However, there will be no adverse effects on the local economy. The market will be competitive and the urbanization and semi-urbanization effect may lead to the high cost of



living. The sale of agricultural plots will rise and they will convert into residential and commercial areas. Some industries that are located near the road may also have the tendency to relocate to other places and develop their properties as commercial areas. The expectation that the road will be widened has already affected the private land developers and has already started the residential plot development schemes. The local inhabitants may find it difficult to adjust in this new dimension of development.

Ribbon settlement is a common along the roadsides in Nepal. After the widening of the road, the ribbon settlement along both sides of the road will be inevitable. The high concentration and population density along this road shall raise social issues and concerns.

Since the local people are living in harmony from socio-economic point of view and there will be plenty of economic opportunities after the operation of the road, there will be no socio-cultural adverse impacts in the area.

i) Road traffic accidents and road safety

After the completion of the upgrading works, the road will be traffic in four lanes and because of better road surface, the vehicles would move in a higher speed. This is likely to increase road accidents of vehicular collisions, and collisions with pedestrians and road-crossing people and animals.

Road crossing for school-going children will be especially dangerous, and parents have expressed their worry also. In addition, the women who collect water from cross the roads also express their worry, because of high speed traffic in the wide road.

ii) Population pressure and impact due to new settlement along the road alignment, and possible ribbon settlement development

Various socio-economic and cultural changes are likely in the project areas and adjacent Municipalities/VDCs due to implementation of this road project. The land use pattern will be changed in certain locations and economic activities will be altered. The overall inter-regional connections will also expected to bring changes in the life style of locals. Trafficking, prostitution, consumption and import of alcoholic products are expected to be increased especially at existing settlement areas and likely at the service and facility sites that will be introduced by Road project.

The project is expected to lead to improved transportation facilities. Similarly, the major benefits of the project recognized by the different stakeholders are potential employment opportunities & increase in income, generation of revenue, reduction in travel time & vehicle operating costs, tourism development, and decrease in market value of commodities in densely populated city, enhancement of local potential areas through area development projects. However, this road is already in high traffic so this impacts will be minimal.

4.2.2 On Physical Environment

4.2.2.1 During Construction stage

i) Air and Noise Pollution and Vibration Effect

During the construction stage, the operation of the construction equipment and heavy vehicles and machinery will generate air pollution while works like site clearing, excavation, cutting, filling, leveling, compaction etc. is conducted. These works shall cause dust and air

pollution to the entire surrounding areas. In addition, during wet season, the road will be muddy and cause nuisance to vehicles and pedestrian traffic. However, these effects will be for the short term period only, especially during dry seasons.

The road construction activities are likely to increase noise level and cause vibration during operation of the heavy construction equipment. Noise disturbance cannot be avoided because these activities will generate the noise level beyond acceptable limit of 70 dBA. There are some schools along the road and they are likely to be affected by the noise and vibration problems. The operation of the heavy construction equipment is likely to cause vibration in the vicinity of the construction site. Such construction is likely to develop damages or cracks due to the vibration caused by the operation of the heavy equipment, which need to be monitored and checked, especially near bazaar areas.

Further, bitumen heating and asphalt plant operation, if located nearby the site, will generate significant amount of smoke and pollute the air. Bitumen heating emits considerable amount of gases such as SO_x and NO_x, which will have adverse impact in the environment. Though such pollution will be for the short term and temporary, the level of pollution may be significant.

ii) Impacts due to quarrying and borrow pit operation and Rehabilitation, Fresh Cuts and Earthwork Cutting

Uncontrolled quarrying by contractors from non-approved sources is a damaging activity, which must be controlled. However, sometime such activities are beyond the control of the constructing engineers. The extraction of materials from inappropriate places or in excessive amount can seriously damage the local environment. For example, quarrying from a high slope and fragile terrain can result slope instability; extraction of sand and gravel in excessive amount from river can cause riverbank cutting, erosion, and changes of river regime. This will eventually affect the local environment in terms of erosion, flooding of cultivated land, damage to community infrastructures, affect road and road embankment itself and eventually affect the entire livelihood of local people. General scouring of river beds resulting in endangerment of bridges and continuous degradation of the river regime are potential impacts of quarry operation. The possible location of quarry site is given in the table below:

Table 4.3: Possible location of quarry site

S.No.	Chainage	Type of material	Equipment used for materials Extraction	Resources Ownership
1	Danda Khola (34+000)			
	Danda/Kawarjod Khola Bank. Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 225,500m ³	i. Boulder	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC)
		ii. Sand and Coarse Aggregate		
		iii. Sub-base		
		iv. Base Course (CSB)		
		v. Pavement sealing Aggregate		
2	Girwar Khola (ch. 43+000)			
	Girwar Khola Bank. Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 205,000m ³	i. Boulder	Excavator, Bulldozer, Tipper, Loader, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC)
		ii. Sand and Coarse Aggregate		
		iii. Sub-base		
		iv. Base Course (CSB)		



S.No	Chainage	Type of material	Equipment used for materials Extraction	Resources Ownership
		v. Pavement Aggregate		
3	Arun Khila(50+000)			
	Arun Khola Bank. Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 164 475m ³	i. Boulder ii. Sand and Coarse Aggregate iii. Sub-base iv. Base Course (CSB) v. Pavement wearing Aggregate	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC)
4	Bhaya Khola (57+000)			
	Bhaya Khola Bank. Alluvial deposit comprised of boulder, cobble, gravel and sand of predominantly gneiss, quartzite and Schist. Estimated available Qty = 116500m ³	i. Boulder ii. Sand and Coarse Aggregate iii. Sub-base iv. Base Course(CSB) v. Pavement wearing Aggregate	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant	District Development Committee (DDC)
5	Ebewah Quarry (Tissa Khola)			
	Tissa Khola. Alluvial deposit of boulder, cobble, gravel and sand quartz and Schist with Sandy River gravel, away about 12 km from project end point Bulwal towards Bhatalshahr. Estimated available Qty = 528.37m ³	i. Boulder ii. Sand and Coarse Aggregate iii. Sub-base iv. Base Course v. Pavement Aggregate	Excavator, Bulldozer, Loader, Tipper, Trucks, Tractors, Shovel and Crusher Plant and Screen plant etc.	District Development Committee (DDC) and Private Land deposited gravel

Source: Detail Design Report, 2016

iii) Stockpiling of construction material/ Handling of Granular materials/Bituminous Materials , Grease, Oil, Diesel

Construction materials are usually stockpiled for relatively short period without covering. It is often done on riverbeds or riverbanks, forest area, open spaces, and cultivated land. This situation may lead to environmental degradation in of air pollution, land pollution, pollution of surface water, and permanent changes of land use if not rehabilitated after work complete. Standing crop or future cultivation on such land is disrupted. The construction material will be stockpiled near open area at chainage. All the construction materials will be handled properly and within the designated sites. So while stockpiling of construction material following area should take into consideration.

Table 4.4: Probable Stockpiling locations:

SN	Location/Chainage	Geomorphology	Stability condition
1	21+000~21+500	Plain area	Stable slope
2	26+000~26+600	Plain area	Stable slope
4	46+700~46+900	Hill side Slope	Stable slope
5	73+400~74+000	Plain area	Stable slope

- Place where considerable vegetation is available.
- Low land inundation Forest area where folding and water logging is prone.

- Agricultural field where folding, water logging is prone
- Settlement area where excess road will be blocked inundation with materials

(iv) Impacts due to spoil disposal/Wet-Mix Macadam

Since the road is an upgrading and widening project, substantial quantity of excess spoil materials will not be generated as cutting will be only minimal at the major lengths of the road. The road design has employed balanced cut and fill concept and thus spoil disposal problem is expected to be minimal. However, at localized sections, excess spoils may be generated which need to be managed properly. The possible location of spoil disposal site is given in the table below:

v) Impacts due to disruption / obstruction to natural drainage, causing inundation areas/ Construction of Embankment / Culverts and minor Bridges Works on Water bodies

Construction of the road likely to block natural flowing natural cross drainages flowing from chum hills on north to southern plain crossing road alignment rendering scouring, erosion, water logging, ponding and flooding on the northern side. There may be the issues of Embankment also and there are 47 rivers along the road side which will produce adverse impact upon seasonal and perennial drainages affecting its natural and direct flow. Impact due to stockpiling and disposal of huge amount of spoil, soil and other construction materials from road alignment have to be managed properly in place.

vi) Slope instability, landslides and erosion of cut hill-side slopes

As the proposed road track requires fresh cuttings of hill side slopes, likely impacts of slope instability and landslide will be anticipated at the areas having slopes greater than 45 degree. Landslide and soil erosion will also be triggered due to excavation through blasting activities at the rocky portion area of the proposed alignment. Similarly, landslide and soil erosion are likely at new open cut sections during construction phase where heavy mass of spoil will be generated. During the construction phase of the project the intensity of erosion can be envisaged high during summer especially in the area of steep slopes and areas recommended as high.

Moreover, the weathered and eroded material from the surface will be washed periodically. When the slope is steep the intensity of removal of the weathered and eroded material will always be high. Since the alignment of the road passes along the river very near to the flood plain most of the rock exposed rocks are moderately weathered to fresh. However, at many places highly weathered rock exposure was also observed. The problem of soil erosion although does not appear significant at present but after the excavation for the slope the problem will be day-lighted due to the requirement of the deep cut slopes in soft soils/weathered rocks. Such slides have observed only the area with the chainage 25 to 50 area only.

vii) Degrading the water qualities of existing rivers/ Handling of the chemicals

Construction activities such as cutting and filling, disposal of construction waste and spoil, road track with excavation etc., might increase in turbidity of streams and rivers nearby. As proposed road alignment crosses most of the river course and direct disposal are likely

Improper sanitation of workers or local inhabitants, (e.g. lack of appropriate sanitary facilities, defecation in open field) disposal of wastewater from labour camps, unauthorized washing of vehicles and unauthorized/unsuitable garbage dump sites are likely during construction stage. Moreover, haphazard disposal of spoil upon rivers along the proposed road alignment will further degrade water qualities of rivers nearby it. Though River could be consider as open sewerage in the mean time, haphazard disposal of spoil will further increase turbidity and rise in river bed.

viii) Solid waste disposal issues/ Waste management

Operation of labour camps can cause significant impact upon ambient environment if camp operation will not planned in advance. The main issues of concern are unmanaged disposal of solid and liquid wastes into watercourses, natural drains and improper disposal of storm water and black water in the cultivated land and village areas.

ix) Surface and ground water contamination from unsanitary disposal of toilet waste

Other major issues of concern with the establishment of labour camp are likely to be uncontrolled open defecation by construction workers, unmanaged disposal of toilet wastes into watercourses, natural drains. Surface and ground water contamination is likely if toilet waste and other sanitary waste dispose haphazardly in the entire project area.

x) Impacts due to operation of Crusher Plants, Concrete Batching Plants and storing of material on river banks Operation and construction Machines and Equipments

Since the proposed road construction activity will requires to establish five crusher plants. One crusher plant will be located at the Gideri Khola all over the construction period. Another crusher will be in mobile form as required when on the proposed material source areas. The following is the proposed crusher plants and operation during the construction of project only.

Stone crushing plants are temporary work sites, occurring during construction and rehabilitation of this road project. They are normally established near quarry sites from where the stones are derived. It is anticipated that specific quarry site for stone and boulder might not be required for retaining walls, culverts, bridges, road surface works etc. because substantial amount of stones and boulders are expected to be acquired from the excavation and opening of the road track width. However, crusher plants, concrete batching plants will be operated at the adjacent side of the proposed alignment. Crushing plant as well as concrete batching plant sites are high risk areas for accidents and injuries. Also, there will be continuous flow of heavy vehicles for carrying the materials to construction sites. If their path is along school and busy market area, there will always be potential risk of serious accidents. River flow regimes are likely to be changed if extraction of sand and gravel in excessive amount from river bed and river banks.

xi) Construction of Bridges

Since the road requires numbers of Bridges. So the bridge construction may cause the impacts on the environment. The potential impacts on the rivers and streams, construction materials, the chemical leakage on the rivers and waterbodies etc are the potential impacts during the construction of the Bridges.

xii) Planning traffic Diversion and Detours

During the construction period the construction activities may hamper the traffic operation and many more. So the pedestrians and other passengers may get troubles. This impacts will be during the construction stage.

4.2.2.2 During Operation stage

i) Obstruction to natural drainage and water logging

The road embankments are constructed across the flow direction of natural drainage, so the obstruction to natural drainage and waterlogging is possible at certain sections. The design team has taken this into consideration by appropriately locating cross-drainage structures.

Direct impact due to water logging or surface runoff upon public and private lands, water resources, and natural drainage is likely during operation of the road project. Similarly, direct disposal of surface lead off drains from road upon private cultivated lands and properties will have adverse impacts of soil erosion and landslide. Surface runoff and road side lead off drains will have significant adverse impacts upon public and property. Runoff and lead off drain constructed in inappropriate location likely to trigger further landslide and soil erosion at the basement area of the road alignment as well as inundation and siltation of private and cultivated lands.

ii) Fragmentation of individual land plots

Fragmentation of agricultural land is inevitable for entire road length where the alignment passes through private land. Fragmentation of agricultural land will likely to be declined in productivity, increase in labor intensive farming reducing commercial farming. Moreover, natural resources and existing infrastructures such as drinking water supply pipelines, irrigation canals, electricity supply existed across the proposed alignment will be either relocated or will be accessed through road alignment to the adjacent lands.

After the construction of the road track, the road alignment cause the fragmentation of the land two to three segment as it transverse along it. Due to such fragmentation of the agricultural land many difficulties such as water logging, access and even the productivity of the land will be impacted.

4.2.3 On Biological Environment

4.2.3.1 During construction stage

i) Loss of forest trees due to road construction activities

The Total numbers of tree losses are estimated to 9027 from the construction activities. It includes from total of 55 forest and national forest. There are 18 major species that will be affected with the road construction. There will be loss of Sal trees at highest scale because of the dominance of this species in the road alignment. Similarly other species like Jamun, Shaj, Boldhajo, Kukath etc. are the most affected species. It is estimated that there will be loss of more than 6000 trees of Sal similarly there will be loss of more than 600 trees of Jamun etc. The details of the loss of trees from the RoW close to different community forest area has provided in table Table 4.6. The details of wood loss and timber loss will be as per the combined survey with the DFO representative and consultant as well as contractor. The entire removed forest product will be handed over the respective DFO or will be sold and



revenue generated will be collected in the government account as per the norms of the "Sarkari Rukh Hataune Karyabidhi 2071"

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Table 4.5: Loss of trees within the road corridor of the community forests

S/N	Name of Community Forest	Trees Lost within the road corridor of the community forests																Total		
		El	Kulab	Bot	Dunro	Jemua	Kadam	Sa	Bano	Kumbi	Karam	Gannu	Dabruyo	Hongrayto	Halyo	Sash	Tant		Kharua	Others
1	Hakuman Mandi Reserve Forest, Gaidakot-9 (S)	23	12	12	12	12	-	14	13	-	13	-	-	-	-	12	-	-	9	160
2	Hanyali Community Forest, Gaidakot-5, 7, 1	87	8	88	38	38	-	-	12	12	-	-	-	-	-	-	-	-	2	200
3	Marayani Community Forest, Gaidakot-7, 9 (N)	149	12	12	3	3	-	-	-	-	12	-	-	-	-	-	-	-	-	190
4	Mahundolen Community Forest, Gaidakot-10 (S)	200	2	2	-	-	-	1	1	-	2	-	-	-	-	-	-	-	-	238
5	Pitaji Community Forest, Gaidakot-10 (S)	240	-	2	2	2	-	2	1	-	-	-	3	-	-	-	-	-	-	249
6	Shakti Durga Mandi Religious Forest, Gaidakot-6 (N), 2	28	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32
7	Maharaja Community Forest, Gaidakot-15 (N)	80	44	14	34	34	28	-	-	-	-	-	2	1	-	-	-	-	-	204
8	Shard Madhyabari Community Forest, Kamalpur-13 (S)	170	8	1	8	-	-	-	-	-	-	-	-	1	-	-	-	-	-	181
9	Shim madhyabari Community Forest, Kamalpur-2 (N)	165	-	12	-	-	-	-	-	-	-	8	-	-	1	-	-	-	-	179
10	Manakamana Madhyabari Community Forest, Kamalpur-7, 8, 1 (S)	134	36	34	12	12	-	-	-	-	-	-	-	-	13	34	-	-	-	283
11	Ankur Adarsha Madhyabari Community Forest, Kamalpur-16 (300m N)	78	-	24	21	21	-	-	-	-	-	12	15	-	-	-	12	-	-	158
12	Satyawan Community Forest, Kamalpur-18 (20m Both)	273	-	13	35	35	-	-	-	-	-	-	-	-	-	-	-	-	-	319
13	Madhyabadi Hanyali Community Forest, Kamalpur-15 (20m Both)	200	8	24	66	66	-	-	-	-	-	-	-	-	13	-	-	-	-	327
14	Kusadul buffer Zone Community Forest	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20

S.N	Name of Community Forest	Tree Losses within the road corridor of the community forests															Total			
		Sai	Kukhri	Bot	Dharu	Jamuna	Kadun	Sai	Bano	Kumbi	Karun	Cantawa	Darungo	Hongrayio	Haiudo	Saihai		Talari	Kharwa	Bakamo
15	Ra, Mahe BOD	17																		17
16	Madhyabindu Community Forest, Madhyabindu-7 (2km Both)	223		12	35	36									37					342
17	Madhyabindu Laligara Community Forest Madhyabindu-7 (Green belt)																			
18	Bileya Community Forest Madhyabindu-7 (greenbelt)																			
19	Lokodhara Community Forest, Madhyabindu-6 (Greenbelt)																			
20	Basarla Community Forest Madhyabindu-7 & 9 (Greenbelt)																			
21	New Haryali Community Forest Madhyabindu-7 & 9 (Greenbelt)																			
22	Duga Community forest Madhyabindu-7 Greenbelt																			
23	Janipratola Community Forest Madhyabindu-5 Greenbelt	875	167	163	34	230	71	48	66		47	56	24		35	24		12		1674
24	Rachar Community Forest Madhyabindu-6 Greenbelt																			
25	Kalinda Community Forest Prasaun-6 & 9 Greenbelt																			
26	Dharapan Community Forest Prasaun-4 and 5 greenbelt																			
27	Anarata Community Forest Area																			
27	Jigra Community Forest Prasaun-1 Greenbelt																			
28	Ghatel Community Forest Prasaun-3 Greenbelt																			
29	Jangalgram Community	354	2	12	25															393



S.N	Name of Community Forest	Tree Losses within the road corridor of the community forests																Total	
		Sai	Kubath	Bot	Jamuna	Kadam	Sai	Baro	Kumbi	Karam	Camuna	Dunungo	Hongrayto	Mabdo	Seth	Tam	Khamna		Bakima
	Forest Nayabharan-7 (Both)																		
30	Avukhola Community Forest Nayabharan-8 (Both)	230	15	12	21		21												289
31	Nawa Budshai Community Forest Dumkabash, Bothside	340	32																372
32	Pahelchitta Community Forest Dumai Bash, -1,2 Both Side	255	65	13	13		1												282
33	Bharya Community Forest Dumkabash-1,3 Both Side	185		34	17								7						233
34	Gheukhola Community Forest Dumkabash -1,2,5 Bothside	158	16	13			14		12										224
35	Dumkadani Tapodan Religious Forest Dumkabash-5 (Both side)	305	18	1	1										6				324
36	Sayapain Community Forest area Bandaghat -3 (Both)	145	16	38	44			20				15							284
37	Chisapani Community Forest area (North)	85	25	13	51														154
38	Banshuka Community Forest area(North)	89	24	12															126
39	Sansukot CF (north)	45	1																46
40	Parjat Community Forest area	158		2	1			3				2							166
41	Hariyal Community Forest Tialpur (North)	145	2		1		5												153
42	Badera community Forest Ramnagar -2,3,4 (North)	136		5		4													147
43	Devadaha Seghedani Forest (S)	321	7	1	1										12				336
44	Janasudaya Community Forest, Sonaul4(North)	16	1	1	1														19
45	Mulpain Community ForestSunawal, Bothside	16		2	1														19
46	Janasriya Community Forest	35			3														38

Tree Losses within the road corridor of the community forests																				
S.N	Name of Community Forest	Sai	Kokath	Bot	Alumna	Kadam	Sai	Bano	Kumbi	Karam	Chama	Darungo	Hongryto	Matoko	Sorih	Talan	Kharua	Bakano	Others	Total
	Devdaha 10,11																			
47	Pirgali Community Forest Devdaha-7	12		1	3															22
48	Budhanagar Community Forest Devdaha-10	7		1																9
49	Siyana Community Forest Devdaha-5,6	7																		7
50	Small Community Forest Devdaha-4,8,9	14																		14
51	Min Community Forest Devdaha-9,10	12																		12
52	Sulhaus Hanyal Tidoman 13, 14 (200m)	44																		44
53	Karhiya Community Forest Tidoma 11	8			2															20
54	Shamanager Community Forest Tidoma 1,3 (South)	12		24	36		12													64
55	Shimanager Community Forest/Bubut-9,10,11 50m North	16																		16
Total		6234	528	575	634	62	120	12	51	118	17	63	66	66	63	33	36	12	0	9027

Source: Field Study, 2016

S/N	Total Land Forest Land	81.83
1	Land within the Nawalparasi District	64.73 ha
2	Land within the Rupandehi District	17.5 ha
3	Buffer Zone Community Forest Piraju and Sham Nawalparasi	5.95 ha

Source: Field Study, 2016

ii) Possible depletion of threatened species

Sal (*Shorea robusta*), is the major protected floral species found in abundance along the alignment. The other floral species found in the project area are Bot Dhairo, Sajh, Karma which are likely to be affected severely with the road construction.

Similarly, Tiger, Rhinoceros, Leopard, Striped Hyaena, and Bear are the major protected and threatened species of wild life identified along the forest areas of road alignment. Although the construction of road will not affect those threatened species directly, the habitat of those species are likely to be fragmented which will trigger them to sustain in limited forest area and are likely to invade into human settlements generating conflict between wildlife and human for natural resources.

Similarly, the protected and threatened species of birds are Huchil, Khar Mujur, Kalo Sarus, Raj Dhanesh identified at the forest area of this road alignment. Moreover, the protected species of amphibians those are likely to be affected are Frog identified at project site.

iii) Disturbance to wildlife by the construction activities

Blasting activities including road excavation for the formation of road width is likely to disturb wildlife inhabited along the forest area of proposed road corridor. Vibration, blasting, influx of workers are the major activities that will disturb upon wildlife and their habitats. Wild animals travelled into human dwellings and animal sheds in search of food and prey are likely with the disturbance.

iv) Impact due to wildlife poaching, illegal tree felling and fire hazards

There will be a high possibility of poaching of wildlife during the time of construction at forest areas of the project sites. Similarly, illegal tree felling at the vicinity of the project area is also likely rendering depletion of adjacent forest area. Forest fires due to blasting and other fire related activities near the existing forest sites are likely during the construction of tunnel portals and blasting activities at other forest and hard rocky portions. Possibility of forest fire due to labour's entrance into forest areas can also be taken as considerable impacts upon existing adjacent forest areas.

v) Pressure on forests for fuel wood in labor camps

Existing forest situated at the vicinity of the proposed alignment are likely to be affected during construction due to pressure laid by construction labour for fuel wood in labour camps. Labourers will have easy accessibility upon existing forests situated at the project vicinity.

vi) Impacts on CNP, Buffer zone and wildlife

The road does not pass through critical wildlife habitat area, which in the project area is located inside CNP 24 km (CH 7+000 to CH 32+000) of the project road passes through the buffer zone where the nearest point to the reserve boundary is 2km. The buffer zone, which comprises the area immediately surrounding the CNP (also called the core zone), is made up of settlements and agricultural fields. Therefore there will be no direct impacts on the CNP itself. However, construction activities may cause disturbances and bring other indirect negative impacts. In light of the existing problems of local people still accessing resources and fishing inside the reserve, construction workers may get tempted to also hunt or poach



and extract other resources. Noise and vibration from construction activities may also cause disturbances for the wildlife. However, this will be limited as there is a good distance of a minimum of 20m between the road and the CNP. Since wildlife in the project area exists mainly in and around the CNP area, potential impacts on wildlife in other parts of the road are insignificant.

vii) Impacts on tiger and wild animals in the buffer zone of CNP

Discussions with the local people in the CNP area revealed that the elephants pass through the buffer zone and the project road between the chainage of 7+000 to 31+000 throughout the year. There is no specific season for the movement of the wild animals.

Based on the information from above it is highly likely that the tigers will cross the road during the construction period. The usual tiger movement time has been observed to be from 10pm to 4am, during which no construction activities will take place. So the chances of direct interference of the construction activities with the elephant movement across the road are low. However, one cannot rule out the possibility of day time movement. If there is any elephant movement while construction activities are going on during the day, the wild animals may get distracted by the noise and vibration and become aggressive or not be able to move across the road. This may pose a danger for the construction workers and given the human-wild animals conflict history could result in injuries and destruction of construction equipments and road works. However the following locations are prone for the wildlife movement.

Table 4.6: Location of Wild Animals crossing across the road corridor

Chainage	Community Forest	Settlement	Volume	Direction	Distance from CNP
7+300 to 11+300	—	Thumai and Mukundasan area	Medium	2 way (settlement – agricultural land)	4.5 km
Arun	—	Arun Khola Area	High	2 way (settlement – agricultural land)	700m

Source: Field Study, 2016

4.2.3.2 During operation stage

i) Encroachment into forest areas for commercial logging, settlements

Gradual encroachment into forest area existed periphery to the project area is likely with the gradual increment in the population within the project area. Tree felling, wood cutting, illegal export of fuel wood and other forest products including Non Timber Forest Products (NTFPs) are likely during the operation of proposed road project.

ii) Impact upon wildlife and habitat movement due to forest fragmentation

Implementation of road project will fragment the wildlife habitat at different location along the proposed alignment as locals might have easy access to remaining forest after construction. Major forest areas located along the road alignment is fragmented in to north and south part. The road alignment will restrict the movement of the wild fauna inside the forest area. The habitat of wildlife likely to be affected at buffer zone of Chitwan National Park area as the proposed alignment will prevent free movement to wildlife from that forest area existed at

the northern side. Besides it, this area is known for the corridor of the elephant movement in Terai region.

Forest fragmentation is inevitable with the implementation of project. As majority of the alignment passes through forest, existing forest will be fragmented by the Road alignment. Similarly, there will be gradual encroachment into forest area existed periphery to the project area with the gradual increment in the population within the project area. Tree felling, wood cutting, illegal export of fuel wood and other forest products including Non Timber Forest Products (NTFPs) are likely during the operation of proposed road. Environmental Monitoring Unit of the Road project will be established in order to monitor overall environmental condition and likely impacts due to operation of the project. However, forest user groups will also be responsible for monitoring to avoid such likely impacts. Moreover, site enhancement projects and area development projects will be launched in order to maintain and enhance greenery within the project Municipalities/VDCs as well as adjacent other VDCs.

4.2.4 On Chemical Environment

i) Use of bitumen and their storage, heating, spreading etc.

Bitumen is a hazardous material, which is used for road surface dressing during construction and maintenance period. It has also environmental consequences during its heating and mixing with aggregates before its application as surface dressing material.

Bitumen and other chemicals of road sealing usage are highly inflammable. Unless it is stored safely and handled correctly, it may become source of fire hazard, and incidences become common.

Bitumen and other chemicals of road sealing usage are highly corrosive when it is hot. Prior to its spread over road pavement for sealing, its viscosity needs to be altered to a condition of 'appropriate fluid' either using cutback or heating. Altered bitumen can cause skin irritation, burns to its handlers unless adequate protection measures (safe boots, gloves, goggles etc) are put into practice.

ii) Use of fuel, lubricants, oil, acids and other chemicals for construction (vehicle, plants and equipment) and their storage

Fuel, lubricants, oil, acids and other chemicals used for road sealing purpose are of petro-chemical products, which being highly environmental unfriendly does not react as do biological process but deactivate and impair it on the site where it is spilled. These products if not safely stored on the stockpile site can cause peripheral damage.

During vehicle and equipments maintenance and repairing and washing, used lubricants may be spilled nearby water-sources which may cause adverse environmental pollution.

4.3 Evaluation of Impacts

The above impacts are of two categories – identified and predicted. In general, direct impacts are identified and indirect are predicted. These identified and predicted impacts have been evaluated to know their environmental significance, taking into consideration of Magnitude, Extent and Duration.



The environmental impacts are ranked either high, Medium or Low Magnitude on the basis of judgmental evaluation of the impact vis-à-vis the nature and size of the project. Similarly, the impacts are categorized into Long-term, Medium-term & Short-term according to the impact's likely lasting duration due to the operation of the project.

Quantitative data on number of trees to be felled and number and area of land and houses affected are used as the basis of determining the Magnitude of the impact. In the absence of quantitative data, the environmental study-team's experts' judgment has been used for determining the Magnitude- based primarily on experiences from similar projects. The allocation of scores for the Magnitude (High, Medium & Low), Extent (Regional, Local & Site-specific) and Duration (Long-term, Medium-term & Short-term) for each impact is done as per the National EIA Guidelines, 1993.

Table 4.7: Evaluation of Beneficial Impacts

SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
Construction Phase								
1	Employment generation and increase in income	Direct	Identified	High 60	Local 20	Short Term 05	Very Significant	Construction
2	Skill enhancement of local manpower	Direct	Predicted	Medium 20	Local 20	Medium Term 10		
3	Increase in enterprise development and commercialization	Indirect	Predicted	Medium 20	Local 20	Long Term 20	Significant	Construction
4	Community development and income generation plans	Direct	Identified	High 60	Local 20	Short Term 05	Very Significant	Construction
5	Development of social services	Indirect	Predicted	Medium 20	Local 20	Medium Term 10		
Operation Phase								
1	Improved transportation facility and decrease in transportation cost and time	Direct	Identified	High 60	Regional 60	Long Term 20	Very Significant	Operation
2	Enhancement of economic activities, trade and business	Direct	Identified	High 60	Regional 60	Long Term 20		
3	Enhancement of the social services facilities	Direct	Predicted	Low 10	Local 20	Long Term 20	Significant	Operation
4	Appreciation in land value	Indirect	Predicted	Medium 20	Local 20	Medium Term 10	Significant	Operation
5	Increase crop productivity, promote trade for agriculture products and engenderous products due to easier market access	Indirect	Predicted	Medium 20	Regional 60	Long Term 20	Very Significant	Operation
6	Impacts due to increase in income and living standard of people	Indirect	Predicted	Medium 20	Local 20	Long Term 20		
7	Empowerment of Local Women	Indirect	Predicted	Low 10	Local 20	Long Term 20	Significant	Operation

Table 4.8: Evaluation of Adverse Impacts

Impacts on Socio-economic and Cultural Environment

Impacts on Socio-economic and Cultural Environment								
SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
Construction stage								
1	Impact due to house property acquisition	Direct Irreversible	Identified	no	Site Specific	no	insignificant	Construction
				0	10	0		
2	Occupational health and Safety condition at site during construction	Direct Reversible	Predicted	Medium	Site Specific	Medium Term	insignificant	Construction
				20	10	10		
3	Gender involvement and child labour during construction	Indirect Reversible	Predicted	Medium	Site Specific	short Term	insignificant	Construction
				20	10	05		
4	Possible social conflict and social pollution; impact on social, cultural and religious practices due to in-migration of people	Indirect Reversible	Predicted	Medium	Site Specific	Medium Term	insignificant	Construction
				20	10	10		
5	Impact due to pressure on social service facilities by influx of workers	Direct Irreversible	Predicted	Low	Site Specific	Short Term	insignificant	Construction
				10	10	5		
6	Impact due to unsocial activities including due to outside labour	Direct Reversible	Predicted	Medium	Site Specific	Medium Term	insignificant	Construction
				20	10	10		
7	Impacts due to establishment of labor camps	Direct Reversible	Predicted	Medium	Site Specific	Medium Term	insignificant	Construction
				20	10	10		
Operation stage								
1	Road traffic accidents and road safety	Direct Irreversible	Identified	Medium	Site Specific	Long Term	Significant	Operation
				20	10	20		
2	Population pressure and impact due to new settlement along the road alignment and possible ribbon settlement development	Direct Irreversible	Predicted	Low	Site Specific	Short Term	insignificant	Operation
				10	10	5		

Impacts on Physical Environment

During Construction stage

SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
1	Air and noise pollution and vibration effect	Direct Reversible	Predicted	Medium	Local	Medium Term	Significant	Construction
				20	20	10		
2	Impacts due to quarrying and borrow pit operation	Direct Reversible	Identified	Medium	Site Specific	Long Term	insignificant	Construction
				20	10	20		
3	Stockpiling of construction material	Direct Reversible	Identified	Medium	Site Specific	Short Term	insignificant	Construction



SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
4	Impacts due to spoil disposal	Direct Reversible	Identified	Medium	Site Specific	Short Term	Insignificant	Construction
				20	10	05		
5	Impacts due to disruption / obstruction to natural drainage, causing inundation areas	Direct Irreversible	Identified	Low	Site Specific	Long Term	Insignificant	Construction
				10	10	20		
6	Degradation of water qualities of existing river	Direct Reversible	Predicted	Medium	Local	Short Term	Insignificant	Construction
				20	20	05		
7	Solid waste disposal issues	Direct Reversible	Predicted	Medium	Site Specific	Medium Term	Insignificant	Construction
				20	10	10		
8	Surface and ground water contamination from unsanitary disposal of toilet waste	Direct Reversible	Predicted	Medium	Local	Medium Term	Insignificant	Construction
				20	20	10		
9	Impacts due to operation of Crusher Plants, Concrete Batching Plants and storing of material if on river banks	Direct Reversible	Predicted	Medium	Site Specific	Medium Term	Direct Reversible	Construction
				20	10	10		

During Operation stage

SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
1	Impact due to obstruction to natural drainage and water logging	Direct Irreversible	Identified	Medium	Site Specific	Long Term	Significant	Operation
				20	10	20		
2	Fragmentation of individual land plots	Direct Irreversible	Identified	High	Site Specific	Long Term	Very Significant	Operation
				50	10	20		

On Biological Environment

During Construction stage

SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
1	Loss of forest trees due to road construction activities	Direct Irreversible	Identified	High	Site Specific	Long Term	Very Significant	Construction
				50	10	20		
2	Possible Depletion of Threatened Species	Indirect Irreversible	Predicted	Medium	Site Specific	Long Term	Significant	Construction
				20	10	20		
3	Disturbance to wildlife by construction works	Indirect Irreversible	Predicted	Medium	Site Specific	Medium Term	Insignificant	Construction
				20	10	10		
4	Impact due to wildlife poaching	Indirect Irreversible	Predicted	Medium	Site Specific	Long Term	Significant	Construction/ Operation

SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
	illegal tree felling and fire hazards			20	10	20		
5	Pressure on forests for fuel wood in labour camps	Direct Irreversible	Identified	High	Local	Long Term	Very Significant	Construction
				60	20	20		
6	Impacts on National Parks	Direct	Identified	Low	Local	Long Term	Insignificant	Construction/operation
				10	20	20		

During Operation Stage

SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
1	Encroachment into forest areas for commercial logging, settlement etc.	Direct Irreversible	Identified	Low	Site Specific	Long Term	Insignificant	Operation
				10	10	20		
2	Impacts upon wildlife and habitat movement due to forest fragmentation	Direct Irreversible	Identified	High	Site Specific	Long Term	Very Significant	Operation
				60	10	20		

On Chemical Environment

SN	Likely Impacts	Nature of Impacts					Significance of Impacts	Phase
		Type	Identified or Predicted	Magnitude	Extent	Duration		
1	Use of blumen and their storage, filling, spreading etc.	Direct Irreversible	Predicted	Medium	Site Specific	Short Term	Insignificant	Construction
				20	10	05		
2	Use of fuel, lubricants, oils, acids and other chemicals for construction and their storage	Direct Irreversible	Predicted	Medium	Site Specific	Short Term	Insignificant	Construction
				20	10	05		



CHAPTER 5: ALTERNATIVE ANALYSIS

During the EIA study, Alternative Analysis was carried out considering the location and likely environmental impacts of project activities for each alternative were documented. During the assessment of possible alternatives, the design, project area, available technology, operation procedure, construction method (including schedule and raw material) and environmental management methods were considered. Likely impacts of each alternative were evaluated and compared in terms of potential environmental impacts beneficial and adverse, capital and operating costs, suitability under the local conditions, institutional and monitoring requirements. To extent possible, cost benefits of each alternative were quantified, incorporating the estimated cost of any associated mitigation measures. The best and environmentally sound alternative was recommended for further assessment. The alternative analysis was carried out whether or not the risks resulting from the implementation of the proposal can be accepted. Alternative option such as no action option, also analyzed during the EIA study.

Alternative analysis has been considered as an integral part of the EIA study. The technical feasibility, economic viability and environmental acceptability govern the alternative analysis. Detailed Engineering Survey and Design of the proposed alignment was conducted after comparing the different alternative route. However, the EIA study team has made the assessment on the environmental impact assessment and economic viability of different section of alternatives, which is presented in this Chapter.

5.1 No Action Alternative

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

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

The impacts of these defects against the backdrop of increase in traffic in the future are: i) increase risk of injuries and mortalities from road crashes due to inadequate road safety measures; ii) accelerated deterioration of the road condition due to inadequate drainage works will increase road maintenance cost; iii) increase in road congestion due to lack of road capacity will lead to increase in operating cost, and travel time resulting to economic loss; iv) congestion and accelerated deterioration of road leads due to non-optimal travel speed will increase fuel consumption leading to higher emissions, deterioration of air quality, and increase impacts on human health. Increase in traffic particularly at night will increase

the risk of vehicle-wildlife crashes endangering the population of wildlife, particularly the endangered Royal Bengal Tiger. However, one positive note of not improving the road is the preservation of trees along the road right-of-way and avoid further disturbance to critical habitat in the project area. Finally, without the project all impacts related to construction like camp site management, occupational and community health and safety, shifting of utilities, and dust, noise, vibration from construction equipment are avoided.



Figure 5.1: Road crash along the project road section (Daunne)



Figure 5.2: Existing road condition



5.2 Upgrading Options Considered under the Feasibility Study

The 'Upgrading of the Road Section Alternative' assumes that the road will be improved as described in Chapter III. The upgrading of the road is needed to correct the geometric defects and comply with the Asian Highway standard, improve riding quality, increase road capacity, and enhance road safety.

During the feasibility study stage several design options were investigated to determine the most feasible options on needed upgrading for each of the land uses the road will service and projected traffic. Design parameters like at grade vs. elevated intersections, pavement materials, lane width and numbers, shoulder materials, maintenance or improvement of drainage and bridges were assessed and combinations thereof were formulated to come up with the project design that meets the financial, economic, and technical requirements. These parameters are presented in the succeeding Table. Of the 4 options studied, the first option (1A) was selected for the project mainly due to technical and financial reasons.

Table 5.1: Design Options Assessed in the Feasibility Study

Feasibility Design Alternative Options Option-1 A	This option comprised of • Intersections at Grade (33 nos.), in existing major Bazaar Areas crossings with adequate traffic safety signage • Service Lane i.e. in about 37.99 km urban area • AC pavement in all length • Paved Shoulder in Jungle Section • Double Lane plus climbing lane in Daunne Section with 12m width • Replacement of all Minor Bridge with four lane new bridges and new two lane 21 major bridges, • construction of 411 nos. box culverts, 138no Slab Culverts • 49.00km both side (98 km total) main road drain and 37.99km both side (total 75.98km) service lane drain. • Utility crossing HPC on Bazaar Area 800mm dia 80 and 10nos. 900mm dia. • 17no. of foot over bridge • 4 wildlife underpasses
Option-1 B	This option comprised of • Intersections at Grade (33 nos.), in existing major Bazaar Areas crossings with adequate traffic safety signage • Service Lane i.e. in about 37.99 km in existing urban area • DBST Surfacing in all length • Paved Shoulder in Jungle Section • Double Lane plus climbing lane in Daunne Section with 12m width • Replacement of all Minor Bridge with four lane new bridges and new two lane 21 major bridges, • Construction of 411 nos. box culverts, 138no Slab Culverts • 49.00km both side (98 km total) main road drain and 37.99km both side (total 75.98km) service lane drain. • Utility crossing HPC on Bazaar Area 800mm dia 80 and 10nos. 900mm dia. • and 17no. of foot over bridge
Option-1I	This option comprised of • 17 Underpass for major intersection and remaining intersections (16 nos.) at Grade • Service Lane i.e. in about 37.99 km in existing major Bazaar Areas • AC pavement in all length • Paved Shoulder in Jungle Section • Double Lane plus climbing lane in Daunne Section • Replacement of all Minor Bridge with four lane new bridges and new two

	lane 21 major bridges, • construction of 411 nos box culverts, 138no Slab Culverts • 49.00km both side (98 km total) main road drain and 37.99km both side (total 75.98km) service lane drain, • Utility crossing HPG on Bazaar Area 600mm dia 80 and 10nos. 500mm dia. and • 17no. foot over bridge
Option-III	This option comprised of • 26 Underpass and 7 fly overs for major intersections and remaining minor intersections at Grade, • Service Lane i.e. in about 51.88km area including in existing major Bazaar Areas and rural side for future extension, • AC pavement • Paved Shoulder in Jungle Section, • Double Lane plus climbing lane in Daunne Section, • Replacement of all Minor Bridge with four lane new bridges and new two lane 21 major bridges, • construction of 411 nos box culverts, 138no Slab Culverts • 62.86km both side (125km)main road drain and 103km service lane drain in both side, • Utility crossing HPG on Bazaar Area 600mm dia 80 and 10nos. 500mm dia. • and 17no. foot over bridge

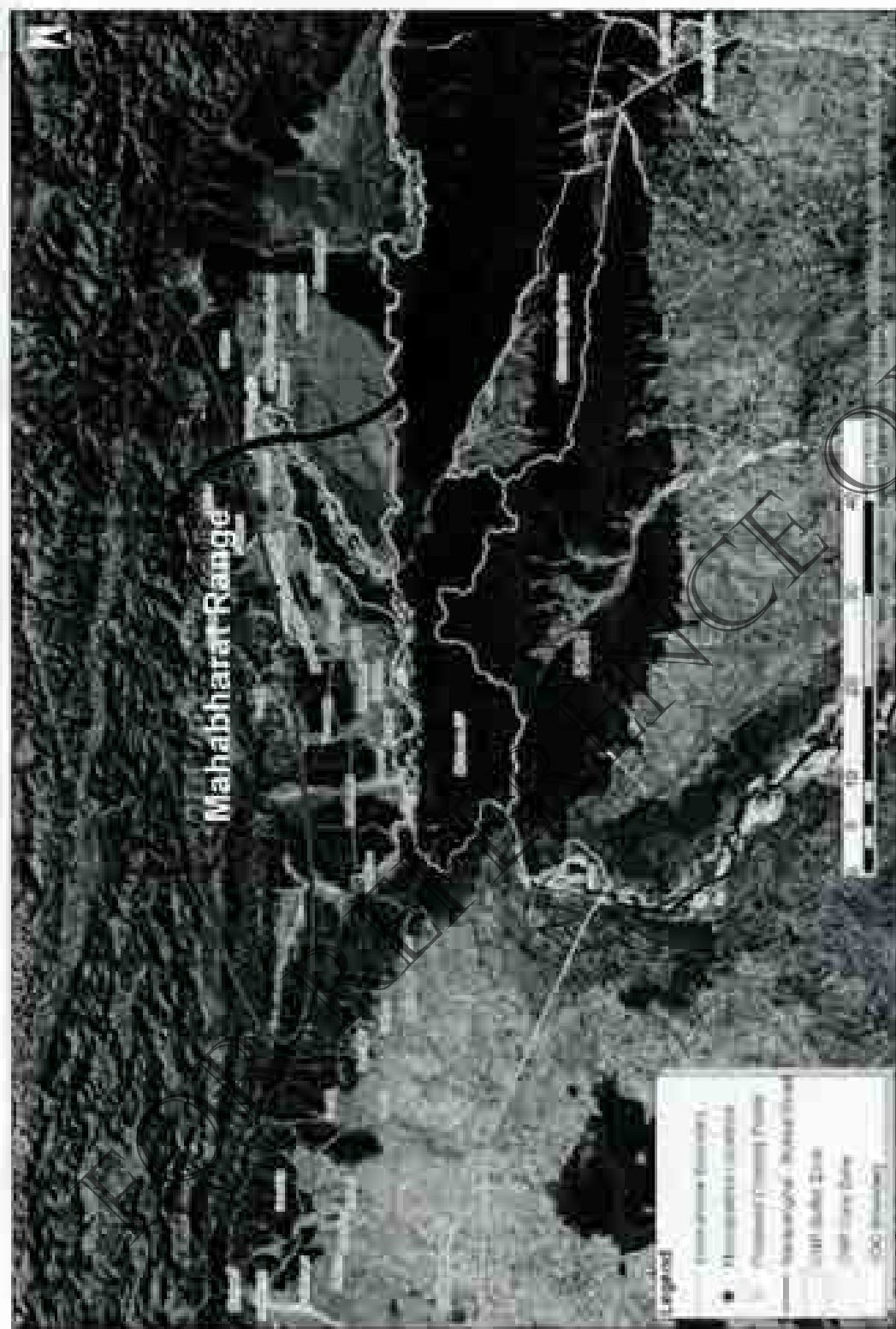
Source: Feasibility Report, 2018.

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

The most significant adverse impacts of the project pertains to risk of further destruction of habitat for numerous Wildlife species with varying protection status that cross the project road to move towards the Mahabharata Range also called the Lesser Himalaya (see succeeding Figure). Doubling the existing number of lanes from 2 to 4 widens the linear barrier for wildlife to cross and with the projected increase in volume and speed of traffic the seriousness of wildlife-vehicular crashes will inevitably increase unless mitigation measures are implemented.



Figure 5.3: Wildlife crossing and risk of habitat fragmentation from the project road widening





From the five wildlife crossing areas as shown in Figure , the most significant is along the boundary of the Chitwan National Park where wildlife animals including the endangered Bengal Tiger has established a corridor in search of new territories and prey. Other protected species of CNP such as Gharial, Elephant are not found in the project area and the Narayani River lies at a distance of 150-200 m from the project road. To ensure the movement of the Bengal Tiger is unhampered, the project will provide animal underpasses. Accordingly the construction of 4 animal underpasses are included in the selected design option IA.

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CHAPTER 6: ADVERSE IMPACTS MITIGATION MEASURES

In Chapter 4, the beneficial as well as adverse impacts due to the construction of the road has been identified and evaluated. In order to attain long-term and sustainable benefits from this road project, its implementation should be guided by principle of environmental friendly construction and operation. For this, The study team identified the most effective augmentation measures for beneficial impacts and mitigation measures for possible perceived adverse impacts to minimize the environmental impacts of project implementation needs to be adopted are presented in this chapter. Incorporation of mitigation measures in the detail design and tender document and subsequent implementation are recommended.

6.1 Benefits Augmentation Measures

6.1.1 During Construction Stage

i) Employment Generation and Increase in Income

For the construction of the proposed road 3,331,300 unskilled and 75000 skilled person-days of skilled manpower and 16,700 person-days of unskilled manpower is estimated to be necessary and the local people will get opportunity to engage in construction works.

The Project needs to give priority to the local people to work during construction so that the prevailing unemployment within the project area will be minimized and employment benefits in local communities will be ensured. In order to provide maximum employment opportunity for local communities, the construction work, particularly labor oriented works will be scheduled, as far as possible, during periods when farmers are free from their agricultural work.

The Project shall include a binding clause in the contractor's agreement for the adequate involvement of the local people, without gender discrimination, of both semi-skilled and unskilled labour force, to the extent available and give wages not less than that determined by the Government agency. The Project will also disseminate information about the project and invite the local people in road construction activities.

This beneficial aspect can be enhanced by the following actions:

- Wherever applicable, adopt labor-based methods of construction
- Give maximum priority to employ local labors and project-affected families, offer skilled, semi-skilled and unskilled labors from project area first priority for work, with gender equality
- Whenever practical, scheduling the construction works during the agricultural off-season to enable local people to become engaged
- Include binding clause in Contractor's Contract Document to give priority for local people with govt accepted wage and recruit local labour impartially without favour or gender discrimination
- Full payment of wages to worker as per contract document



ii) Skill Enhancement of Local Manpower

During the construction period, a large number of local people will be involved as semi-skilled and unskilled labor. In order to enhance the technical skill, on-the-job training and practical training to the local workforce on operation of equipments, stone masonry works, gabion wire weaving works, stone dressing works, concreting works etc. shall be provided so that the local workforce shall be able to use the skills at other job sites and to find jobs as skilled workers in future projects as an alternative occupation in addition to agriculture. To ensure that the Contract gives such on-the-job training, it should be included as a binding clause in Contractor's Contract Document.

iii) Increase in Enterprise Development and Commercialization

The Project shall encourage its construction workers and staff to buy the local products in order to promote trade and business. Furthermore, the Project shall disseminate information on construction schedule and approximate number of labours in the site and can designate some places, outside the road alignment and ROW, for the operation of tea stalls and grocery shops near the work or labour camps so that local products, including vegetables, are easily available for the construction workers. Identification of such places would also encourage the local people to sale their cereal and livestock products such as rice, pulses, eggs, milks, ghee, chicken, mutton etc. in the same place and it will minimize time for searching the products as well. This will enhance the local trade and business during the construction stage.

The project will provide allowance to the vulnerable groups along in this activity peoples will be encouraged for commercial farming in agriculture. Further the project shall also disseminate information to the public on the construction schedule and estimated number of workers well prior to the beginning of the works so that the villagers can plan for their agricultural and livestock production to meet the demand of the workers during the construction stage. In addition, the local farmers should be provided necessary advice on methods to increase agricultural and livestock products.

iv) Community Development and Income Generation Plans

The Project shall encourage the establishment of community development centers such as health and sanitation facilities, adult education facilities, market facilities etc. The Project shall also educate the locals on additional income generating plans through community based approach while construction of the road. The Project should establish a link with such communities and the NGO/CBOs working in such fields.

v) Development of Social Services – Enhancement Issues

The Project will encourage the establishment of public infrastructures such as education/schools and healthcare services, minor accesses, irrigation and water-supply systems, electricity and communication facilities, chautaras, public rest houses, bus terminals and parking areas etc. by providing technical help and monetary help to the extent possible. The Project shall also encourage the Contractor to contribute to this as far as possible.

6.1.2 During Operation Stage

(i) Improved Transportation Facility and Decrease in Transportation Cost and Time

The proposed road should be designed as per the standard design and road construction practice with proper drainages so that the road is functional for the design period. The Project shall conduct periodic maintenance of the road to avoid major failures. Project should check for weak areas prior to rainy season and take necessary precautions in advance.

The timely completion of the Project is of utmost importance.

Regular public bus services should also be operated in the route. The transportation fare should be determined after considering the travel time and VOC.

(ii) Enhancement in Economic Activities, Trade and Business

As benefit augmentation measures the Project shall promote market places at some intermediary areas for the promotion of local goods and products. In addition, promotion of cooperative and providing bank financing for setting-up business enterprises shall be encouraged.

For the increase and promotion of trade and business after the operation of the road, the concerned agencies should assist in the development of such market centers with forward-backward linkages. The locals should be assisted to establish vegetable/milk collection centers etc. and give advice in increasing agricultural output. The very poor people should be assisted to obtain credit facilities, micro-credits, provide technical assistance to establish cottage industries, business outlets etc.

Examples for likely development of business opportunities would include:

- Provide agriculture improvement advice for farmers
- Provide access to market and storage facilities
- Small trade store businesses along the route
- Establish agriculture input stores and availability of fertilizers
- Credit facilities for farmers
- Fuel stations, vehicle maintenance and repair shops
- The commercial agricultural practices will be increased

(iii) Enhancement of the Social Service

Project shall provide technical / monetary support for establishment of public infrastructures, e.g. improvement of side connection road, drinking water spouts, street lights, pedestrian crossing bridges etc. where necessary and demanded by the public. The side roads joining the main road at service lanes should be improved and black topped to approximately at least 100m, so that the road junction will not be deteriorate.

(iv) Rise in Land Value

Land value will be progressively increase only if urban development takes place in a planned manner, with development of infrastructures such as water supply, sewerage,



electricity and telephone etc. Thus after the construction of the road, planned growth with necessary urban infrastructures shall be targeted for the increase in land value.

vii) Impact due to increase in income and living standard of people

The project will encourage local people to involve into project directly or indirectly in order to generate livelihood and income. Establishment of service areas, promotion of markets, development of industries and other projects with the investment of private sectors and banks will further create opportunities to locals for their involvements directly as well as indirectly enhancing income and living standard of local people. Further, educational institutions will be established and existing institutions will be upgraded into higher level.

viii) Empowerment of local women

Rural women will be motivated to have better opportunities hospitals, health clinics, training institutes etc. that will be established after the operation of road. Women will aware and will be attracted in such organizations that will enhances their knowledge. Furthermore women will be encouraged to participate in the income generation activities and will promote to lead the organizations especially in the project area.

6.2 Adverse Impact Mitigation Measures

Mitigation Measures required during the project construction and operation phase is discussed in this section. The measures to prevent or to minimize the impacts due to implementation of project within the proposed project area have been discussed in the section. Mitigation measures for the affected existing physical structures situated within the 25m on either side of proposed road alignment width will also be required to minimize its severity and impact in the environment and to the people.

All the adverse environment impacts upon physical, biological, socio-economic and cultural environment are discussed below and request mitigation measures of corrective, compensatory and preventive types are proposed in order to avoid, reduce or minimize such impacts as well as augmentation measures for achieving beneficial environmental impacts with the implementation of project. There are also a number of other matters that will require detailed designs that consultant engineers have prepared and assuming all significant adverse environmental impacts due to construction. That shall be avoided devising good engineering design and minimize operational environmental pollution and impacts as far as applicable.

6.2.1 On Socio-economic and Cultural Environment

6.2.1.1 During Construction Stage

i) Impact due to house/property acquisition

The project will provide compensation for all land and private properties to be acquired before starting construction activities. Adequate provisions and compensation arrangements has maintained through Resettlement and Rehabilitation Action Plan for the proposed the project has proposed NRs 5.7 million to remove house and structures. The water supply pipe and other public utilities has proposed to be rehabilitated along with road construction for the purpose the project has provided cost of NRs. 429 million under rehabilitation which has included under BoQ.

The total Land required for this project will be 1733.5. The resettlement cost will be NRs 26.8 million (RAP Report, NB Road)

ii) Possible social conflict and social pollution; impact on social, cultural and religious practices due to in-migration of people

Security system will be established to avoid conflict between workers and local people. However, contractors will be responsible to control their own labors those are imported from outside the project area and strengthening local communities through awareness activities. Whereas, contractor will be responsible to encourage locals for labor work including indigenous people and women providing both of the gender with equal wages not less than district rate.

iii) Impacts due to establishment of labor camps

To minimize adverse impacts to the local people due to establishment of labor camps, the following measures are proposed:

- Identify labour camp sites such that it does not affect the people residing around the site
- Prepare a "Code of Conduct" to be enforced inside labour camp sites and include them in Contractor's Contract Document
- Provision water and latrines for site workers
- Provide adequate compensation to private land owners for renting their land
- Reinstate land to original condition after completion of works.

Potential sites for the Camp:

SN	Location/Chainage	Geomorphology	Stability condition
1	21+000-21+500	Plain area	Stable slope
2	26+000-26+500	Plain area	Stable slope
4	46+700-46+900	Hill side slope	Stable slope
5	73+400-74+000	Plain area	Stable slope

iv) Occupational health and safety condition at site during construction

Occupational Health and Safety of labors during construction of the proposed road alignment will be significant issue. Working safety measures will be executed by the contractor to workers providing ample numbers but not limited to helmets, boots, rubber gloves, and masks as required. Life of worker will be ensured by maintaining Life insurance of each worker of the project. First aid facilities for the workers will be provided at working sites as well as at labour camp sites. If possible, one qualified nurse or Certified Medical Assistant (CMA) will be present at all times on the construction site/camp. Routine checkups of labours will be performed; this will be at least once per month for each labour workers. Similarly, Health and Safety of the local people will be another significant issue during construction stage of the project. Awareness programs to local people will be provided regarding environment health and safety. The contractor and the project should make it mandatory the following points regarding OHS at the site:

- Make mandatory the use of helmets, safety belts, masks, gloves and boot by workers depending on nature of work.



- Necessary planning and safety approach will be made for rescue during emergency.
- The supervisor will have to check whether the provisions made in the plan are implemented according to plan.
- Workers will be provided with first aid and health facilities.
- There will be provision for group accidental insurance for the workers.
- First aid training will be provided to field staffs like overseer, social mobilizers and supervisors.
- Strict rule for non-complying safety condition such as payment withholding and/or termination of contract.
- Sprinkle water at high dust prone sites on daily basis.
- Provide clean drinking water at sites and camp.
- Provide pit toilets at sites and camp.
- Provide first aid facilities at sites and camp with training to use them.

v) Gender involvement and child labor during construction

The current need of the women workers in the informal sectors can be mentioned as follows:

- Organizing and unionizing of the informal sector with focus to women workers
- Minimum Wage implementation in a wide coverage
- Genuine Price for the products & services of self employed workers
- Market Access to self employed workers
- Skill & technical training
- Literacy and awareness building activities
- Land reform in favour of landless rural workers
- Policy intervention and lobbying by Trade Unions and NGOs
- Maintenance of Minimum Labour standards
- Gender review of legislation
- Social protection through various measures
- Implement GESI Guidelines of DoR through CSC and contractor

The current need of the Child/ child Labor in the informal sectors can be mentioned as follows:

- Promoting education reform
- Reducing household vulnerability
- Promoting women's literacy
- Social mobilization and awareness-raising
- Strengthening legislative and monitoring measures
- Filling information gaps

vi) Impacts due to pressure on social services facilities due to influx of workers

Contractor will be responsible to manage all the labor workers maintaining their daily schedule of labor camp and working hours of workers. CSC will introduce programs against alcohol abuse, violence, sexual abuse etc. Local educational institutions existed nearer to the project alignment shall upgrade themselves in order to recruit likely increase number of

students. Social specialist will conduct the awareness raising programme and HIV and AIDS etc.

vii) Impact due to unsocial activities due to outside workers

Contractor will maintain the strict law and order situation at the site and the labor are complied to comply with the code of conduct set by the contractor. Security systems will be established to avoid various sorts of conflicts between the local and immigrants during the time of construction. As majority of the rural areas along the proposed road alignment is inhabited by indigenous people, conflict upon existing natural resources between inhabitants and in-migration people will be avoided establishing police post at several locations as appropriate. The project will further encourage indigenous local people to participate in the construction of road generating their livelihood.

6.2.1.2 During Operation stage

i) Road traffic accidents and road safety

The road passes through a number of settlements and bazaar area. The Project will erect signposts including information on speed limit, danger-caution sign, no-horn at settlements, school and health institutions, turnings, road gradients etc. to let the motorists know about the obligatory rules to be followed during driving. Such signs will also be erected during the road construction stage.

The Project shall install railing on foot-paths to prohibit people from road crossing at prohibited section of the road. In addition, children are seen playing on the roads or near the roads, which is very dangerous. The families need to be educated not to allow their children to play on the roads.

In addition, to enhance road safety and minimize road accidents, the following methods are proposed:

- Install road marking & its timely re-marking when its worn out & invisible by drivers. Erect danger & precautionary signs and signals at potential danger areas. Provide street lights and reflectors to avoid night-time accidents
- Strictly enforce speed limits and traffic rules to all drivers
- Enforce public vehicle drivers to pick and drop passengers at designated locations only
- Conduct Traffic Safety Campaign and Media coverage / informatory announcements to public several times a year
- Educate road side people not to allow their children to play on the roads
- Educate people not to allow their cattle to enter in the roads

ii) Population pressure and impact due to new settlement along the road alignment

Mitigative measures to discourage ribbon development and encroachment of ROW include:

- Establish public notices that specify the acquisition / property rights of the RoW and that explain at the same time non-permissive uses of the RoW by non-entitled persons.
- Establish and propagate an effective land-use plan for the region; such land-use plan should clearly incorporate future visions for acquiring land



- Prepare good cadastral records that can easily be verified by land-use planners
- Good demarcation of RoW, incorporating physical barriers and appropriate planting (through community forestry programs) of selected zones adjacent to the road
- Incorporate physical barriers in zones of potential / prospected encroachment risks, e.g. by roadside plantation (ornamental plants) schemes
- Initiate, by engaging local NGOs/CBOs, community awareness and assistance programs to prevent undesired land-take and roadside squatter development
- Put in place appropriate mechanisms for grievance resolution to settle disputes between new squatters and local communities
- Exert all legal and socially acceptable means to evict illegal occupants of the RoW, but take in due consideration the needs and constraints of vulnerable and indigenous groups
- Consider long-term solutions to avert undesired growth (e.g. expanding markets along road or in different axis) by planning for road bypasses in congested areas.

6.2.2 On Physical Environment

6.2.2.1 During Construction stage

i) Air and Noise Pollution and Vibration Effect

Generation and spread of dust and exhaust from automobile and equipments are the cause of deterioration of air quality. The generation of dusts and spread is mainly caused from the construction activities and movement of vehicles and equipment.

Air Pollution/ Handling of Soil and Dust

The mitigation measures to be adopted to minimize air pollution

- Water spraying in all earthen roads two times in day if dust pollution becomes nuisance
- prohibit open storage and spillage of loose soil in and around construction site
- appropriately cover the stock piled and spoil materials with polythene sheets
- cover loaded trucks during transportation
- Use of face masks to the construction workers in dust prone areas such as crushing plants, excavation sites etc
- Prohibition of open burning
- The vehicles and mechanical instruments will be used as per the standard of Nepal government
- Install Monitoring stations and controls the dust (Cost have been included in Mitigation cost)

Water Pollution

The following mitigation measures in order to minimize the impact on water quality

- Avoid disposal of solid waste, sludge, and other wastes directly into water bodies and properly manage campsites
- Prohibit disposal of waste fuel, oil, grease into water and cleaning of vehicles in rivers
- Prohibition of urination and defecation in open areas and near water bodies by construction workers with the installation of sanitation facilities.

- Prevent soil slippage at toe of the stocked areas by installing barriers at the perimeter

Noise Pollution

The following mitigation measures will be adopted to minimize the noise pollution:

- Establish crusher plant, batching plant etc. away from settlement and wildlife habitat areas to extent possible.
- Construction of noise barrier such as bund or vegetative barrier at construction site
- Prohibition of using pressure horns by vehicles near the settlements and wildlife habitat areas.
- Provide ear plugs to each construction workers in the noise prone areas such as blasting for hard rock excavation at selected side
- Large noise producing machineries such as air compressors, crushing plants to be fitted with noise reduction mechanism

In addition the following should also be considered:

- Community and road user awareness programs should be organized to enhance public understanding on how individuals can contribute to reduce environmental impacts associated with road uses;
- Provide proper signage on accident-prone spots, and include appropriate speed-limit measures (road police patrolling and enforcement, speed bumpers).
- Control and enforce vehicle emission standards, and stipulate vehicle owners to engage in proper and regular vehicle maintenance;
- Ensure proper use and sale of (clean fuel) at local pump stations;
- For control of dust nuisance, sprinkling of water, speed limit of vehicle and vegetative barrier of earthen bounds should be designed.
- In congested settlement and sensitive areas (schools, health posts, hospitals) consider sealed surface of the road for the stretch it pass through the sensitive area.
- Include appropriate roadside planting (bushes, hedges, trees) and ornamental plants where possible, to enhance absorption of vehicle emissions by the plants.

Vibration Effects

The following measures will be adopted to minimize the effect due to vibration:

- Avoid use of compaction equipment during night time
- Use compaction equipment with caution and monitoring for any cracks near the settlement areas
- Use lighter equipment which generates less vibration near settlement areas.
- Ensure good construction practice by the Contractor
- Indicate air, water, noise and vibration limits in Contractor's Contract Document

ii) Planning traffic diversions and Detours

Diversion roads should be made and traffic guides put in place to avoid risk of accidents to the community. Constant watering of the road to reduce dust and related diseases. The

contractor will be required to adopt safety measures for workers and road users particularly those that are more vulnerable to crashes. Contractors need to emphasize safety among drivers, ensuring drivers have adequate skills, avoiding dangerous routes and times of day to reduce chances of crashes, speed control devices, and regular maintenance of vehicles to avoid premature failure. To address the risk caused by increase in traffic, the Contractor will: i) minimize pedestrian interaction with construction vehicles, ii) install signage, visibility and overall road safety particularly near schools or where children are present, iii) coordinate with local emergency groups on location of active construction fronts to facilitate appropriate first aid, iv) use of local materials to the extent possible to reduce hauling distance, v) employ flag person to warn dangerous conditions.

The Contractor should make a Traffic Management Plan before the construction start and shall get approval from the concern client.

iii) Material Procurements/ Impacts due to quarrying and borrow pit operation

Quarrying of material should not cause much environmental impacts if the extraction is done in a proper manner. The timing, quantity of extraction and location of the extraction should be done as per the rules and regulations which have been prepared by the concern District Development committee.

Borrow pit sites must be chosen from areas where it will not cause water logging problems in future and according to the availability of suitable gravel material and their proximity to the associated roadwork. For quarries, where alternative sites are available, the lowest value production land must be selected. Site selected for borrow pit must be lands where the effect will be temporary and generally involve lower value land. Again, the total area involved shall be relatively small, and the sites shall be rehabilitated soon after use.

The selected quarry sites were there in according to environmental implications are minimal. The aggregate crushing plants should be away from settlement areas and pollution control mechanisms need to be installed.

In addition, the following should also be followed:

- Restricted to small areas, on sites without trees cover – and located away from cultivable lands and settlements, drinking water intakes.
- Areas where it will not result slope instability, erosion, disruption of natural drainages, changes in river regimen, river bank cutting, destruction of vegetation, damage of farmland and other physical resources.
- Extraction of sand and gravel will be spread over the longest length possible from seasonal rivers so that no section of river bed is excessively disturbed.
- No condition is created inducing spill over of impoverished materials by the discharge during wet season over the arable land on the valley side.
- After the completion of extraction, the site will be properly fenced and closed, landscaping completed and plantation will be done on it.
- The crusher plants will be operated only to the planned area of the project construction area.

(iv) **Transportation of materials/ Storage of Materials / Stockpiling of construction material**

Impacts due to stockpiling can be minimized by the following methods:

- Avoid stockpiling site near cultivable lands and settlements, drinking water intakes, public places, near school, health centres, forest area, sensitive ecosystem, fragile and landslide prone slope or terraces etc. and where natural drainage will be disrupted
- Stockpiled material should be protected from erosion prior to rainy season, unless covered by a suitable material, including construction of drainage, trenches and ponds around the heap and where necessary, seal the area so surface water pollution does not occur
- Storage of material on private property will be allowed only if written permission is obtained from the owner or authorized lessee
- Compensation for land and crops damaged due to stockpiling of materials should be given by the Contractor to the affected landowners
- Site should be cleaned and brought to original condition after closure and removal of the stockpile

v) **Camp Site Management**

Construction camp shall be sited at such locations so as to utilize the existing infrastructure. No productive land should be utilised for construction camp. All sites must be graded, ditched and rendered free from depressions to avoid water stagnation. Accommodation and ancillary facilities including recreational facility for workers shall be erected and maintained to standards and scales approved by the resident engineer.

All camps should maintain minimum distance of 500 m from habitation and water bodies.

All construction camps shall be provided sanitary latrines and urinals with provision of septic tanks attached with soak pits. Storm water drains shall be provided for the flow of used water outside the camp. Drains and ditches shall be treated with bleaching powder on a regular basis.

Garbage bins must be provided in the camp and regularly emptied and disposed off in a hygienic manner. LPG cylinders shall be provided as fuel source for cooking to avoid any tree cutting.

At every workplace, the Contractor will ensure, in collaboration with local health authorities that a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances shall be provided. Workplaces remote and far away from regular hospitals shall have indoor health units with one bed for every 250 workers. Suitable transport shall be provided to approach the nearest hospital. At every workplace an ambulance containing the prescribed equipment and nursing staff shall be provided.

Ensure the good health and hygiene of all workers to prevent sickness and epidemics. These include the HIV/AIDS prevention program to reduce the risk and transfer of HIV virus between and among the workers and community, promote early diagnosis and assist affected individuals. Activities under the program include monthly information, education, and consultation communication campaigns to workers, drivers, delivery crew, and communities on the risk, dangers, and impacts of STD and HIV/AIDS.



Ensure that sufficient supply of suitable and hygienically prepared food at reasonable price is available to the workers.

Provide adequate and safe water supply for the use of the workers.

Ensure that all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides which should comply with local regulations.

No alcoholic liquor or prohibited drugs will be imported to, sold, given, and barter to the workers of host community.

Migrant workers may be the potential carriers of various diseases. Local community may get exposed to the diseases carried by migrant workers. Regular health check-up and immunization camps shall also be organized for the workers and nearby population.

vi) Impacts due to spoil disposal

Direct disposal of excavated materials and soil affecting top soil of agricultural lands and private lands will be avoided. The construction works and disposal works will not produce significant impact upon other public land adjacent to the proposed road alignment. Similarly, impact upon infrastructures and water resources available at the nearby settlement areas and agricultural lands will be avoided. The lists of locations are presented in Chapter six where disposal of spoil upon agricultural land is likely.

During the commencement of construction, the contractor will have been primed by informing the detailed EMAP and incorporating environmental assessments in the bidding and contract documentation. The contractor will be required to follow method statements and plans in advance of commencement of construction as required in the EMAP for Construction related management plans including other plans incorporated in BOQ. Following are the plans for the contractor to follow during the commencement of construction civil works but not limited to:

- Muck / Spoil Site Management Plan
- Top Soil Saving Management Plan
- Occupational Health and Safety Management Plan

Muck/Spoil Site Management Plan will include the following necessary required steps and guidelines that will be abide by the contractor but not limited to:

- Spoil will be disposed properly at identified spoil disposal site.
- Spoil disposal sites will be rehabilitated by providing proper water drainage systems and applying bio engineering techniques and plantation.
- Direct and haphazard disposal of spoil upon valley side River, water bodies, cultivated and private lands will be strictly avoided.
- Disposal of spoil upon natural forest will also be strictly avoided.
- Excess muck and earth will not be disposed of on fragile hill slopes instead will be used for back filling of gabion walls and other toe and retaining walls.
- Locals feed backs and consent including guidelines lined by the government agency will be followed to safeguard environment.
- Wherever possible, surplus spoil will be used to fill eroded gullies and depressed areas.

- If feasible, spoil material will be disposed in abandoned quarries and borrow pits as means to help restore original contours;
- Contractors will be advised to use the excavated materials for reclaiming the degraded land in near vicinity in consultation with local communities on their preferences.
- Spoil on fragile slopes, flood ways, wetland, farmland, forest areas, natural drainage path, religious and culturally sensitive sites, wetlands, canals and other infrastructures will never be disposed;
- Acidic and saline spoil will not be spread onto agriculture land.
- Spoils will never be disposed on areas that will create inconvenience to the local community or it will deprive the livelihood of people.
- Spoil material may be discharged to a landfill or tipping site that is constructed using a series of small spoil benches to prevent slope overloading.
- During disposal, the spoil will be placed in layers of about 15 cm and compact each layer at optimum moisture content.
- After the disposal, the site will be landscaped, provided with proper drainage, plant with vegetation, and will provide adequate protection against erosion and scouring.
- Spoil will not be disposed in rivers, lakes and water bodies;
- Exposed areas will be planted with suitable vegetation at the earliest opportunity following the GESU/DoR Manual on Vegetation Structures for Stabilizing Highway Slopes- A Manual for Nepal.
- Contractor will be responsible to provide adequate compensation to land and property, if damaged by spoil storage and disposal;
- Spoil disposal sites will be developed into community facilities like playground or park by reclaiming;
- Spoil will be used in local road net and embankment construction works.

vii) Clearing /Grubbing/Dismantling of existing structures/ Impacts due to disruption / obstruction to natural drainage, causing inundation areas

Small and large drainage systems that existed on piling area along the entire alignment will be noticed. Maintenance of smooth discharge across culverts and cross drainages by cleaning and maintaining them regularly so that water logging on adjacent land due to road track embankment do not occur. Upstream drain water will not be discharged into farmland or environmentally sensitive locations. Regulate the stockpiling and piling area and channels the water flow on such area to avoid any blockage of natural drainage to avoid inundation of upper streams.

The proposed road alignment crosses natural streams and drainages pattern. However, the road works proposed are designed to improve the drainage discouraging soil erosion in the operational phase. Impact upon natural drainage during the construction stages will be avoided as far as applicable. Haphazard disposal of spoil and stockpiling of other construction materials into the natural drainage will be avoided in order to prevent the natural flow of the drainage triggering landslide and mass wasting at the downstream. Proper water management and natural flow of existing drainages will not be disturbed.

Direct side tipping and deposition of excavated materials at the proposed road alignment shall be avoided. Side tipping and haphazard disposal of spoil and other construction materials into the stream side will be avoided and direct tipping will likely to disrupt the flow



of rivers, water depletion, water logging, and as well as increase the speed of flow which will be erosive in nature.

viii) Handling of Earth/ Slope instability, landslides and erosion of cut hill-side slopes

Angle of slope cutting will be maintained for fresh cutting slopes in order to avoid instability, landslide and erosion. However, section with highly weathered rock exposure area will be considered duly providing civil engineering structures.

The exposed slope should be protected using conventional civil engineering structures in conjunction with bio-engineering techniques. It is also advised to do minimum damage to vegetation during construction. Exposed slopes should be planted with suitable vegetation as soon as possible using previously stockpiled top-soil.

All areas susceptible to erosion, such as cut and fill areas will be protected by either temporary or permanent drainage works. Measures will be taken to prevent ponding of surface water and scouring of slopes. Newly eroded channels will be backfilled and restored to natural contours. Where crossing unstable terrain is unavoidable, minimize the road width for the section affected to reduce disruption to the slope. Special attention will be given to drainage and will leave a temporary road surface until a stable condition is achieved.

The Bioengineering is proposed for the stabilize the soil and geological process as well as geographical process for this project. The following are the sites where the Bioengineering have been proposed.

ix) Cutting Environment of Surface water Bodies/Degrading the water qualities of existing rivers

Construction activities will be carried out in environmental friendly way so as to avoid adverse impact upon water quality of Major River adjacent to proposed alignment and other water bodies. Disposal of construction waste and spoil into the river will be avoided. Adequate sanitation facilities will be provided at the labour camps with the adequate supply of water for washing, cleaning and drinking purposes. Labour camps will be established only at the pre-identified sites establishing appropriate drainage and installing pit latrines and toilets. Open defecation will be avoided strictly at the vicinity of labour camps. Similarly, labour workers will be provided with awareness trainings and further contractor will be responsible for mitigation if any sort of improper sanitation condition has been carried out by work force. Disposal of wastewater from labour camps and organic wastes from kitchen will be disposed safely in pits avoiding direct disposal in water bodies as well as avoiding ground water contamination. Liquid wastes from vehicle washing and workshop waste will not be disposed directly into river system and nearby water bodies.

x) Waste management /Solid waste disposal issues

Labour camps and contractor's camp will be established at the pre-identified appropriate place within the project area. Consultation with the local people is an important step prior to the establishment of such camps. The contractors will further ensure that labour workers will not dispose chemicals, raw sewage, and wastewater effluent.

The following are the potential disposal sites for this project/

SN	Location/Chainage	Geomorphology	Stability condition	Tentative area for disposal soil
1	21+000-21+500	Plain area	Stable slope	> 20000 m ²
2	26+000-26+450	Plain area	Stable slope	> 18750 m ²
3	44+300-44+675	Foot Hill Plain area	Stable slope	>56250 m ²
4	46+700-46+900	Hill side Slope	Stable slope	>18375 m ²
5	73+7000-74+000	Plain area	Stable slope	>28750 m ²

xi) Surface and ground water contamination from unsanitary disposal of toilet waste/ Maintenance at Construction camps

The contractor will ensure the operation of labour camps will not produce nuisances and adverse environment impact to the locals. Sanitary wastes and excreta will be safely disposed into septic tanks. The contractors will further adopt good management practices ensuring sustainable supply of water to rest rooms as well as for washing and bathing purposes, energy for cooking and other necessary purposes, and ample drinking water for labour workers and other project staffs. The contractors will further ensure that labour workers will not dispose chemicals, raw sewage, and wastewater effluent. Prior to the close out of construction the worker camps will be removed and restored to the original condition as far as is reasonably practicable. Construction camps will be established in areas with adequate natural drainage channels in order to facilitate flow of the treated effluents. Contractor will ensure that no any sort of negative impacts upon environment and local community and no any sort of contamination into the natural drainages and water resources from the operation of camps within the project area. Furthermore, The contractor will comply with Construction Camp Management Plan but not limited to guidelines mentioned into it. It is further anticipated that contractor will work under close coordination with Environmental Monitoring Unit (EMU) of the project.

Contamination can be controlled to some extent by using phytoremediation by incorporating roadside planting strategies:

Fuel and lubricants will be stored as per the plan. Storage area will be paved with gentle slope to a corner and connected with a chamber to collect any spills of oils.

To avoid soil/water contamination at the wash-down and re-fuelling areas, 'Oil Interceptors' will be provided. Oil and grease spill and oil soaked materials will be collected and stored in labelled containers (Labelled: WASTE OIL; and hazardous sign be displayed).

xii) Impacts due to operation of Crusher Plants, Concrete Batching Plants and storing of material if on river banks/ Handling of Granular Materials/Handling of Bituminous Materials/Handling of Oil and Diesel

Crusher plants will be established in two area one is at Gideri Khola area and second is as mobile base. concrete batching plants will be established and operated at the selected and identified sites only. Proper traffic signals and markings will be provided at the vicinity of such plants in order to avoid accidents and injuries. Extraction of sand and gravel from various river beds situated around the project area will be avoided. Substantial amount of stones and boulders are expected to be acquired from the excavation and opening of width. For the storage of construction materials, contractor will provide bricks and sands for flooring in order to prevent soil and water contamination due to oil spillage.



Similarly, contractor will provide damp –proof flooring for the storage of cements will be carried out as per standard codes. Further, contractor will store blasting materials as per the specific provisions provided in the Act.

xiii) Impacts during the construction of Bridges

During the construction of the bridges the following mitigation measures should be consider

- Cutting should be nominal and environment friendly
- The pollution level should not be altered specially water and soil
- construction materials should be taken from the same sites for the road construction
- construction activities should be align with the road construction activities
- The aquatic environment should not be affected

xiv) Planning Traffic Diversion and Detours

- Proper traffic diversion should be maintained before construction starts
- The construction activities should be maintained only a single site once
- Stretch wise construction should be preferred

6.2.2.2 During Operation stage

i) Obstruction to natural drainage and water logging

Direct impact due to surface runoff upon public and private lands, water resources, and natural drainage will be avoided by providing lead off drains at the appropriate sections of road alignment. The direct disposal of side surface lead off drains upon private cultivated lands and properties will be avoided. Surface runoff and side lead off drains will be managed properly in order to prevent significant adverse impacts upon public and property. Locations of runoff and lead off drain will be further taken into account in the detail design stage that will not trigger further landslide and soil erosion at the basement area of the road alignment as well as inundation and siltation of private and cultivated lands.

The following mitigation measures will be carried out

- Maintenance of smooth discharge across culverts and cross drainages by cleaning and maintaining them regularly so that water logging on adjacent land due to road do not occur.
- Side drain water will not be discharged into farmland or environmentally sensitive locations
- Regular cleaning of cross drainage structure/ channels across the road to avoid any blockage of drainage

ii) Clearing of construction camps

- Construction camps should be far from the forest area
- construction camp clearance should be taken from the concern stakeholders
- Construction camp regulations should be prepared and approved from the client
- The construction camp should be maintained clean

iii) Camp site restoration

- The contractor should restore the construction camp properly
- There should be maintain the surrounding environment

iv) Dismantling of camp site

- The dismantling should be environment friendly

- There should not be waste materials during the dismantling
- The surrounding is to be environmental friendly

The contractor should be responsible for the dismantling of the camp site. The waste and other materials during the construction period should not get affected for the restoration of the camp area.

v) Clearing of water channels side drains

During the operation period the water channels should not get affected due to the construction activities. No water resources should be affected by the construction activities. The side drains should also get clear during the operation. The lines men from the DoR will also be responsible for the clearing of the side drains.

vi) Rehabilitation of borrow pit area

The project is so serious about the rehabilitation of the borrow pits area. The contractor shall be responsible for the rehabilitation of the borrow pit area. The designated borrow pit area must be rehabed after the construction activities. The environmental impacts should be mitigate. The restoration should ensure the environmental sustainability of the borrow pit area.

6.2.3 On Biological Environment

6.2.3.1 During construction stage

i) Loss of forest trees due to road construction activities

The Project will support/involve CFUGs, Collaborative Forest User Group, District Forest Office and Buffer Zone Management Committee to carry out compensatory plantation at the rate of 25 saplings for each felled tree in available locations provided by the concern Forest and their management until the age of 5 years. For this compensatory purpose, the project required to plant 225,675 numbers of tree saplings of locally adopted plant species will be planted within the affected government, community and collaborative forest area existed along the proposed road alignment. FUGs will be coordinated for mitigation works as well as during felling of affected tree and site clearance at pre-construction phase. FUGs will be further handed over with compensatory re-planted trees after the completion of plantation works and will be responsible for protection for at least five years. Consultation with Department of Forest and other related government bodies will be carried out for the execution of such works. Planting in road right of way, adjacent areas and other public areas in consultation with local people can help to support local flora and fauna. Compensatory planting in locations away from the road impact zone may provide additional habitats and migration routes for local animals, while also guarding against erosion. Compensatory plantation of at least twenty five saplings of determined size for every tree cut is done as per policy and site-specific prescriptions of the Department of Forest.

It should be ensured that plantation is carried out only in areas where water can be made available during dry seasons and the plant can be protected during the initial stages of their growth. The species shall be identified in consultation with officials of forest department, giving due importance to local flora. It is recommended to plant mixed-species in case of both avenue or cluster plantation. The saplings for plantation can be supplied by the Forest Department or managed from local nurseries or nurseries of the District Road Office. Costs



for providing saplings will be borne by the road construction funds. Planting should be done wherever possible with native species, which are likely to require little maintenance and may prove beneficial in maintaining ecosystem integrity.

If the vegetative covers are cleared, they will be re-vegetated by the suitable endemic and indigenous species. The priority of planting Species will be from the endemic species. Through geometric realignment, the number of trees to be cleared will be further reduced during construction survey when the Contractor and Engineer perform ground staking. No tree will be cleared without prior approval of the jurisdictional DNPWC, CFUG and clearance from the DFO.

ii) Possible depletion of threatened species

Cutting and felling of protected and threatened species will be avoided as far as possible. However, number of protected floral species that are existed within the carriage width and required to cut will be marked properly and volume of those affected trees will be calculated prior to cutting. All the required legal procedures and approvals will be carried out before felling of protected species. Protected floral species such as Khayer, Sal etc., will be included higher in number during compensatory plantation. Saplings of such species will be acquired from Forest office and community forest user groups.

In addition, contractors will be responsible to ensure illegal hunting and poaching of any sort of wild animals including birds during highway construction.

iii) Disturbance to wildlife by the construction activities

Disturbance to wildlife habitat and its habitat by the construction works will be avoided as far as possible. Contractors will ensure to avoid disturbance to wildlife by his construction workers especially at dense forest areas such as buffer zone area of Chitwan National Park, Community Forest Areas of the road alignment. Besides if the whole stretch of forest will be divided in to many stretch and will works only single for a single time.

iv) Impact due to wildlife poaching, illegal tree felling and fire hazards

Contractor's document must include provisions to restrict work forces with regard to forest product and wildlife collection and trade. Equally, collection of non-timber forest products (e.g. bamboo, medicinal plants and other NTFPs) by work staff must be prohibited and enforced. The project management should instruct the project officials, labour force, contractors, consultants and other stakeholder not to indulge in such activities and abide by the forest act and its regulation. The project will closely coordinate with Forest Office and its outlets to control illegal poaching and trapping by the project stakeholders or other outside wildlife poachers, wildlife traders and timber smugglers. Blasting activities will be carried out under controlled environment to avoid fire hazards. Contractors will strictly restricting workers to avoid forest fires and illegal hunting, poaching, tree felling activities during construction.

Fireline Management plan should be implemented. The fireline management plan should be constructed longitudinal basis. These longitudinal firelines are believed to be the fire hazards.

v) Pressure on forests for fuel wood in labor camps

Contractor will be responsible to prevent labours from direct entrance into the adjacent forest during construction. Awareness about environment and conservation will be provided to construction labours in order to maintain and control ambient environment from degradation and human interference upon existing forests. Contractor will provide legal sources of energy in labour camps. Contractor will obtain fuel wood from adjacent community forests only if forest user groups willing to sell their extra fire woods.

vi) Impacts on CNP, Buffer zone and Wildlife

To minimize disturbances to wildlife and the CNP and at the same time ensure timely progress of construction activities the following measures recommended below will be implemented by the contractor.

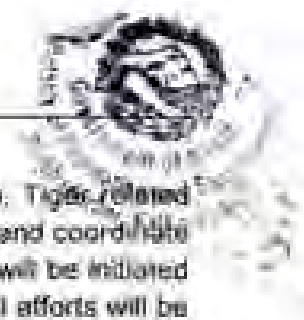
- No construction camps or staging camps including temporary storage will be allowed inside the CNP-Buffer Zone which is located from CH 7+150 to CH 31+200.
- No materials will be sourced inside the CNP Zone. This includes earth borrowing and quarrying.
- All works will be suspended between sunset and sunrise throughout the length of the project road.
- Harvesting of flora and fauna in the project area will be strictly prohibited and included as a condition in the agreement with the contractor.
- Speed brakes in terms of temporary barriers and sign boards informing elephant crossing areas will be installed to advice motorists of possible encounters with elephant and hence, to reduce vehicle speed at most 40km/hr.
- Blowing of vehicle horn in the buffer zone will be restricted. This will be enforced through installation of appropriate sign boards.

There will be close coordination with the CNP warden and BZMC and user groups in case of wildlife related incidents (such as wildlife coming near the construction site) occur during construction.

vii) Impacts associated with Tiger, Rhinoceros in the buffer zone of CNP

If any wildlife come near the road construction site while construction activities are going on during the day, construction activities must be stopped immediately and the construction workers must be taken away to a safe distance from the wildlife. This must be done to allow passage of the wildlife through the area with minimal disturbance and also to prevent any injuries to the workers due to attacks from the wildlife. Construction activities may resume only after the wildlife have passed through or moved away from the construction site.

While no construction activities will be allowed during the night time, the construction of road will sometimes need to be kept clear of any animal or tiger movement particularly after application of the DBST. To discourage the tiger from crossing the road at these times, the road will be lit up during the night. While potential damages to the constructed road can be saved, this measure can also prevent potential injuries to the elephants by soft road layering (for instance asphalt), or from other containers, equipments and materials which may need to be kept on site.



To keep up to date with new knowledge and methods of dealing with Rhino, Tiger related issues, the project staff under DoR, CSC and NGO will closely communicate and coordinate with the CNP that is scheduled to undertake a study on the White the study will be initiated either at the same time or only after the start of project construction works, all efforts will be made to quickly integrate new knowledge, if any, into the mitigation measures for the project.

6.2.3.2 During operation stage

i) Encroachment into forest areas for commercial logging, settlements

Environmental Monitoring Unit of this road project will be established in order to monitor overall environmental condition and likely impacts due to operation of the project. However, forest user groups will also be responsible for monitoring to avoid such likely impacts. Moreover, site enhancement projects and area development projects will be launched in order to maintain and enhance greenery within the project VDCs as well as adjacent other VDCs. Promotion of local agricultural products including NTFPs and bamboo plantation and conservation programs will be included in area development projects. Following mitigation measures should be considered.

- Encourage and support local communities and authorities in controlling illegal harvesting of forest resources.
- CFUGs/LHFGs will be supported to conserve and manage their CFUGs/LHFGs according to operational plans.
- Encourage and support local community for controlling illegal harvesting of forest resources and encroaching the forest area for settlement.
- Strict rules and regulation will be enforced in and around the alignment area to protect from the illegal harvesting of the vegetation and wild life.
- The project have proposed a habitat management project as an enhancement measures of the project to manage the forest and its ecosystem so that the gross loss of the forest area will not be changed.

ii) Impact upon wildlife movement and habitat due to forest fragmentation

The wildlife including Tiger movement has been noticed in the buffer zone of CNP from which the road alignment passes. These passing area have been identified based on the consultative meeting with the representative of forest agency in District and local offices as well as the local peoples. The wildlife movement mechanism has been proposed on the basis of the requirements identified from the field visit and discussion with concern stakeholders. For mitigating these impacts check post shall be installed with additional number of speed breaker in the buffer zone area and the vehicles will be compelled to stop as soon as the movement of Tiger is noticed. 8 numbers of under pass have been proposed for the easy movement of the wildlife. The chainage of the wildlife pass are as follows:

Animal Pass crossing in (Ch. 7+350, 7+825, 8+805 and 9+350) (29+840, 39+980) and (Smyiti Bridge, 11+450, RC slab bridge 54+819 and Jyamire Bridge 60+358).

Beside it DoR is planning to manage the habitat through a awareness and habitat management plan. The Habitat management plan will work closely with the local Forest and Wildlife related organization which could support for the construction of a biological road to pass through the Wild animal underpass.



Speed control facilities in the form of speed bumps and speed signage will be provided in all wildlife crossing points (existing crossing points as well as expected future crossing points)

- ii. Signboards informing road users on the presence of wildlife and tigers will be posted at appropriate locations along the road
- iii. Regular maintenance of the animal underpasses provided

5.2.4 On Chemical Environment

i) Use of bitumen and their storage, heating, spreading etc.

Adequate care is necessary in handling bitumen. It should be stored in a confined place in order to minimize or avoid contamination with water sources in case of spillage. Bitumen is applied at high temperature, leading to a considerable risk of burns to the laborers. Protective clothing and gloves should be provided to the laborers and make ensure to use of it.

Bitumen bleeding due to excessive application rates could be contributing cause of accidents during operation. Good road maintenance practice requires bleeding problem to be resolved as soon as possible by spreading 5 mm sized chips over the affected area and rolling in them.

Additionally, the following should also be followed:

- Adequate care in storing and handling bitumen. Avoid contamination with water sources in case of spillage. Storing compounds shall have fire extinguisher facilities.
- Protective clothing, gloves, boots etc. should be provided to the laborers.
- Bitumen heating and mixing plants should be away from settlement areas.
- Excess bitumen should be managed properly.

ii) Use of fuel, lubricants, oil, acids and other chemicals for construction (vehicle, plants and equipment) and their storage

Storing of fuel, lubricants etc. should be done in a properly manner. Used lubricants shall not be discarded in a haphazard manner or disposed in streams and rivers. Cleaning of vehicles or equipments should not be done in streams, rivers or canals.

All storing compounds shall have fire extinguisher facilities and first aid kits.

The following should also be carried out:

- Storing of fuel, lubricants etc. should be done in a safe manner.
- Used lubricants shall not be discarded in a haphazard manner or disposed in streams, rivers and water sources.
- Direct cleaning of vehicles or equipments should prohibit in streams, rivers or canals.
- All storing compounds shall have fire extinguisher facilities and first aid kits.



6.3 Summary of mitigation measures

Following table summarizes the major impacts and responsible sectors for the mitigative measures to be adopted.

Table 6.1: Beneficial impacts enhancement measures

During construction stage

SN	Likely Impacts	Beneficial Impacts Maximization Measures	Responsibility	Remarks
1	Opportunities for increased income generation and employment	- Whenever applicable, adopt labor-based methods of construction - Give maximum priority to employ local labors and project-affected families, offer skilled, semi-skilled and unskilled labors from project area first priority for work, with gender equality - Whenever practical, scheduling the construction works during the agricultural off-season to enable local people to become engaged - Include binding clause in Contractor's Contract Document to give priority for local people with govt. accepted wage and recruit local labour impartially without favour or gender discrimination - Full payment of wages to worker as per contract document	Project and Contractor	
2	Opportunities for technical skill enhancement of Local Manpower	- Provide on-the-job training and practical training to local workforce on operation of equipments & construction works - Include binding clause in Contractor's Contract Document for providing on-the-job training to local workforce	Project and Contractor	
3	Increase and enhancement in Enterprise Development and Commercialization	- Project shall disseminate information on construction schedule and approximate number of labours and can designate some places for the operation of temporary stalls - Encourage consumption of local products by labours & Project staff	Contractor	
4	Community Development and Income Generation Plans	- Project shall provide technical / monetary support for establishment of public infrastructures, e.g. bus stops, drinking water spouts, street lights, pedestrian crossing bridges etc. - Widen roads and provide bus stops near Bazaar areas	Project and Contractor	
5	Improvement / enhancement of existing social service facilities	- Project shall provide technical / monetary support for establishment of public infrastructures, e.g. bus stops, drinking water spouts, street lights, pedestrian crossing bridges etc. - Widen roads and provide bus stops near Bazaar areas	DDC, VDCs, Workers and Project Staff	

During Operation stage

SN	Likely Impacts	Beneficial Impacts Maximization Measures	Responsibility	Remarks
1	Improved Transportation Facility and Decrease in Transportation Cost and Time	- Construct road as per standard design with proper drainages - Timely completion and operation of the main 2 lane road - Timely completion and operation of 2 service lane road - Scientifically designed side access to service road that is acceptable to local users - Prohibit haphazard development of side access entry to service road Operation of regular public bus services and determine travel fare rates scientifically - Periodic maintenance of road to operate road up to its design period - Avoid road blockages, prohibit burning of tire, dumping of construction materials on roads - Prohibit road digging by different agencies without proper plans to reconstruct the damage caused	DoR	
2	Enhancement in Economic Activities, Trade and Business	- Proper operating of road corridor at all times - Avoidance of road blockages and stoppages	DoR, DOTM Project	
3	Enhancement of the Social Service Facilities	- Project shall provide technical / monetary support for establishment of public infrastructures, e.g bus stops, drinking water spouts, street lights, pedestrian crossing bridges etc. - Widen roads and provide bus stops near Bazaar areas	DDC, VDC, Ward office	
4	Appreciation in Land Value	- Establish and propagate an effective land-use plans, e.g. commercial/business areas, residential areas, industrial areas etc. and develop by-laws - Development of social service facilities such as water supply, sewerage, electricity and telephone etc. all along the road and its influence areas - Prohibit haphazard growth and haphazard construction of side access to service road	DDC, VDC, Municipalities	
5	Agriculture development	Implementation of agricultural development subproject at different location with fast, easy access and transportation of goods	DDC, VDC, Municipalities	
6	Increase in crop productivity, promote trade for agriculture products	Implementation of road line and other sub-project components with fast and easy Accessibility	Project Proponent	
7	Impact due to increase in income and living standard of people	Promote economical activities of local due to the increase on income generating activities and their living standards and life	Project Proponent	



Table 6.2: Adverse impact mitigation measures

Impacts on Socio-economic and cultural environment

During Construction stage

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
1	Loss of houses and property for road construction	- Identify exact households that needs to relocate and rehabilitate - Assist such households to perform their daily activities and in-come generating activities	Contractor	
2	Probability of social conflicts and social pollution due to influx of construction workers	- Employ local labours to the extent possible - Orientation to labours on importance of maintaining social harmony - Close vigilance of labours in labour camps - Strict enforcing of labour's 'code of conduct'	Contractor, Local Police	
3	Likely adverse impacts to local community and environment due to establishment of Work Camps	- Identify labour camp sites such that it does not affect the people residing around the site - Prepare a 'Code of Conduct' to be enforced inside labour camp sites and include them in Contractor's Contract Document - Provision water and latrines for site workers - Provide adequate compensation to private land owners for renting their land - Reinstate land to original condition after completion of works	Contractor	
4	Occupational health and safety issues	- Erect danger signs and signals on the hazardous area - Provide workers with safety gears (helmets, boots, gloves, masks, goggles, earplugs and reflector jackets) - Orientation and training shall be provided to workers on safety measures and work procedures prior to their dispatch to possible dangerous sites - Provide accident insurance for workforce - Provide routine health checkups for labours before employment and during construction works - Study of presence of any local communicable disease from locals to outside workers and immunize labours from outside the area before employing them	Contractor	
5	Gender involvement and child labour during construction	- Give priority to the women while hiring the workers - Provide skill enhancement and technical training to women - Maintenance of minimum labour standards - Gender review of legislation - Promoting women's literacy - Reducing household vulnerability	Contractor	
6	Impact due to unsocial activities due to outside	Appropriate preventive mitigation measures will be applied to reduce and avoid unsocial activities	Contractor	

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
	workers	- Awareness raising to control such activities - Monitoring and comparison of such activities on daily bases		
7	Pressure on scarce resources by construction workers	- Contractor should make own arrangements for water and sanitation for their work-force - Employ local work-force to reduce pressure on use of social service facilities	Contractor	

On Socio-economic and Cultural Environment

During Operation stage

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
1	Possibility of road traffic accidents and issues related to road safety	- Install road marking & its timely re-marking when its worn out & invisible by drivers. Erect danger & precautionary signs and signals at potential danger areas. Provide street lights and reflectors to avoid night-time accidents - Strictly enforce speed limits and traffic rules to all drivers - Enforce public vehicle drivers to pick and drop passengers at designated locations only - Conduct Traffic Safety Campaign and Media coverage / Informatory announcements to public several times a year - Educate road side people not to allow their children to play on the roads - Educate people not to allow their cattle to enter in the roads	Traffic Police	
2	Population pressure and impact due to new settlement along the road alignment, and possible ribbon settlement development	- Establish and propagate an effective land-use plan for the region, such land-use plan should clearly incorporate future visions for acquiring land for further road network expansion - Prepare good cadastral records that can easily be verified by land-use planners - Permanent demarcation of RoW incorporating physical barriers and appropriate planting - Incorporate physical barriers in zones of potential / prospected encroachment risks, e.g. by roadside plantation (ornamental) schemes. Species selection for the roadside plantation will be done with the consultation of DFO - Initiate, by engaging local NGOs/CBOs, community awareness and assistance programs to prevent undesired land take and roadside squatter development - Consider long-term solutions to avert undesired growth (e.g. expanding markets along road or in different axis) by planning for road bypasses in congested areas - Establish public notice that specify the acquisition / property rights of the RoW	Project	

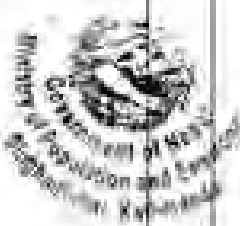


SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
		and that explain at the same time non-permissive uses of the RoW by non-entitled persons. - Exert all legal and socially acceptable means to evict illegal occupants of the RoW, but take in due consideration the needs and constraints of vulnerable and indigenous groups		

On Physical Environment

During Construction Stage

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
1	Air and Noise Pollution and Vibration Effect	- Ensure good construction practice by the Contractor - Indicate air, water, noise and vibration limits in Contractor's Contract Document Air Pollution - Water spraying during construction two times a day if dust pollution becomes nuisance - Prohibit open storage and spillage of loose soil in and around construction site - Appropriately cover or wet the stock piled and spoil materials if it gives rise to dust pollution - Cover loaded trucks with polythene sheets / tarpaulin during transportation - Use of face masks to the construction workers in dust prone areas such as crushing plants, excavation sites etc. Water Pollution - Avoid disposal of solid waste, sludge, and other wastes directly into water bodies and properly manage composts - Prohibit disposal of waste fuel, oil, grease into water and cleaning of vehicles in rivers - Prohibition of urination and defecation in open areas and near water bodies by construction workers with the installation of sanitation facilities. - Prevent soil slippage at toe of the stocked areas by installing barriers at the perimeter Noise Pollution - Establish crusher plant, batching plant etc. away from settlement and wildlife habitat areas to extent possible - Construction of noise barrier such as bund or vegetative barrier at construction site - Prohibition of using pressure horns by vehicles near the settlements and wildlife habitat areas, if any - Limit the volume of geyatin while blasting at quarry sites - Provide ear plugs to each construction workers in the noise prone areas such as blasting for hard rock excavation	Contractor	



SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
		- Large noise producing machineries such as air compressors, crushing plants to be fitted with noise reduction mechanism. Vibration Effects - Use compaction equipment with caution and monitoring for any cracks near the settlement areas - Use smaller equipment which generates less vibration near settlement areas. Avoid use of compaction equipment during night time.		
2	Possible impacts due to quarrying materials and borrow pit operation	- Restricted to small areas, on sites without trees cover – and located away from cultivable lands and settlements, drinking water intakes - Areas where it will not result slope instability, erosion, disruption of natural drainages, changes in river regimes, river bank cutting, destruction of vegetation, damage of farmland and other physical resources - Extraction of sand and gravel will be spread over the longest length possible from seasonal rivers so that no section of river bed is excessively disturbed - No condition is created inducing spill over of impoverished materials by the discharge during wet season over the arable land on the valley side - After the completion of extraction, the site will be properly fenced and closed, landscaping completed and plantation will be done on it.	Contractor	
3	Possible impacts due to stockpiling of construction materials in nearby residents or natural environment	- Avoid stockpiling site near cultivable lands and settlements, drinking water intakes, public places, near school, health centres, forest area, sensitive ecosystem, fragile and landslide prone slope or terraces etc. and where natural drainage will be disrupted - Stockpiled material should be protected from erosion prior to rainy season, unless covered by a suitable material, including construction of drainage, trenches and ponds around the heap and where necessary, seal the area so surface water pollution does not occur - Storage of material on private property will be allowed only if written permission is obtained from the owner or authorized lessee - Compensation for land and crops damaged due to stockpiling of materials should be given by the Contractor to the affected landowners - Site should be cleaned and brought to original condition after closure and removal of the stockpile	Project Contractor	

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
4	Possible impacts due to spoil disposal	Avoid disposal on: – natural water course posing a threat of or causing chocking in its flow and course change – over the edge of the excavations and fresh embankments – immediately above potential arable land and forest areas – above public utilities and existing services – water supply lines, irrigation canal systems, valley side trails etc. – above local settlements' physical structures, especially houses – on fresh unstable slopes Spoil disposal should be prioritized on: – On undulated and low, flat plains – Flood plains without stretching over to main course – Site requiring landfills, especially local play ground, community ground, reclaimed land from rivers, etc. – Site requiring value adding landfills, especially reclaiming land for building constructions – Broad flat land on the ridge and depressions spread over large areas	Project Contractor	
5	Blocking of natural drainage and cross drainages	– Avoid disposal of any excess material in natural drainage paths – If temporarily disposed, clear drainage path prior to start of rainy season – Periodically clean and maintain all cross drainage facilities – Strictly prohibit disposal of solid wastes by local people – Filling of excess material should be done such that it does not hinder natural drainage	Contractor	
6	Slope instability, landslides and erosion of cut hill side slopes	– On cut slopes, landscaping should be carried out with bio-engineering works, prior to rainy season, with the application of top soils – Compensatory plantation if possible should be carried out in this area – New embankments should be properly compacted and exposed surfaces should be covered with vegetation to avoid slope washout – Contractor's BOQ should mention such measures	Project Consultant Contractor	
7	Degrading the qualities of existing rivers	– Make a strict rule not to throw the excess material generated during construction – Properly manage this stockpiled material so that the downstream erosion doesn't occur	Contractor	
8	Generation of Solid Wastes from Labour Camps	– Employ maximum number of labors from nearby villages as far as possible – Establish labour camps away from water	Contractor	

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
		- sources and specify appropriate sites for establishment of labour camps with appropriate arrangements for solid waste collection and its management through incineration or proper landfill for degradable wastes – Strict prohibition of disposal of solid wastes near water sources – Develop and implement “Code of Conduct” and enforce strict penalty to violator of “Code of Conduct” – Educate about non-use of bio-non-degradable materials such as plastic, metal, glass etc. and separation of such waste material and incineration safely		
9	Surface and ground water contamination from unsanitary disposal of toilet waste	– Avoid open defecation of construction workers and construct pit latrine near the labor camps – Sanitary wastes and excreta will be safely disposed into septic tanks – Provide awareness program and training to the construction workers regarding health and sanitation	Contractor	
10	Impacts due to operation of crusher plants, concrete batching plants and its storage	– The crusher plant and concrete batching plants shall be established and operated at the selected places only – Proper traffic signals and markings should be provided at the vicinity of such plants – Extraction of sand and gravel from various river beds situated around the project area should be avoided – The two crusher plants will be operated at Gideri Khola area and another on a mobile basis	Contractor	

On Physical Environment

During Operation Stage

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
1	Possible damage due to obstruction to natural drainage and water logging	- Periodically clean and maintain all cross drainage facilities - Strictly prohibit disposal of solid wastes by local people – Avoid disposal of any excess material in natural drainage paths – If temporarily disposed, clear drainage path prior to start of rainy season	Contractor	
2	Fragmentation of individual land plots	– Establishing easy access path rather than long time consuming into settlement area and farm land – The RoW should be demarcated and fenced in order to avoid encroachment – Improving agricultural extension services and applying additional protective measures on water logging issues	Contractor	



On Biological Environment

During Construction Stage

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
1	Loss of forests	- Minimize forest loss through careful execution of work and cutting only those trees which are absolutely necessary - Planning for compensatory planting, by adopting the following steps: - Prepare elaborate Action Plan (for cutting of trees, its management, compensatory plantation at 1:25 ratio, establishment of nurseries etc.) in consultation with concerned authorities (CFUG, DDF, DFO) - Obtain approval from authorized agency for cutting of the trees - Make joint survey with respective DFO and confirm the location as well as planting species for compensatory plantation - Implement the Action Plan jointly by CFUG, DFO and other agencies as per the approved Action Plan as per existing rules and regulations.	Project, DFO, contractor, consultant	
2	Possible depletion of threatened species	- Cutting and felling of protected and threatened species should be minimized - All the legal procedures and approvals should be carried out before felling of protected species. - Protected flora species such as Mayur, sal should be included higher in number during compensatory plantation	Project, Contractor, CSC, DFO	
3	Disturbance to wildlife by the construction activities	- Disturbance to wildlife and its habitat by the construction works should be avoided as far as possible - Contractors should be ensured to avoid disturbance to wildlife by the construction workers	Project, Contractor, CSC, CFUG, DFO	
4	Impact due to wildlife poaching, illegal tree felling and fire hazards	- Contractors' document should include provisions to restrict work forces with regard to forest product and wildlife collection and trade - Collection of non-timber forest products by the work staff should be prohibited - The project management should instruct the project officials, labor force, contractors, consultants and other stakeholder not to indulge in such activities	Project, contractor, CSC, CFUG, DFO	
5	Pressure on forests for fuel wood in labor camps	- Ensure strict penalty and fines for illegal activities - Effective patrolling and surveillance from CFUG - Establish security check-posts at proper locations - Educate and create awareness among local people - Contractor to provide kerosene to its labour and prohibit use of wood collected from nearby forests - Contractor not to use wood from nearby forest for blumen heating purpose	Project, Contractor, CSC	

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
6	Impacts on CNP buffer zone and wildlife	- No construction camps or staging camps including temporary storage should be allowed inside the CNP buffer zone - No materials should be sourced from the CNP/buffer zone area - Illegal harvesting of flora and fauna in the project area should be strictly prohibited and included as a condition in the agreement with the contractor	Project, Contractor, CSC, CFUG, CNP	
7	Impacts due to elephants in the buffer zone of CNP	- Construction activities should immediately be stopped if elephants come near the construction site - As far as possible no construction activities should be allowed during the night time - Wildlife friendly construction approach should be followed as per the suggestion of the experts	Project, Contractor, CSC	

On Biological Environment

During Operation Stage

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
1	Encroachment into forest areas for commercial logging, settlements	- Environmental monitoring unit should be established for this road project - Encouragement to local communities and authorities in controlling illegal harvesting of forest resources - Strict rules and regulation should be enforced in and around the alignment area to protect from illegal harvesting of the vegetation and wildlife	CNP, CFUG, DFO	
2	Impact upon wildlife movement due to forest fragmentation	- The wildlife movement mechanism should be made efficient making wild life crossing underpass - Wild life movement corridor should be effectively developed and ensure with no wild life crime activity in the area through monitoring - Check post with speed breaker in the road should be installed in the buffer zone area	CNP, CFUG, DFO	

On Chemical Environment

SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
1	Possible impacts due to use of bitumen	- Adequate care in storing and handling bitumen. Avoid contamination with water sources in case of spillage. Storing compounds shall have fire extinguisher facilities - Protective clothing, gloves, boots etc. should be provided to the laborers - Bitumen heating and mixing plants should be away from settlement areas - Excess bitumen should be managed properly	Contractor, CSC	
2	Possible impacts due to use of fuel, lubricants, oil, acids and other chemicals for construction	- Storing of fuel, lubricants etc. should be done in a safe manner - Used lubricants shall not be discarded in a haphazard manner or disposed in streams/ rivers and water sources - Direct cleaning of vehicles or equipments should be prohibited in streams, rivers or canals	Contractor, CSC	



SN	Likely Impacts	Adverse Impacts Mitigation Measures	Responsibility	Remarks
		- All storing compounds shall have fire extinguisher facilities and first aid kits		

6.4 Tentative cost estimation of mitigation measures

6.4.1 Compensatory plantation and its protection

The compensatory plantation, as envisaged by the Department of Forest, MoFSC is in the ratio of 1:25. The planted tree seedling / saplings have to be protected and managed for at least 5 years. Total no. of trees to be cleared: Trees: 9,027 Nos. Compensatory plantation at 1:25 ratio and number of trees plantation necessary is approximately 225675 Nos. The cost for compensatory plantation is estimated as presented in following Table 6.2

Table 6.3: Compensatory plantation cost for the community forests

Forest Name	51 Community Forests, 3 Religious Forest and 1 Sapling Forest		
Tree No. Lost	9027 Nos.		
Tree Cutting Costs		Total	
Replantation (@ 1:25)	Numbers 225675		As per provision of MoFSC
Replantation Costs			
Seedling Cost	NRs 10		
Cost of Plantation	NRs 50		
Protection/ Conservation Costs (for 5 years)	NRs 50		
Total Costs		Rs. 24824250	

Source: Estimation done by the consultant team

Source: Combined Indigenous Peoples plan and resettlement plan, 2012

6.4.2 Cost of Enhancement Measures

Cost of enhancement measures are presented in Table 6.4 below:

Table 6.4: Cost of Enhancement measures

SN	Particulars	Nos. / Units	Amount	Remarks
1	Skill development training	LS	Rs. 2,500,000	
2	Income generation trainings	LS	Rs. 1,000,000	
3	Orientation to School Children	LS	Rs. 500,000	
4	Erection of Signs and Signals at road crossings	LS	Rs. 300,000	
	Total		Rs. 4,300,000.00	

Source: Estimation done by the consultant team

6.4.3 Cost of other mitigation measures (Safety costs)

Cost of other mitigation measures are presented in Table 6.5, below:

Table 6.5: Cost of other mitigation measures

SN	Activity	Nos. / Units	Amount	Remarks
1	Water sprinkling and sound barrier	LS	Rs. 1500,000	
2	Personal Protective Equipment (PPE)	LS	Rs. 1098,000	

3	Habitat management	LS	Rs. 1,000,000	
4	Resettlement Cost		Rs 42,909,592.00	
5	Bioengineering measures	LS	As included in civil cost	
Total			Rs.46,505,592.00	

Source: Estimation done by the consultant team

6.4.4 Summary of cost of mitigation measures

Table 6.6 below presents the summary of the tentative estimated cost environmental mitigation measures.

Table 6.6: Summary of cost of mitigation measures

S.N	Items	Total Costs	Percentage (%)
1	Compensatory plantation cost	24,824,250.00	
2	Animal Underpass	120,400,000.00	
3	Cost of Enhancement measures and Agriculture Development	5,300,000.00	
4	Public Utilities	60,000,000.00	
5	Cost of other mitigation measures (Safety costs)	108,0000.00	
5	Air Pollution Monitoring Instruments	10,000,000.00	
6	Management of Illegal hunting and Wildlife Trade	500,000.00	
Total Environmental mitigation costs		322,104,250.00	

Source: Detail Design of Road



CHAPTER 7: REVIEW OF POLICY, LEGISLATION, GUIDELINES AND INSTITUTIONS

7.1 Constitution of Nepal

The Article 30 (1) of the Constitution of Nepal, assures the right to every citizen to live in a clean environment and Article 51(f 2) requires the state to keep the environment clean and to provide priority to the protection of the environment and prevention of further damage to the environment due to development activities and to take special measures for protection of wildlife, vegetation and forests.

Furthermore, the Constitution has safeguarded the property rights of the citizens by entitling them to earn, use, sell and exercise their rights of property under existing rules and regulations. Except for public welfare the state will not acquire or obtain or exercise authority over individual property, but in case the state acquires or establishes its right over individual property for public good, the loss of property will be suitably compensated.

EIA is the only proven tool to prevent such damage, therefore application of this clause is in concurrence with the use of EIA in all development works to prevent further damage.

7.2 Environment Related Acts

i. Environmental Protection Act (EPA), 2053 (1997)

The Environment Protection Act, 1997 is the principal legal framework for environment protection and pollution control. The legal regime on the environment makes every effort to integrate environmental aspects in the projects and programs. The Environment Protection Act (EPA), 1997 and the Environment Protection Rules (EPR), 1997 (amendment 1998), enforced since June 1997 and 1998, oblige the proponent to carry out Initial Environmental Examination (IEE) and/or Environmental Impact Assessment (EIA) of the prescribed proposal before implementation of the Project. The Act provides that no one shall implement or cause to be implemented a proposal without getting it approved from the concerned agency or the Ministry.

The environmental laws contain elaborated provisions on the approval process of the EIA report. Sections 3 to 6 of the EPA, 1997 and Rules 3 to 11 of the EPR, 1997 contain such provisions and this EIA report has been prepared following those legal requirements. Rule 12 of the EPR obliged the proponent to comply with the matters mentioned in the report and other conditions, if any, prescribed by the approving agency or concerned agency. Furthermore, the environmental law has made the public consultation a pre-requisite to all the prescribed projects to provide different stakeholders an opportunity to raise their concerns. Section 18 of the Environment Protection Act (EPA), 1997 empowers the prescribed authority case any person implements a proposal requiring environmental assessment without any approval or carries any act in contrary to the approved proposal.

The environmental management plan is the heart of the environmental study report. The proponent is obliged to implement the mitigation measures. The environmental monitoring works should be performed by the concerned agency / Ministry and auditing by the Ministry.

of Science, Technology and Environment (MoSTE) in accordance with the provisions of the EPR, 1997

ii. Local Self Governance Act, 2055 (1999)

The Local Self-Governance Act, 2055 provides more autonomy to Village Development Committees (VDCs), District Development Committees (DDCs), and municipalities by empowering local authorities to manage natural resources, and guides them to integrate environmental resources and environmental planning.

Sections 28 and 43 of the Act provide the VDCs a legal mandate to formulate and implement programs related to protection of environment and bio-diversity. Similarly Sections 189 and 201 of the Act provide that the DDCs are liable to formulate and implement programs related to protection of environment and give adequate priority for protection of environment during formulation and implementation of district level plan. As this is the national level priority road project, the respective VDCs and DDCs can regulate soil and water conservation activities that support to stabilize the road slopes and minimize likely adverse impacts on the road and by the road.

Highlights pertaining to environmental governance include the following:

- The Act requires wards to help in protection of environment through plantation and stipulates the rights and duties of the VDCs;
- It empowers VDCs to levy taxes on utilization of natural resources;
- It provides powers to formulate and implement plans for conservation of forest, vegetation, biological diversity, and soil; and
- It provides power to formulate bylaws in the area of management of all natural resources.

iii. Public Procurement Act, 2053 (2007)

The Public Procurement Act, 2053 has been formulated to make the procedures, processes and decisions relating to public procurement much more open, transparent, objective and reliable. In addition, the Act intends to obtain the maximum returns of public expenditures in an economical and rational manner by promoting competition, fairness, honesty, accountability and reliability in public procurement processes, and ensure good governance by enhancing the managerial capacity of procurement of public entities in procuring, or causing to be procured, construction work and procuring goods, consultancy services and other services by such entities and by ensuring the equal opportunity for producers, sellers, suppliers, construction entrepreneurs or service providers to participate in public procurement processes without any discrimination.

The Act deals with the following provisions: Provisions Relating to Responsibility for Procurement and Procurement Methods have been made, Provisions Relating to Bid, Provisions Relating to Consultancy Services; Other Provision Relating to Procurement; Provision Relating to Review of Procurement Proceedings or Decision; Provision Relating to Procurement contract; Provision Relating to Conduct; Provision Relating to Monitoring of Procurement Activities.



iv. **Public Road Act, 2031 (1974)**

The Public Road Act, 2031 has been enacted to ensure the construction and operation of the road projects smoothly. Section 3 of the Act empowers the GON to prohibit the construction of permanent structures (buildings) in the prescribed distance from the road. i.e. the Department of Roads (DoR) has the authority over everything within the boundaries of the road. The DoR may acquire temporarily the land and other property adopting compensatory measures during the construction, rehabilitation and maintenance of the public road (Sections 14 and 15). The Act obliges the DoR to plant trees on both sides of the road and handover it to the local bodies (VDC or municipality) for their management (Section 16). The Act also empowers the DoR to operate quarries and borrow pits and other facilities during the road construction (Section 17). In sum, the Act facilitates the construction of the road by acquiring land and property including for the execution of construction materials and development of other facilities during road construction through compensation as negotiated and as well as to maintain greenery along the roadside.

v. **Land Acquisition Act, 2034 (1977)**

The Land Acquisition Act, 2034 empowers the Government to acquire land for development purposes, by paying compensation for the landowner. The Land Acquisition Guidelines, 1989 have been issued to facilitate the acquisition process under the Act.

The Act clearly empowers the Government to acquire necessary land and fixed property of any owner for development use and welfare, diplomatic mission, international organizations after issuing public notice and completing required procedures. Under this Act, the Government can also acquire land for public and private corporations, organizations, private firms for public use and welfare.

However, the Government shall not acquire land for corporations, organizations and private firms for agriculture purpose except for research purpose under this Act. The Government shall provide compensation to the concerned person and organization as decided by the Compensation Fixation Committee. The compensation rate to be determined may differ for person whose land was wholly acquired or for those whose land was partially acquired. There are different provisions regarding the compensation rate:

- Compensation rate to landowner whose land has been acquired for government-owned institutions, organizations and local bodies,
- Compensation rate to landowner whose land has been acquired for other institutions and organizations, and
- Compensation rate to land owner whose land exceeds land ceiling according to Land Reform Act, 2021 acquired for government-owned institutions, organizations and local bodies.

Land acquisition through negotiation is an important aspect included in Section 27 of this Act which has a provision that the Government can acquire land through direct negotiation with the owner. This will minimize dissatisfaction of landowners regarding compensation and loss. Section 34 of the Act has a provision to return acquired land to the owner if it is not required. Similarly, the Government may also cancel its decision regarding land acquisition.

However, as there is no amendment on this Land Act over the last 35 years, it has many gaps while dealing with problem of involuntary settlement, particularly in the context of international practices and approaches.

a) There is no clear definition of the Project Affected Person/ Family. Entitlements for the project-affected person/family have been developed according to Land Acquisition Act, 2034. The Act does not consider any person as the project affected who is not the registered land owner or tenant. The major issue here is entitlements for non-title holders on land, house and other properties.

b) The issue is whether squatters, local merchants (who does not own land or house in the project area but runs a business), porters, informal tenant (does not have the tenancy right but cultivate some body's land over the years), agricultural laborers (normally resides in the area and makes a living doing agricultural laborer), artisan (such iron smith, tailor and leather worker who sell their skills on an annual-grain contract basis) and so on qualify as the project affected people for entitlements.

vi. National Park and Wildlife conservation Act, 1973;

The National Parks and Wildlife Conservation (NPWC) Act regulates the trade of species listed in CITES appendices. The Government has designated the Natural History Museum (Tribhuvan University) and the Department of Plant Resources as the scientific authorities for wild fauna and wild flora respectively. Similarly, the Government has designated the Department of National Parks and Wildlife Conservation and the Department of Forest as the management authorities for wild fauna and flora respectively. The Convention urges Parties not to allow trade in specimens of species included in the CITES Appendices I, II and III except in accordance with the provisions of the Convention.

vii. Immovable Property Requisition Act, 2013 (1956)

The Act enables the Government of Nepal to requisition of immovable property for maintaining law and order as well as the convenience and economic interest of general public. The Government can acquire private immovable property by giving a notification in writing to the property owner or any person having possession over the said property. The Act enables the Government to issue an order to the owner of property or any other person in order to impose restriction on sale and size modification of such property and on providing in rent to tenant without the approval of the Government. The Government can make reasonable modification of the building or land requisitioned in its own cost in order to use in easiest manner. In case any property is requisitioned pursuant to this Act the Government shall provide compensation and the valuation of such compensation shall be calculated as per the principle prescribed in Section 8 of the Act.

viii. Forest Act, 2049 (1993)

The Forest Act, 2049 has provisioned for the development, conservation, management and sustainable use of forest resources to meet the basic needs of forest products of the people, socio-economic development, and environmental promotion. The provisions relating to protected forests, community forests and leasehold forests will have longterm impact on the conservation and sustainable use of biological resources.



Section 23 empowers the Government to delineate any part of a national forest that has a special environmental, scientific or cultural importance as a protected forest. It is necessary to prepare and implement operational plan for any protected forest. The government is empowered to grant any part of a national forest to the community users, and as leasehold forests for the purpose of meeting the raw materials required by industries, planting and increasing the production of forest products for sale or use, and promoting eco-tourism or agro-forestry in a manner conducive to the conservation and development of forests.

The Forest Act has divided national forest into five categories:

- Government-managed Forests: National forests managed by the Government;
- Community Forests: National forests handed over to user groups for development, conservation and utilization for the collective benefit of the community;
- Leasehold Forests: National forests leased to any institution established under existing law, industry or individual, for the production of forest products, agro-forestry, tourism or farming of insects and wildlife;
- Religious Forests: National forests handed over to any religious group or community for development, conservation, and utilization; and
- Protected Forests: National forests declared by the Government of Nepal as protected forests in consideration of their special environmental, scientific or cultural significance.

Section 68 of the Act states that "in case there is no alternative except to use the forest area for the implementation of the plan having national priority and if there shall be no significant adverse effect on the environment while implementing such plan, the Government of Nepal may give assent to use any part of the government-managed forest, community forest, leasehold forest or religious forest for the implementation of such plan." The government has the ownership of any categories of forests.

ix. Plant Protection Act, 2030 (1973)

The Plant Protection Act was enacted in 1973. The Act lists plants that need to be protected during any interventional works to be carried out in the country. The Act obliges all to protect the plants enlisted in this Act.

x. Labor Act, 2048 (1992)

According to the Labour Act, 2048, section 4 on employment of workers and employees, and sub-section 3 on workers or employees engaged in any contract work of a permanent nature in any enterprise shall also be made permanent under subsection (2).

Workers or employees engaged in any work as mentioned in subsection (3) shall be paid benefits provided for in this Act according to their post and scale. Notwithstanding anything contained under subsections (2) and (3), in the event that any establishment is required to increase production or service for a short period of time, it may appoint workers or employees according to need for a certain period by specifying such a period.

Under section 5, no child shall be employed. Except in prescribed circumstances, minors and women may ordinarily be employed for the period from 6 a.m. to 6 p.m. Women may be employed like men after making appropriate arrangements on the basis of mutual agreements between the general manager and the employees or workers in question. All labours should be provided safety equipments such as helmets, gloves etc. during works.

xi. Child Labor (Prohibition and Regularization Act), 2056 (2001)

Child Labour Prohibition and Regularization Act, 2056 was enacted in favour of the welfare of the Children's right. The section 3 of this Act facilitates the children to inherit rights. Hence the Act prohibits the organizations to involve the children under fourteen years of age to employ in the works. The Child Labour Prohibition Act and Regularization shall be followed in all the works carried out under the Project.

xii. Aquatic Animal Protection Act, 2017 (1960)

This Act indicates an early recognition of the value of wetlands and aquatic animals. Section 3 renders punishment to any party introducing poisonous, noxious or explosive materials into a water source, or destroying any dam, bridge or water system with the intent of catching or killing aquatic life. Under Section 4 of the Act, Government is empowered to prohibit catching, killing and harming of certain kinds of aquatic animals by notification in Nepal Gazette.

xiii. Soil and Watershed Conservation Act, 2039 (1982)

In order to properly manage the watersheds of Nepal, the Soil and Watershed Conservation Act, 2039 was enacted. Section 3 of the act empowers the government to declare any area as a protected watershed area. Section 4 of the act provides that a watershed Conservation officer has the authority to implement the following works in protected watershed areas:

- Construct and maintain dam, embankment, terrace improvements, diversion channels and retaining walls.
- Protect vegetation in landslide-prone areas and undertake a forestation programs, and
- Regulate agricultural practices pertinent to soil and watershed conservation.

Under Section 10 of the act, power is extended to the Watershed Conservation Officer to grant permission to construct dams, drainage ditches, canals, cul.

Privately owned trees, excavate sand, boulders and soil, discharge solid waste, and establish industry or residential areas within any protected watershed.

The Act outlines the essential parameters necessary for proper watershed management (including rivers and lakes). The act is applicable to protected watersheds.

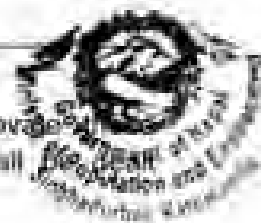
xiv. Explosive Material Act, 2018 (1961)

The Explosive Material Act, 2018 has made a legal provision on how to use explosive material during the construction stage of the project. The provision on the category of explosives and the handling procedures and the necessary approvals required is stipulated in the Act. Article 4 of the Act requires license for procurement, storage, use and transportation of explosives, including for any development projects.

If construction activities require the use of explosive, in accordance with the Explosive Material Act, 1961, prior approval of the Chief District Officer (CDO) is needed to purchase explosives. Article 4 of the Act is relevant.

xv. Ancient Monument Preservation Act, 2013 (1956)

The Ancient Monument Act, 2013, was enacted to integrate the conservation and protection of ancient monument and archeological properties. The section 3 of this Act obliges the



government to identify the importance of the historical monuments, renovate monuments and protect such places. Any works that attracts this Act shall accordingly to this Act.

xvi. Motor Vehicle and Transport Management Act, 2049 (1993)

The Act defines and prescribes necessary standards for vehicles emission and mechanical condition for vehicle registration by the Transport Management Office (TMO) and the TMO can deny a permit based on environmental factor. Standards are set for petrol and diesel engine under the Nepal Vehicle Mass Emission Standard 1999.

xvii. Water Resources Act, 2049 (1992)

The Water Resource Act, 2049 is a comprehensive legislation on water resources. It deals with the development, utilization and conservation of the water resources in the country. The Act states that the State is the owner of water resources of the country. This Act grant right to use water by individuals, organisations and private sectors. No person shall be entitled to utilize the water resources without obtaining a license under this Act. The licensee has to pay prescribed charge or annual fee for utilizing the water resources. Prior approval is required to transfer the license in any manner.

The service may be stopped or the license can be cancelled as prescribed. License is not required for the usage of water resources in the following situation:

- For one's own drinking and other domestic use on an individual or collective basis;
- For the irrigation of one's own land on an individual or collective basis;
- For the purpose of running water-mill or water-grinder as cottage industry; and
- For the use of boat on personal basis for local transportation.

Section 16 of the Act deals with utilization and acquisition of land and house. This Section allows the licensee to submit an application to the Government of Nepal if someone's land or house needs to be acquired. The Section further states that the Government may make available such land and house in the same way as it makes available to any corporate body under the prevailing laws. Sections 18, 19 and 20 of the Act deal with water quality standards, water pollution and adverse effect on the environment. Sections 18 and 19 allow the Government to prescribe pollution tolerance limits and water quality standards for various uses. Sub-section 2 of Section 19 prohibits anyone from polluting water resources to the effect at the prescribed tolerance limits are exceeded. Section 20 of the Act states that "while utilizing water resources, it shall be done in such a way that no significant adverse effect be made on the environment by the way of soil erosion, flood, landslide, or similar other cause".

The Act provides the following priority orders to be followed while utilizing the water resources:

1. Drinking and domestic use
2. Irrigation
3. Agricultural uses such as animal husbandry and fisheries
4. Hydro-electricity
5. Cottage industry, industrial enterprises and mining use.

- 6. Navigation
- 7. Recreational uses, and
- 8. Other uses

Sub-section 1 of Section 9 of the Act states that "notwithstanding anything written in Section 8, the license relating to the survey of water resources and its utilization for the generation of hydroelectricity shall be governed by the prevailing laws". Regarding the study and development of hydropower project, the Electricity Act, 2049 shall prevail the Water Resources Act, 2049.

xviii. Road Board Act, 2059 (2002)

The Road Board Act has been enacted to expedient to make necessary provisions on repair and maintenance of roads, minimizing the expenditures to be incurred in repairing and maintaining the roads and making transparent and effective the repairing and maintaining works of the roads. The main objective of this Act is to provide sustainable fund for planned maintenance of road to the different Road Agencies. With planned road maintenance approach it is able to achieve reduction in the vehicles operation cost and travel time. Roads Board Nepal (RBN) was established under the Act in 2003, to collect and manage the road fund. The Act allows RBN to work together with Road Agencies (RAs), which actually implement the road maintenance works. The Department of Roads identifies RA is responsible for the maintenance of Strategic Road Network (SRN). The District Development Committees (DDC) and Municipalities recognizes RAs for the maintenance of Local Road Network (LRN). The Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) coordinates, supervise and monitor the maintenance works carried out by MC and DDC.

xix. Solid Waste Management Act 2065

The SWMA has stipulated the requirements while managing the solid wastes in the city, towns or, industrial as well as the work places of projects and their labor camps.

7.3 Review of Environment Related Rules

i. Environmental Protection Rules (EPR), 2054 (1997)

The EPR obliges the proponent to inform the public on the contents of the proposal in order to ensure the participation of stakeholders. EPR contains the elaborative provisions on the process to be followed during the preparation and approval of projects requiring IEE and EIA including scoping document, terms of reference, information dissemination, public consultation and hearing and environmental monitoring and auditing. Article 12 of the EPR, requires the proponent to comply with the matters mentioned in the report and other conditions, if any, prescribed by the approving agency or concerned agency, while Rule 13 and 14 are related to environmental monitoring and environmental auditing.

ii. Forest Rules, 2051 (1995)

The Forest Rules 2051 elaborates legal measures for the conservation of forests and wildlife. Based on forest legislation, thirteen plant species are included in the level protection list. Of them, GoN has banned the felling, transportation and export of Champ (*Michelia champacta*), Khayer (*Acacia catechu*) and Sal (*Shorea robusta*).



Rule 65 stipulates that in case the execution of any project having national priority in any forest area causes any loss or harm to any local individual or community, the proponent of the project itself shall bear the amount of compensation to be paid. The Rule also stipulates that the entire expenses for cutting and transporting the forest products in a forest area to be used by the approved project shall be borne by the proponents of the project.

iii. Public Procurement Rules, 2064 (2007)

The Public Procurement Rules, 2064 has been formulated by exercising the power conferred by Section 74 of the Public Procurement Act, 2063, of the GON. The Rules deals with the following provisions in detail: Preparation of Procurement proceedings, Procurement Planning and Cost Estimate, Procurement and Selection of Procurement Contract, Qualification Criteria, Technical Capability and Technical Specifications; Provision Relating to Bidding; Provision Relating to Consultancy Services; Other Provisions Concerning Procurements; Provision Relating to Procurement of Ration, Provision of House/Land Renting and Service Contract, Provision Relating to Review; Provision Relating to Procurement contract; Provision Relating to Dispute Resolution; Provision Relating to Transparency and Conduct; Provision Relating to Monitoring of Procurement Proceedings.

iv. Buffer Zone Rules, 1996

The Buffer Zone Regulation, 1996 contains the following objectives, with a key provision being the application of 30-50% of revenue directly to community development activities in the park buffer zones.

- Promote activities that meet the basic needs of local people for firewood, fodder, timber, and grazing.
- Launch programs to alleviate poverty
- Provide maximum benefits to uplift the economic status of people while preserving social and cultural traditions of the area
- Coordinate with all organizations and agencies working in the park and its buffer zone.

v. Solid Waste Management Rules 2070

This rule strictly prohibits the open burning of solid wastes. This has to be followed in the work sites and the labor camps of the project.

7.4 Review of Guidelines, Manuals, Codes and Standards

i. National EIA Guidelines, 1993

The guideline provides clear directions about the process of conducting EIA. This guideline makes EIA in Nepal legally mandatory and contains process for ensuring public involvement during the preparation of EIA report. It calls for information regarding identification of physical, biological, socio-economic and cultural impacts. Impacts ranking method also suggested in this guideline. It stresses the inclusion of mitigation measures to avoid, minimize and mitigate adverse impacts and maximize beneficial impacts resulting from the development project and monitoring & environmental auditing in the EIA report. Its revision in 1997 calls for the ensuring local people's participation, collection of relevant information, identifying major issues of public concerns, evaluate them and establishing priorities for EIA study.

ii. EIA Guidelines for the Forestry Sector, 1995

EIA Guidelines for the Forestry Sector has given focus to make proposals which have forest components socio-culturally acceptable, economically feasible and environmentally sustainable, thereby to conserve genetic resources and biodiversity, and minimize environmental damage in forest areas and facilitate in identification of positive and adverse impacts of proposal implementation.

iii. Environmental Management Guidelines, GESU / DoR, July, 1997

The Guideline, prepared by the Geo-Environment & Social Unit (GESU) of DoR, stipulates the integration of environmental mitigation measures in surveying, design, tender document preparation, contract document preparation, construction, maintenance, rehabilitation and operation of road projects. The guideline results from a program undertaken jointly by GoN and the World Bank under the Road Maintenance and Rehabilitation Project (RMOP). The Guideline has been formally approved by Minister level decision in 1997.

The Guideline is the part of operational practices for all road maintenance, rehabilitation and construction activities under DoR schemes. The environmental mitigation measures are broken down into twelve categories including (i) Quarries; (ii) Borrow Pits; (iii) Spoil and Construction Waste Disposal; (iv) Work Camp Location and Operation; (v) Labour Camp Location and Operation; (vi) Earthwork/Slope Stabilization; (vii) Use of Bitumen; (viii) Stockpiling of Materials; (ix) Explosive, Combustible and Toxic Materials Management; (x) Setting Up and Operation of Stone Crushing Plants; (xi) Water Management; (xii) Air & Noise Pollution.

The Guideline suggests methods for determining how and when the public should be included in the environmental analysis. Apart from providing a comprehensive list for mitigation measures to be incorporated into DoR projects, it describes the procedures for public participation, and other socio-economic safeguard considerations. It gives advice on assessing socio-economic impacts and strategies for reducing or avoiding potential adverse impacts, and for maximizing the positive ones for the benefit of local residents. The Socio-economic impacts include important issues of land acquisition and compensation and other economic impacts related with markets for agriculture production, agriculture inputs, nutrition, extraction of natural resources beyond replenishment, migration and influx of migrants, land speculation, illegal logging and mining, carrying goods by porters etc. It also includes the handling of impacts on cultural heritage.

iv. Public Road Management and Land Acquisition Directives, DoR, 2002

The DoR has published a directive for Public Road Management and Land Acquisition in 2002 for the use in road management and land acquisition in DoR's Sector Wide use. This Directive specifies two categories of affected families, Project Affected Families (PAF) and Seriously Project Affected Family (SPAF). A PAF consists of the members of a household including elderly dependents and minor children (under 18 years) residing under one roof and operating as a single economic unit, who are adversely affected by the project. SPAF is defined as a family who loses over 25% of its total land holdings or whose land is reduced to an uneconomic holding (less than 5.0 katha) or who is being displaced.

Under this Directive the concerned officials, with the assistance of the project team, are to carry out assessments of project affected families to identify their standard of living and



types of assets. Valuation of land and asset lost were to be based on comparative market values of similar assets in the vicinity. The Directive also included arrangements for rehabilitation of project-affected families. For PAF's, the compensation package includes cash for assets acquired or damaged by the project and a rehabilitation grant (assistance allowance) to cover any suffering and hardship. For SPAF's, the compensation additionally include employment for one family member and provision of skill training.

v. Land Acquisition Guidelines, 1989

Two sets of guidelines related to land acquisition are significant for DoR Sector Wide use. They are the Land Acquisition Guidelines of 1989 and guidelines pursuant to section 16 and 17 of the Land Acquisition Act 2034. These guidelines specify two categories of affected families, Project Affected Families (PAF) and Seriously Project Affected Family (SPAF).

The Guidelines specify the establishment of an Acquisition and Rehabilitation Committee (also known as Compensation Fixation Committee, "CFC") consisting of the concerned Chief District Officer (Chair), Land Revenue Officer, representative of the DDC and the Project Manager and others as deemed necessary. The Committee is responsible for acquiring land and paying compensation. In 1993, a second set of guidelines reduced the Acquisition and Rehabilitation Committee to a four-member Compensation Fixation and Rehabilitation Management Committee by dropping the Land Revenue Officer and other governmental appointees. The functions and powers of the committee were clarified, as were methods of payment and means of ensuring fair valuation of land quality.

vi. Forest Produce Collection and Sales Distribution Guidelines, 2058 (2001)

The guideline's clauses 3 to 10 have specified various procedure and formats for getting approval for vegetation clearance, delineation of lands for vegetation clearance, evaluation of wood volume etc. and government officers and officials responsible for the approval, delineation and evaluation. These provisions have a direct relevance to the development of the project and need compliance to these provisions.

vii. Guidelines on Use of Forest Area for Other Purposes, 2063 (2006)

The guideline has stipulated that forest areas will not be allowed to be used for other purposes for project other than those listed as projects of national importance. Only national projects of non-profit nature will be allowed in the forest areas, which does not have any other alternatives. If other alternatives are not present, then the proponent shall develop equal areas as forest area and make arrange to conserve it for five years. All trees cleared need to be compensated by replantation at the ratio of 25 trees for each tree cut.

viii. Reference Manual for Environmental and Social Aspects of Integrated Road Development, MoPITM / DoR, 2003

This Manual is designed to help integrate social and environmental considerations, including public involvement strategies, with technical road construction practices. It suggests stepwise process of addressing Environmental and Social issues alongside the technical, financial and others. The Manual is a suggestive, and not exhaustive, and advise and recommends various environmental and social approaches, actions and strategies to assist developers in following mandatory requirements of the law and improving public involvement. The Manual is based on the experiences of Nepal, as well as incorporates the

national (EPA, 1997; EPR, 1998/1999) and international 'best practices'. It suggests process of environmental and social assessment process, roles and responsibilities of stakeholders at various stages of the project, advice on impact mitigation action plans, and process for involving the public.

ix. Environmental and Social Management Framework, DoR, 2007

This Environmental and Social Management Framework report (ESMF) is prepared for the Department of Roads (DoR) to compile in an overview and guidance manner, various safeguard and compliance aspects of environmental and social issues related with the Sector Wide Road Program and the Priority Investment Plan Study for Nepal's Strategic Road Network (SRN) planning for 2007 to 2015. The Study commenced in September 2005 and was completed in December 2006.

The ESMF intends to provide technical and managerial inputs and guidance into the design of the strategic roads (both designated for rehabilitation and, to lesser extent, to new construction, in the Western Districts of Nepal), through identification of key environmental and social issues related to the foreseen projects, mitigate potential impacts and concerns and, devise opportunities to enhance the benefits. The framework integrates in a step-wise approach the most important environmental and social considerations into all stages of project preparation, implementation, monitoring and operation and is applicable to all future sub-projects funded under the SRN program.

The ESMF is applicable to all proposed project activities and through all stages of the project cycle, i.e. from pre-planning, planning and design, implementation to post-implementation.

x. Roadside Bio-Engineering, DoR, GoN, 2002

This reference manual on bio-engineering works along roads, gives a comprehensive information on the use of vegetation in engineering. In addition to covering the principles underlying techniques of slope stabilization, the manual also outlines those aspects of the ecology, geology, geography and law of Nepal that would be of relevance. The manual provides standard specifications for bio-engineering works, profiles of the main bio-engineering species and rate analysis norms of bio-engineering approved by the Government. The manual provides the information needed to design, plan, implement and maintain roadside bio-engineering works and is intended for use in the site.

xi. Guide to Road Slope Protection Works, DoR, GoN, 2007

This document aims to provide concise guidance on what action to take following a roadside slope protection works.

The guide book focuses on:

- Problem definition
- Appropriate information collection
- Decisions and actions required in the light of the recovered information
- Summary information on appropriate procedures
- Where to access more detailed guidance
- Selection of standard geotechnical engineering options

This guide is intended as a series of signposts to enable practising engineers to access information appropriate to their requirements and procedures towards effective and appropriate decisions related to the geotechnical problems faced at construction site

xii. Environmental Management Guidelines for Roads and Bridges, Geo-Environmental Unit DoR, GoN, 1999

The Guidelines ensures that environmental considerations are integrated into the project survey and design, tender document, contract document, and project supervision and monitoring. The guideline is intended to minimise environmental impacts resulting from road and bridge construction, operation, maintenance and rehabilitation. The guideline intends to improve road performance and reliability, increase benefits to local residents and maximise cost effectiveness.

xiii. Public Works Directives, 2002

As stated in the Section 62 of the Financial Administration Rules (FAR) Directives for carrying out Public Works have been developed and were approved by GoN, which have been in effective for past few years. A management unit in the form of a Steering Committee with representation from the concerned Ministries has been established within MoPT. The Public Works Directives (PWD) contains organizational directive, procedural directive, standard bidding documents and a compendium of applicable acts, regulation, standards and guidelines. The present assignment has also referenced the use of PWD in preparation of EIA, site specific EMAPs and standard bidding documents for NCB.

xiv. Buffer Zone Management Guideline, 1998

The Buffer Zone Management Guidelines provides a basis for operation of Buffer Zone program including resource allocation. The regulation prohibits following activities within the Buffer Zone:

- Occupy any land without legal ownership or cut trees, clear forests or cultivate forest land
- Any activities damaging forest resources or to set fire in the forests
- Excavate stone, earth, sand or mine or remove any minerals, earth or other such materials
- Use of any harmful poison or explosive substance into the river, stream or source of water flowing in the buffer zone
- Hunting illegally and any acts damaging to wildlife

7.5 Review of Plans and Policies

i. Fourth Three Years Plan (2016 – 2019)

The 3 Year Plan (2016-19) was prepared to give continuity to previous achievements, and address issues specific to the transitional period in a post-conflict situation. This plan has verdict to implement the new administrative structure for the environment friendly development aspects.

This plan has formulate a mechanism to give the sustainable transport system in the newly implemented structures of Nepal. Meanwhile the transportation development sector is the prime sector for the development.

ii. National Transport Policy, 2001

The principal objective of the National Transport Policy is to develop a reliable, cost effective, safe facility oriented and sustainable transport system that promotes and sustains the economic, social, cultural and tourism development of Nepal as a whole.

For the attainment of these objectives the following strategies will be followed:

- (i) The Government shall clearly indicate the limit and scope of work to be done from the central level and take responsibility of transport structure to be constructed from the central level
- (ii) Making the decentralized governance system more strengthened and by maximum utilizing the source and means of local level, the development and promotion of transport system shall be done from the local level itself.
- (iii) Maximum private Sector involvement will be encouraged in the expansion and preservation of the transport system.

The development of transport infrastructure in the local level shall be carried out in accordance with the short term, medium term and long term master plan prepared therefor. High priority shall be given to completing the construction of roads connecting all 75 District Headquarters of the Country to the main road network. In addition, development of the East-West Mid-Hills Highway, shall take place progressively and in a planned and various mean of transportation and infrastructure shall be developed in a coordinated manner.

iii. Forest Policy, 1993

The Forest Policy is attracted when a developmental project directly or indirectly impacts on the forest resources. The forest policy is directed, inter alias, to contribute food production through effective interaction between forestry and farming system, to protect land against degradation by soil erosion, landslide, and other effects of ecological disturbances, and to conserve ecosystem and genetic resources. However, the forest policy re-emphasizes to avoid forest destruction or tree cutting while constructing infrastructures during implementation of project other than forest sector. The policy has prioritized the protection of Bawalik, the geologically vulnerable area, with a view to ensure watershed conservation, and maintenance of water recharge. The policy also stresses conservation of endangered species. It has reiterated that forest area will not be used for any activities other than prescribed in Operational Forest Management Plan. The forest policy emphasizes the implementation of community and private forestry development programs, national parks and conservation areas management programs, soil and watershed conservation program, management and development of medicinal plants, and conservation of biological diversity.

The Forest Products Sales and Distribution Regulation contain a complex set of procedures to obtain permits and to extract and utilize forest products. In consequence, this law is frequently circumvented.

Also under the regulation the following two species are banned for collection, use, sale, distribution, and export: *Dactylocteniza hatagirea* and *Cordyceps sinensis*.



The following eight species are banned for export in their unprocessed form: *Nardostichis grandiflora*, *Valeriana jatamansi*, *Cinnamomum glaucescens*, *Taxus baccata*, *Abies spectabilis*, *Ravolfia serpentina*, *Pernellia* spp, and Silejt (a mineral).

iv. Master Plan for Forestry Sector Policy, 1993

The Master Plan for the Forestry Sector, 1993 aims at meeting the basic needs of rural Nepalese for fuel, fodder, and timber. Its long term objectives are to improve farming systems, conserve the soil and water, ecological balance, conserve genetic resources and ecosystems, and develop and manage forests for income and employment opportunities.

Its medium term objectives are to achieve people's participation in forest development, management and conservation by decentralizing authority, to develop a legal framework to involve people in forest management, and to build the institutional capability of forestry institutions to perform their job effectively.

Community forestry is the main focus in the MPFS, receiving 47% of funding for the 25-year period of the Plan. The focus for activities has until recently been in the midhills, but the focus is now also on the high mountains, where locals heavily rely on forestry for their subsistence.

The Plan discusses development aims and objectives for seven groups of NTFPs: medicinal and aromatic plants, Daphne paper, pine resin, kathra (from *Acasia catechu*), sabai grass, and canes and bamboo.

The Forest Based Industrial Development Plan of this Plan emphasizes creation of jobs and processing facilities as well as cultivating many of the widely collected medicinal plants.

v. Climate Change Policy, 2011

This policy aims to manage the climate change impacts within the country. The development and other activities in the country should be climate change friendly. The activities should be within the limit the national standard of the emission level of carbon. Meanwhile the policy also aims to involve the local peoples to manage the climate change impacts in Nepal.

vi. Resettlement Policy 2071

This policy have been prepared for the development project by Government of Nepal. There are the provisions for the acquisition of land for the development projects. This policy has make the provisions of the voluntary as well as the involuntary mechanism of the acquisition of the land.

vii. Guidelines on Use of Forest Area for National Priorities Projects, 2074 (2016)

The guideline has stipulated that forest areas will not be allowed to be used for other purposes for project other than those listed as projects of national importance. Only national projects of non-profit natures will be allowed in the forest areas, which does not have any other alternatives. If other alternatives are not present, then the proponent shall develop equal areas as forest area and make arrange to conserve it for five years. All trees cleared need to be compensated by replantation at the ratio of 25 trees for each tree cut.

7.6 Review of Environment Related International Conventions, Strategies

i) Convention on Biological Diversity (CBD), 1992

Nepal signed the convention on biological diversity in 1992, ratified in 1993 and formally became state party to the CBD in 1994. The CBD linked PAs to larger issues of public concern like sustainable development, traditional knowledge, access to genetic resources, and equitable sharing of benefits. The main purpose of CBD is to integration of plan, policies, and programs in sectoral and cross-sectoral agencies to conserve biological component.

ii) Convention on International Trade in Endangered Species (CITES), 1973

Nepal became party to CITES in 1975. CITES has facilitated international co-operation to regulate 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. The National Parks and Wildlife Conservation (NPWC) Act regulates the trade of species listed in CITES appendices. The Government has designated the Natural History Museum (Tribhuvan University) and the Department of Plant Resources as the scientific authorities for wild fauna and wild flora respectively. Similarly, the Government has designated the Department of National Parks and Wildlife Conservation and the Department of Forest as the management authorities for wild fauna and flora respectively. The Convention urges Parties not to allow trade in specimens of species included in the CITES Appendices I, II and III except in accordance with the provisions of the Convention.

iii) Plant Protection Agreement for the South East Asia and the Pacific (as amended), 1956

Formerly the Plant Protection Agreement for South-East Asia and Pacific Region was approved by the 23rd Session of the FAO Council in November 1955 and entered into force on 2 July 1956. Principally, it provides regional implementation of the International Plant Protection Convention (I PPC), the Agreement on the Application of Sanitary and Phytosanitary Measures, and the modern requirements for plant protection, and to strengthen the Asia and Pacific Plant Protection Commission.

iv) ILO Convention, 169

ILO Convention No. 169 is a legally binding international instrument, which deals specifically with the rights of indigenous and tribal peoples. Article 4 of the Convention calls for special measures to be adopted to safeguard the persons, institutions, property, labour, cultures and environment of these peoples. In addition, the Convention stipulates that these special measures should not go against the free wishes of indigenous peoples. The Convention recognizes these differences, and aims to ensure that they are protected and taken into account when any measures are being undertaken that are likely to have an impact on these peoples. The Convention requires that indigenous and tribal peoples are consulted on issues that affect them. It also requires that these peoples are able to engage in free, prior and informed participation in policy and development processes that affect them. Article 7 of Convention No. 169 states that indigenous and tribal peoples have the right to "decide their own priorities for the process of development as it affects their lives, beliefs, institutions and



spiritual well-being and the lands they occupy or otherwise use, and to exercise control over their economic, social and cultural development”.

v) **National Biodiversity Strategy, 2002**

The Nepal Biodiversity Strategy (NBS) is a commitment by the Government of Nepal for the protection and wise use of the biologically diverse resources of the country, the protection of ecological processes and systems, and the equitable sharing of all ensuring benefits on a sustainable basis, for the benefit of the people and to honour obligations under the Convention on Biological Diversity. Biological diversity in Nepal is closely linked to the livelihoods and economic development of most of the people, and relates to agricultural productivity and sustainability, human health and nutrition, indigenous knowledge, gender equality, building materials, water resources, and the aesthetic and cultural well being of the society. NBS has the objective for the protection of biological diversity in Nepal and identifies or restates Government policy on natural resources and their diversity.

The outcomes of the NBS has lead towards stronger political commitment, an information management system, enhanced human and institutional capacity, clear policies and legislation, detailed Action Plans, heightened public awareness and an effective monitoring and evaluation process. The strategic plan highlights the existing weaknesses, gaps, difficulties and other problems that threaten Nepal's biodiversity. It provides the implementation mechanisms, roles and responsibilities of various government agencies, the private sector and people of the country to overcome the challenges related to biodiversity threats. The implementation mechanism of NBS is based accountability and transparency approach.

vi) **14th Periodic Development Plan**

This periodic plan is started from 2017. This plan have focused on the development of large scale infrastructures. The environment friendly development is the prime objective of the 14th periodic plan. Government of Nepal is also trying to get the graduation on developing country based on this periodic plan. So to prepare the base for the ddeveloping country in Nepal sustainable development is the prime concern.

vii) **Solid Waste (Management and Resource Mobilization) Rule, 1990**

This rule authorizes Solid Waste Management & Resource Mobilization Center (SWMRMC) to make all arrangements in regard to solid waste storage, collection, transfer, disposal and resource recovery activities. It authorizes to collect feed from beneficiaries of its services. Also, SWMRMC is allowed to sell resources from the solid waste collected. SWMRMC is authorized to impose and collect fines in cases of the breach of listed prohibitions. SWMRMC is authorized to collect service charges and other fines in the manner prescribed by law for recovery of other Government dues.

In addition, the Solid Waste Management National Policy, 1996 stipulates,

- A separate unit concerning sanitation works should be established in each municipality and VDC responsible for collection, site management, transportation, and final disposal of solid waste.
- Need for improving capacity of local governments to manage solid waste.
- Promote privatization and involvement of NGOs and social organizations.

- Mobilize solid waste as a resource through recycling and processing.

Government create a new central institution and that local authorities are to manage the waste in coordination with this central agency responsible for: (i) select site for final disposal of the solid waste, conduct EIA and assist local bodies in the final disposal works of solid waste as per necessity (ii) develop concept of minimization of waste (iii) develop skilled manpower to carryout solid waste management works (iv) prepare appropriate criteria for the management of solid wastes on the basis of quantity of and waste quality (v) develop solid waste management technology suitable to local conditions and (vi) monitoring and evaluation of various solid waste management activities.

viii) Department of Roads Standards

DOR has issued several standards for the environmental management of road projects, including the EIA Guidelines for the Road Sector (1997), which was prepared under the broad framework of the National EIA Guidelines (1993). This publication sets out environmental assessment requirements for road construction and upgrading projects. Schedule 1 of these Guidelines, relating to the level of assessment required for different project types, is almost identical to the 1997 Environment Protection Regulations.

DOR has also issued the Environmental Management Guidelines (DOR, 1997) (EMG), which provide guidance to the Proponent on the integration of environmental mitigation measures into the project. This specifically deals with the management of quarries, borrow pits, material stockpiling and spoil disposal, camp operation, earthworks and slope stabilization, and environmental pollution. It is the main set of operational guidelines that must be complied with.

Apart from the Acts, Rules, Guidelines, Policies, Plans and Standards, the following institutions are also related and were, to the extent possible, consulted during the study:

• Local Level Institutions

Services such as educational and health institutions, irrigation and drinking water facilities, which may have likely impact by the Project activities.

• Non-Governmental and Community-Based Organizations

Numbers of local clubs, Non-Governmental Organizations (NGOs) are actively involved in the area for the development activities. These NGOs and Community Based Organizations (CBOs) can assist the Project particularly by creating awareness on the importance of road for local area development and sustainability during operation phase.

• District Development Committees/ Municipalities

The District Development Committees and the municipalities of Nawalparasi and Rupandehi did facilitate in obtaining local people's support and educating the local people on the importance of this strategic road network. These Committees can also coordinate with district level development activities/agencies and advise the concerned municipalities / VDCs in assisting project activities in future.

• District Level Development Agencies



The District Administration Office will be directly involved in land and property acquisition and compensation issues, if such issues arise. The Chief District Office (CDO) can facilitate this process as a chairperson of the Compensation Determination Committee. The CDO can also instruct the district level organizations to assist the project activities.

- **District Forest Office (DFO)**

The DFO can assist the Project in felling down the trees to clear the road alignment, and to stockpile and sell the forest products, if required.

- **District Land Revenue Office (DLRO)**

The DLRO can facilitate in transferring the land ownership if needed, once the proponent compensates the privately owned land and properties.

(ix) **Central Level Institutions**

- **Department of Roads**

The Department of Roads (DoR) is facilitating the integration of environmental aspects in the road construction, rehabilitation and maintenance project by developing policies and guidelines. Once the Project submits this EIA report, it will be review by Geo-Environmental and Social Unit (GESU) and forward to the Ministry of Physical Infrastructure and Transport (MoPIT) for necessary approval. Furthermore, the DoR can also be involved in environmental monitoring works and instruct the Project to comply with the environmental monitoring works and instruct the Project to comply with the environmental requirements during its constructions. The GESU can also provide technical guidance to the Project, particularly in the application of bioengineering treatments methods.

- **Ministry of Physical Infrastructure and Transport (MoPIT)**

The MoPIT is the concerned agency responsible for environmental monitoring and it should provide necessary guidance to the Proponent in accordance with the EPA, 1997 and EPR, 1997. The ministry as a policy making body is also responsible for the overall guidance and policy formulation for the development of transport sector in Nepal. It can also co-ordinate other institutions for necessary arrangement for land acquisition and conflict resolutions, if any, for the smooth construction of this project. However, the Ministry can entrust and/or instruct the DoR for environmental monitoring works by providing necessary policy guidance, as the DoR is its technical arm. The DoR can perform its responsibility through its GESU in environmental monitoring during the construction and operation of the project on behalf of the Ministry. According to the provisions of EPR, the Proponent is not obliged to carry out environmental monitoring works.

- **Ministry of Forests and Soil Conservation**

There are few trees required to remove along the road alignment. Co-ordination with DFO is necessary to fell down and use of these tree products. Once the District Forest Office forwards the request to through the Department of Forests, this Ministry may promptly give assent for the use of such tree product. The Ministry is empowered through the forestry laws to issue permission to cut required trees as a part of site clearance for the road project.

- **Ministry of Population and Environment (MoPE)**

The Ministry may be involved in environmental monitoring works. The ministry has also the legal mandate to prepare the environmental auditing report after two years of project operation or commencement of the service from this proposal. It is clear that spirit of the environmental laws is to ensure the involvement of the environmental agency in environmental auditing works.

This review on policy, laws, guidelines and related institutions have helped understand and conduct this EIA study on environmental ground and these instruments further facilitate to integrate the environmental aspects and make the project environmentally sound and sustainable.

FOR REFERENCE ONLY



CHAPTER 8: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Environmental management plan (EMP) is an important document to be prepared during EIA. EMP refers to the documentation pertaining to the project management monitoring and Examination of the implementation of mitigation measures and verification of the predicted impacts during EIA process and project cycle. EMP becomes an important management tool to ensure the proper implementation of the mitigation measures for minimizing the adverse environmental impacts and maximizing the beneficial impacts. An EMP includes project monitoring, examination and the project management issues. The requirement of EMP in project implementation in Nepal is however vague. Yet, EPR, 1998 and NEA guidelines 1993 provide some guidance on the requirement of monitoring and Examination.

Environmental Management Plan (EMP) for the impact preventive measures for physical, biological, Socio-economic and cultural factors are described in the table below.

This is an important document to prepare during environment study. The proposed EMP is based on Adaptive management. There is always uncertainty about the likely impacts and effectiveness of the mitigation measures and their implementation mode. As consequences of these uncertainties, the EMP is serves as a plan that will be revised periodically during the pre-construction, construction and operation phase to account for the improved understanding of impact and to design required mitigation measures.

This site-specific EMAP of the Road Project follows the basic concept of management i.e. the POSDCORB and this has been fitted into environmental management. This concept focuses the inclusion of *planning, organization, staffing, directives, co-ordination, reporting and budgeting*. Within this broad framework, the following sections describes how to address 5W (What, how, where, when and who) for the implementation of benefit augmentation and mitigation measures. Environmental monitoring works in this chapter. It also includes the budget estimates, organizational structure, staffing and reporting requirements, including necessary co-ordination during the project construction stage. This site-specific EMAP guides the project management in such a way that the environmental protection measures are adequately implemented, effectiveness of such measures are monitored and environmental auditing is carried out to know the project performance on environmental ground.

The implementation plan of the environmental protection measures with matrices is presented below. It does consist of provisions for Environmental monitoring and Environmental Auditing (EA). The budget for the implementation plan, both for application of mitigation measures and monitoring, has been included in the matrix.

8.1 Environmental Monitoring

Monitoring of the implementation of environmental protection measures provides a basis of logical comparison of the predicted and actual impacts of a proposal. Environmental monitoring involves the systematic collection of data to determine the actual environmental impact of the project, compliance of the project with regulatory standards, and the degree of implementation effectiveness of the environmental protection measures (Lohani et al, 1997). Such monitoring also provides opportunities to further identify unpredicted impacts and implement necessary measures to avoid costly mistakes. In accordance with Rule 13 of the EPR 1997/1998, the concerned agency- DoR, in this case is the legally responsible

monitoring agency. This rule also empowers DOR to issue additional environmental control measures as directives to the Road Project to adopt measures to reduce impacts if the actual impacts are higher than the ones specified in the conditions at the time of approving the proposal, the time schedule and monitoring methods in this EIA report. The following sub section describes the types of monitoring, parameter, locations, schedules and responsibilities of monitoring.

8.1.1 Types of Monitoring

The National EIA guidelines of 1993, the EIA guidelines for Forestry sector of 1995 and the draft EIA guidelines for Road sector propose three types of monitoring. They are baseline monitoring, compliance monitoring and impact monitoring.

- **Baseline Monitoring**

A baseline monitoring helps generate baseline condition of various environmental parameters. In general, it is carried out if there is a significant time lapse between the preparation of the EIA report and the construction stage or a change in environmental quality is noticeable. Hence, baseline monitoring may not be required if its construction is going to start immediately after the approval of this EIA report.

- **Compliance Monitoring**

The compliance monitoring is essential in order to ensure that environmental protection measures and other requirements set forth are complied with and this monitoring is not concerned with determining actual effect of the project activities on the environment. While impact monitoring helps evaluate the effectiveness of the recommended mitigation measures and verify the impacts predicted and actual level of impacts occurred in the field. Furthermore, this type of monitoring helps increase understanding of cause & effect relationships between the human activities and environmental changes (Lohani et. al: 1997)

So in short, environmental monitoring approaches to verify the accuracy of EIA prediction, and determine the effectiveness of measures to mitigate adverse impact of project on the environment. Broadly, this study recommends the compliance with the following requirements:

- Incorporation of environmental protection measure in the detailed design, contract document and tender documents.
- Allocation of cost for environmental protection measures in tender bidding.
- Allocation of adequate budget for compensation of land, property and agro-products, tree cutting, transportation and stockpiling of forest products.
- Regular supervision of spoil disposal (loading, transportation and dumping) at designated sites.
- Regular supervision on materials handling at earthworks, and stockpiling of construction materials.
- Provision for health and sanitation facilities at works camp, labor camps etc.,
- Procedure for safe storage and use of explosive and toxic materials;
- Extent of local labors employed and skill training launched.



- Regular water spraying to arrest construction related dust and timely vehicle maintenance to minimize gaseous emission;
- Inquiry on the usage of pressure horn in settlements, health and educational institutions;
- Usage of timber for frames by the projects, and firewood by construction worker;
- Rehabilitation of drinking water and irrigation schemes, and for their re-location, including schools;
- Occasional supervision on the possible impacts of timber on adjoining forests and wildlife;
- Drainage management;
- Provision of occupational health and safety (OHS) measures;
- Compensatory plantation;
- Land acquisition and compensation;
- Launching of skill training, and public awareness activities; and
- Other conditions set-forth during the approval of the EIA report, if any.

Although, the environmental monitoring is not the responsibility of the proponent, based on the provisions of the existing environmental laws, the project has planned to monitor the compliance of the technical specification as an in-built practice.

• Impact Monitoring

Impact monitoring is generally carried out to know the effectiveness of the environmental protection measures. Hence, an impact monitoring evaluation study is proposed to carry out at the end of the project construction phase. Impact monitoring study will focus each impact predicted and effectiveness of environmental protection measures. This will also emphasize the stability of slopes, spoils disposal site, work camp and labor camp, use of explosive and toxic wastes on the environment, including the utilization of cash compensation to the extent possible, condition of the local forest and plantation etc.

8.2 Monitoring Locations, Schedules and Responsibilities

Timing for environmental monitoring depends on the nature of parameters. It can be done regularly or intermittently. Compliance monitoring will be done regularly whereas the impact monitoring will be done after the completion of the construction activities. In general, methods such as observation, inspection, interview, counting or measurement could be used for monitoring. The monitoring will be location specific or the whole project area, depending upon the nature and coverage of mentioned parameters.

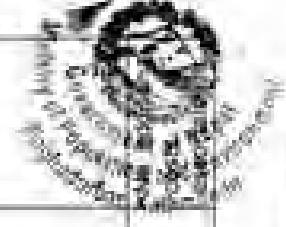
As per the EPR of 1997-1998, current Ministry of Population and Environment is legally responsible for environmental monitoring works. The project has planned to develop an in-built monitoring system, as a part of project administration, by establishing a separate Environmental Division. The project considers that the environmental agencies will have a number of opportunities to visit and monitor the project activities as a part of compliance monitoring. Hence, environmental monitoring is an additional commitment of the proponent to best implement the mitigation measures and make the road environment – friendly.

The implementation of the EMAP is for (i) benefits augmentation and (ii) adverse impacts mitigation measures which is shown in the Table 8.1 and Table 8.2 below:

Table B.1: EMAP for the Implementation of Benefits Augmentation Measures

Beneficial Impacts Enhancement Measures									
Activity / Environment at Risk / Issues	Impacts	Beneficial Impacts Enhancement Measures			Monitoring Methods	Monitoring Schedule and Location	Responsible Implementing Agency	Responsible Monitoring Agency	Associated Costs & Its provision
During Construction Stage									
Employment of Labourers	Opportunities for increased income generation and employment	- Wherever applicable adopt labor-based methods of construction - Give maximum priority to employ local laborers and project-related families, offer skilled semi-skilled and unskilled workers from project area first priority for work with gender equality - Wherever practical, scheduling the construction works during the agricultural off-season to enable local people to become engaged - Include binding clause in Contractor's Contract Document to give priority for local people with prev. accepted wage and local labour especially without favour of gender discrimination - Full payment of wages to worker as per contract document			Inspect & confirm labour related clauses are adequately stated in Contractor's Contract Document	Prior to award of work to Contractor	Contractor and Sub Contractor	Project	
					- Site inspection & labour interview - Verify with contractors period at site	Half yearly during construction period at site			
Employment of Labourers	Opportunities for technical skill enhancement of (Local Marginalized)	- Provide on-the-job training and practical training to local workers on operation of equipments & construction works - Include binding clause in Contractor's Contract Document for providing on-the-job training to local workers			- Inspect related clause in Contractor's Contract Document - Inspect Contractor's Training on labouring details - Site inspection & labour interview	Prior to award of work to Contractor Half yearly during construction period at site	Contractor and Sub Contractor	Project	
Consumption of local produce by Project staff and workers	Increase and enhancement in Enterprise Development and Commercialization	- Project shall disseminate information on construction schedule and appropriate number of labourers and can designate some places for the operation of temporary shops - Encourage consumption of local products (by labourers & Project staff)			- Inspect Contractor's job details in public - Interview local labour business personnel	Half yearly during construction period at site	Contractor and Sub Contractor	Project	No additional costs associated
Enhancement of Local Economy	Community Development and Income Generation	Promote establishment of cooperative and providing bank financing for setting-up business enterprises e.g. fuel stations, vehicle			Inspect establishment / increase in local economic / business	Half yearly during construction period at site	Local communities	Project	43,00,000.00

Activity / Environment at Risk / Issues	Impacts	Beneficial Impacts Enhancement Measures	Monitoring Methods	Monitoring Schedule and Location	Responsible Implementing Agency	Responsible Monitoring Agency	Associated Costs & Its provision
Enhancement of Social Services facilities	Plans Improvement of existing social service facilities	Maintenance and repair shops etc. Small trade store businesses along the route. Project shall provide technical/monetary support for establishment of public infrastructures, e.g. bus stops, drinking water points, street lights, pedestrian crossing bridges etc. - Widened roads and provide bus stops near Bazaar areas	activities within influence areas - Inspect Projects Plans on improving social services and its budgeting with interactional representatives of local communities	Half yearly during construction period at site	DOC, VDC Ward office	Project	Additional budgeting should be done as requested
During Operation and Maintenance Stage							
Operation of 4-lane road	Enhancement in Economic Activities Trade and Business	- Proper operation of road vendor at all times - Avoidance of road blockages and stoppages	Periodically during operation (Monthly)		DoR	DoR, PO/DOs, DOTM Project	No additional costs associated
Operation of 4-lane road	Enhancement of the Social Service Facilities	- Project shall provide technical support for establishment of public infrastructures, e.g. bus stops, drinking water points, street lights, pedestrian crossing bridges etc. - Widened roads and provide bus stops near Bazaar areas	Half yearly during construction period at site - Inspect Projects Plans on improving social services and its budgeting with interactional representatives of local communities		DoR, VDC Ward office	Project	Additional budgeting should be done as required
Operation of 4-lane road	Appreciation in Land Value	- Establish and propagate an effective land-use plans, e.g. commercial/business areas, residential areas, industrial areas etc. and develop bylaws - Development of social service facilities such as water supply, sewerage, electricity and telephone etc. along the road and its influence areas - Prohibit haphazard growth and haphazard construction of sub access to service road	Periodically during construction period at site - Interact with different government agencies, e.g. technical agencies about planned development concept in the road corridor		DoC, VDC Municipality	Project	No additional costs associated
Operation of 4-lane road	Agriculture development	- Implementation of agricultural development subproject at different location with fast, easy access and transportation of goods		During operation (Monthly)	DoC, VDC Municipality	Project	No additional costs associated



Activity / Environment at Risk / Issues	Impacts	Beneficial Impacts Enhancement Measures	Monitoring Methods	Monitoring Schedule and Location	Responsible Implementing Agency	Responsible Monitoring Agency	Associated Costs & its provision
Operation of 4-lane road	Increase in crop productivity, promote trade for agricultural products	Implementation of road line and other sub-project components with fast and easy Accessibility	-	During operation (Monthly)	Contractor CSC	CSC	1,000,000.00
Operation of 4-lane road	Impact due to increase in income and living standard of people	Promote economical activities of local due to the increase on income generating activities and their living standards and life.	-	During operation (Monthly)	Contractor CSC	Project, CSC	No additional costs associated
Operation of 4-lane road	Empowerment of local women	- Motivate to have better opportunities in new organization that will be established. - Attached their own organizations that will enhance their knowledge	-	During construction and operation (Monthly)	Contractor CSC	Project, CSC	No additional costs associated

Table 8.2: EMAP for the Implementation of Mitigation Measures

On Socio-economic and Cultural Environment

Adverse Impacts

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
(a) Pre-Construction Phase (Upon Issuance of Notice to Proceed)						
The Contractor shall complete the following activities within 30 days upon issuance of Notice to Proceed: 1.) Submit appointment letter and resume of the Contractor's Environmental Focal Person (EFP) to DoR Project Directorate 2.) EFP will engage CSC-Environment Specialist (ES) and Q&A/PD to a meeting to discuss in detail the EMP, seek clarification and recommend corresponding revisions if necessary 3.) EFP will submit the Site-specific EMP for the project and approved from the CSC 4.) EFP will request CSC-ES copy of monthly monitoring forms and establish deadlines for submission 5.) EFP will submit for CSC-ES approval an action plan to ensure all permits and approvals needed to be secured during construction stage which include but not limited to: i) operation of crusher and hot mix plants, ii) transport and storage of hazardous materials (e.g. fuel, lubricants, explosives), iii) waste disposal site, iv) temporary storage location, v) water (tap and v) treatment compliance of all vehicles, Arrangements to link with government health programs on hygiene, sanitation, and prevention of communicable diseases will also be included in the action plan 6.) EFP will submit for approval of CSC-ES the construction camp layout before its establishment.						
1. Construction Phase						
Fresh cut and Earthwork Excavation	Slope failure, disruption of road water pollution nearby water bodies dust pollution	Along the road side where earth excavation work is necessary, along the road approximately 12 km cut and backfilling is required. With a portion of the road located in erosion-prone Savanna, minor slides and slope failures were noted between ch 60+500 and ch 75+000.	• Properly fasten and take protection on water position, construction of dyke around stockpiled material, spoil bank cut, employ bio-engineering • Control water flow through construction sites or disturbed areas with ditches, berms, check structures like grass barriers and rock • Maintain and reapply erosion control measures until vegetation is successfully established (Bioengineering) • maintain the steep stability break well, retaining wall etc. • Adequate protection against erosion will be achieved by active revegetation with plants selected from the DoR Roadside Bio-engineering Reference Manual and Soil Handbook, 2002 to ensure that the right plants are being used.	Contractor	Consultant DoR ROADS SUNUP/DoE	
Soil Disposal	Disturbance of road, damage to farmland, water pollution etc.	All disposal Sites 21+000-21+500, 26+000-26+450, 44+300-44+675, 40+700-45+500.	• Whenever possible, surplus soil will be used to fill eroded gullies, quarries and borrow pits, degraded areas etc. • Contractor must identify and select suitable and safest locations for the dumping or land fill and with	Contractor	Consultant DoR ROADS SUNUP/DoE	

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
		73+7000-74+000	sufficient capacity and approvals should be obtained from relevant Local Authorities - Excess spoils shall be disposed in specified tipping sites in a controlled manner - Spoils should not be disposed on fragile slopes, farmland, marshy land, forest areas, natural drainage path, canals and other infrastructures - After the disposal, the site will be provided with proper drainage, vegetation and adequate protection against erosion - Proper engineering design (including drainage and erosion control facilities) should be prepared by the contractor and written approval should be obtained from the local communities prior to dumping at the each identified site. - Adequate protection against erosion will be achieved by active revegetation with plants selected from the DoR Roadside Bio-engineering Reference Manual and Site Handbook, 2002 to ensure that the right plants are being used.			
Operation of Quarry Sites	Damage to farmland, property, etc	All quarry site where material is to be extracted (Kawakot Khola Bank (34+000), Girvan Khola Bank (43+000), Aarun Khola Bank (50+000) Dry Stream - Confluences (61+000-62+000) Binai Khola Bank (77B+500), Thau Khola basin (Elsewhere quarry), East Rapti Khola Bank (Elsewhere quarry), Manahari Khola Bank (Elsewhere quarry) 65 Km from Nanyanghat to Harsauda, Lethar Khola Bank (Elsewhere quarry) Bhanganga Khola Bank	- This approval from the local authority office is necessary before opening the new quarry - Contractor shall prepare quarry and borrow area operation plan to be approved by Engineer - Unstable sites, erosion prone area, dense forest area, settlements, fertile farm land will be avoided for quarrying operation. - After the extraction is completed, the quarry site shall be rehabilitated to suit the local landscape/original state/Bioengineer	Contractor	Consultant/ DoR/ PD/ADB/IC SC/DCC	

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
Cut and fill activities	Slope instability and Soil Erosion	(Elsewhere quarry) All area where cut and fill is necessary (approximately 150m of steep slope will require cut activities)	- Ensuring minimum cut slope - Selecting cut and fill slope at correct angle depending upon the soil type. Undertake and effect fill in layers no deeper than 150mm and compact before applying next layer. - Re-vegetation of cut and fill slope or exposed areas as soon as possible by using native plant species - Adoption of civil engineering work in conjunction with bioengineering techniques - Ensuring minimum damage of vegetation during construction	Contractor	Consultant DoR PCADB/GE SUMED/ DoE	Ry 2,007,800
Construction activity	Air Pollution	All along the road during the sediment area near the Road side	- Use of face mask by the workers to minimize air pollution due to dust generation - Plantation of local species along the roadside as per the Road act of Nepal - Quarries, crushers and asphalt plants must be located at least 500m away from residential or other public sensitive areas - Spray water before loading and transportation of soil and sand particularly during windy conditions - Dust carrying materials must be covered with tarpaulin sheets during transportation - Spray water to maintain the air quality at construction area and roadabout settlements - Ground surface of road where the crusher plant is located should be covered by tarpaulin layer to minimize the dust generation due to vehicle moving. - Use the Wet Crusher Plant as much as possible - Drum of the crusher can be covered by maintaining the appropriate height and conveyor belt also can be covered without disturbing the process in order to minimize the dust generation. - Construction materials must be stored in covered places or must be covered with a suitable covering to prevent dust emissions during wind	Contractor CSC NRs	Consultant DoR PCADB/GE SC	13500000.00
Disruption in natural water	Causing a number of	All area where such Structures are proposed to	Adequate numbers of drainage structures' water beding shall be provided in order to have minimum	Contractor	Consultant DoR	



Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
Flow due to construction of water related structures	Adverse impact on water bodies due to construction of structures downstream people	Be inside Major bridges-21 Minor bridges-40 Pipe culverts of different diameters-277 Box culverts-253 Slab culverts span (<1.2m) span and >1.2m spanning (The dual chainage) are constructed as an arch	- Interference on natural drainage pattern of the area. - Drainage outlet water discharge into farmland or rely locations shall be avoided. - No diversion of water away from natural water course unless it is absolutely necessary. - Avoid any blockage or diversion of natural channels due to extended or incidental disposal of spoil. - Install cascades, steps, energy dissipaters and check dams including bio-engineering measures as per design for gully protection to avoid debris and side erosion of natural course including river beds. - Reforest and avoid water extracts for construction works from the surroundings and public water supplies without any permission of VDC. - Monitor water quality turbidity and impacts to aquatic lives at locations of fish spawning habitat and/or fishing activities by local communities downstream of construction sites.		PO/AD/PE SC	
Construction activity	Disruption of Water Resources Related Infrastructures	All area where such structure is hampered in the streams area of Major bridges-21 Minor bridges-40 Pipe culverts of different diameters-277 Slab culverts-253 Box culverts span (<1.2m) span and >1.2m spanning	- Restoration / reinstating of all disturbed infrastructures. - Coordination with concerned local authorities. - The levels of water should be maintained as in original state if damaged during the road construction. - Contamination of water supply system shall be avoided.	Contractor	Consultant DoR/ PO/AD/PE SC	
Construction camp establishment	Pressure on public utilities by the huge mass of the laborers resulting in impairment in existing environmental condition	Camp sites are proposed along the drainage of 21+000-21+500 26+000-26+600 46+700-46+900 23+000-23+000	- Construction camps shall not be established in forest areas. - All resource needs by the laborer should be provided by contractor so as not to disturb the public utility. - Clear and restore contractor's work areas to natural or stable conditions with vegetation cover. - Catch area shall be provided with first first facility and pit latrine. Solid pit shall be provided for wastewater and solid waste management.	Contractor	Consultant DoR/ PO/AD/PE SC	50,000,000

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
Construction activity	Noise (vibration)	Temporary Crusher plant could be established for the construction activities only side (Kamwabi Khola Bank 134+500), Gurwan Khola Bank (43+000), Anon Khola Bank (50+000) Dry season, Confluence (31+000-42+000), Bina Khola Bank (70+500), Traul Khola bank (Easewhere quarry), East-Bagpi Khola Bank (Easewhere quarry), Manahan Khola Bank (Easewhere quarry) 25 km from Namyangphel to Habauda, Lohar Khola Bank (Easewhere quarry) Banganga Khola Bank (Easewhere quarry)	- To mitigate the impacts due to noise, construction machinery should be operated only during the day time. - Contractor shall equip properly tuned and well maintained heavy construction equipment and vehicles. - Subsidiary noise controlling devices such as exhaust silencers can be used to control noise. - All construction vehicles, machinery and equipment must be properly maintained to comply with the National Emission Standards. - If vibration levels exceed the permissible levels, contractor shall modify the method of construction and compliance with the acceptable level. - When constructions are carried out near public sensitive areas such as schools, hospitals or religious places the contractor must schedule the construction activities in consultation with the relevant Authorities to avoid any inconvenience. - Use of ear muffs to lessen noise pollution during rock breaking and quarrying.	Contractor	Consultant/ DoR/ PD/AD/ANC SC	
Stockpiling of Construction materials	Blockage of plain, damage to forest or agricultural land, dust generation	Place where Construction material is stockpiled: Chhangal 25+000-27+500 35+000-36+000 45+700-46+900 73+400-74+000	- Locate/prepare and seek approval from the supervising consultant for the use of stockpile sites. - Stockpiles shall not be located on water courses, shall not be within 50m of schools, hospitals or public standpipes and shall not affect local and their properties. - Obtain written permission from landowners and local bodies for stockpiling on their land. - Stockpiles will be covered with tarpaulins. For large stockpiles, it will be enclosed with steel barriers and also covered when not in use. - Provide intervening vegetated buffer to prevent any unexpected run-off. - Clean area properly after completion of the work. - Locate, make out and seek approval from Supervising Consultant for stone crushing plant. For more plant	Contractor	Consultant/ DoR	
Establishment and Operation	Local people labor force	Location of selected DANDA KHOLA	Locate, make out and seek approval from Supervising Consultant for stone crushing plant. For more plant	Contractor	Consultant/ DoR	

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
Closure of Dugher Road/Plant/Batching Plants	Contaminated air, noise and water pollution	(34+000) AREA, GIRWARI KHOLA (CH 43+000) AREA, ARUN KHOLA (50+000) AREA, BINAYA KHOLA (57+000) AREA	- Batching plants etc. Locate plant site away from population centers, drinking water intakes, cultivated lands and sensitive ecosystem, preferably at least 500m away from settlement and habitation. - Follow the plans drafted and specified by the concerned DOOs - Obtain permission from local stakeholders, Municipality, DDC or VDC as appropriate. - Stone crushing equipment/batching plant shall be fitted with dust control devices and operated as per Manufacturer's Specification. - Temperature of the hot-mix plant should be controlled at appropriate level in order to control exhaust gases at comply relevant emission standards. - Hotmix Plant shall have in-built mechanisms for the absorption of gases. - The plant shall be operated during day time only. - Reforest all the sites maintaining natural contours and vegetation after use.			
Work on Quarry rock break up etc.	Risk to human health	Work where such work has to be done. The quarry sites are	- Adequate lighting and safety signal devices shall be provided for work safety. - Adequate warning signs and safety barriers shall be provided for work safety. - Protective clothing including helmets, masks, boots, gloves, earplugs and goggles shall be provided for workers safety. - At every work place, a readily available first aid unit including an adequate supply of dressing materials shall be provided. - Maintain health care system at construction camps including regular visits by trained medical staff for routine checkup of workers and avoidance of communicable diseases.	Contractor - Consultant	Consultant and DOR	
Storage/handling and distribution of Bitumen	Risk to human health, with pollution, soil pollution	Area where storage and spreading of bitumen has to be carried out. Channage around	- Secure site for bitumen storage. - The permission from the land owner must be obtained before commencing the storage activities. - The bitumen storage must not be on fertile land and nearby water bodies. If bitumen has spilled over the	Contractor	Consultant and DOR	

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
		21+000-21+500 26+000-26+000 48+700-49+000 73+400-74+000	land accidentally and in improper place then it should be cleaned immediately. • The drum should not be discharged into the drain structure while overlaying on the sub-base material. • Drummer shall be trained in heaters using kerosene diesel or gas fuel. • Broken drums shall be stored in designated area, not scattered along the road and any small accidents spills will be cleaned up immediately. • No bituminous material will be discharged into side drains. • Bitumen shall not be applied in strong wind or rainy conditions. • No hazardous materials allowed to store near surface waters. • Collect and recycle used lubricants and oil or grease safely. • Overlay plastic sheeting under hazardous material storage area. • Collect and near hazardous material leaks and spills laid on the plastic sheet. • Contain contaminated runoff from storage areas in closed ponds with an oil trap at the outlet. • Pack, container and seal plastic sheeting and drums and disposed off site. • The vehicles should not be washed directly into the water bodies. • The vehicles and equipment should be maintenance time to time to ensure any leakage from them. • The storage of chemical should be done in proper place. • Workers should be educated through awareness program about the importance of while be maintaining the ecosystem. • It is recommended to work during day time to minimize the disturbances to the wildlife. • Speed breakers have to be incorporated in design. • Posting of environmental signboards (Illustrated and in local language) have to be displayed in more spots.			
Storage/ handling of chemicals (liquid and non-liquid)	Impact on human health, flora and fauna living nearby	Along the drainage 20+600-22+000 26+000-27+200 48+900-49+900 72+400-74+000 Theses are the potential sites for storage and handling will be through the road		Contractor	Consultant and DOR	
Inflow of labor into the construction site	Disturbance to the Wildlife	Entire road section		Contractor	Consultant and DOR	



Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
			- occurrence zone - The Contractor will be obliged to instruct the work personnel and enforce action for preventing access of labourers to nearby sensitive areas, as identified by the Consultant. - Harassment to wildlife by the workforce will be strictly restricted.			
Influx of construction crew into the construction field	Illegal Hunting and Wildlife Trade	Entire road section CMP, Buffer zone and 51 CF, 3 RT and 1 LRT	- Illegal hunting and fishing during construction period by the involved construction workforce and project staff will be strictly controlled - Depending on the local conditions and logistic constraints, meat and fish for contractor's workforce should be supplied by the contractor by purchasing them from larger markets in the region. - Trading of animal skin, horn, bones, fashers etc. will be fully controlled and supervised, and will be forwarded to enforce legal actions against offenders	Rs.	Consultant and DoR	500,000
Labor camp establishment and contractor camp establishment/ need of fuels for blumen heating operation of crusher plant	Exerted pressure on fossil fuel impacting as loss of forest	Along the chainage 21+000-21+500 28+000-28+600 46+700-46+800 73+400-74+000	- For construction crews stationed at the camp, contractor will provide kerosene or gas for cooking and heating - If heating of blumen is needed for sealing gravel, kerosene will be utilized - Use of forest wood will be restricted for meeting the fuel needs - First aid box, PPE (Helmet, mask, boots, glasses etc) should be provided in the camp site - Water supply and sanitation facilities should be provided to the camp area - Lighting and waste management at camp site should be provided	Contractor	Consultant and DoR	
Influx of labour, heavy machinery work, risk due to gravity of work such as rock break up	Impact on health and Safety issues	Entire road	- The workers will be provided with helmets, masks, muffs depending on the nature of the construction work. - Drinking water facility and temporary latrine will be established at construction sites to prevent open defecation and pollution of water bodies by the workers. - Workers will be provided with first aid and health facilities. There will be provision for group accidental insurance for the workers.	NRA	Consultant and DoR	1,080,000.00

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
			- First aid training will be provided to field staffs, like overseer, Environmental/social monitors and supervisors. - The Contractor will be obliged to carry out regular awareness training for the work forces to prevent undesired interactions with the local communities relating to prostitution, the spread of sexually transmitted diseases (above all HIV/AIDS), drug abuses and increased alcohol consume leading to social conflicts, clashes and crime. - The content and schedule for such awareness campaigns will be subject to specific clauses in the Works contracts.			
Construction Activities	Impact on community infrastructure	Water pipe lines, electric poles and other community property Electric Poles 3500V Telecom Pole 605 Electric Transformer, 99. VWater Supply Pipeline 58 km Passenger M	Restore all disturbed infrastructures to the condition before disturbance or improve where appropriate in coordination with local people	Contractor	Consultant	
Road construction	Grievance and Redressal community relations	All construction locations	- Adopt and maintain GRIEVANCE REDRESSAL Mechanism in contractor's office for each site of road construction - Inform local stakeholders of Grievance Redressal Mechanism and about how they can lodge grievance against contractor's fault work for his rectification - Promptly address all grievances received and provide documentation of grievance until its resolution is achieved - DoR-PDA/DG in regular monitoring reports - Inform the population about construction and work schedules, interruption of services, traffic detour routes and provisions involving traffic routes, blasting and demolition as appropriate - Limit construction activities at day. When necessary ensure that night work is carefully scheduled and the community is properly informed so they can take necessary measures	Contractor	Consultant	

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
Road construction	Disruption of Road and population	Throughout the project sites	Community must be informed/adviced through postings at the project site, at bus stops, and in affected houses/businesses at least five (5) days in advance of any service interruption (including water supply, electricity, telephone, vehicular traffic routes). The project will provide compensation for all land and private properties to be acquired before starting construction activities. Adequate provisions and compensation arrangements will be maintained in the Resettlement and Rehabilitation Action Plan. Further, clear picture and number of PAF and SPAFs will be depicted in Local Area and Vulnerable Community Development Plan to satisfy and compensate all PAFs in a fair and timely manner before the commencement of construction works. Land transfer certificate will be provided to PAF and SPAFs. The project will further encourage locals in the involvement of agricultural extension services to increase local crop production and adopt better hill farming techniques.	SC/Project/DoR	SC/GESU DoR	
Road construction along the forest area	Tree felling needs in 2027 numbers at different locations of	S3, CF, 3 RE, and 1 LHF and one Sajhedan Forest along the road corridor	It should be ensured that plantation is carried out only in areas where water can be made available during dry seasons and the plant can be protected during the initial stages of their growth. The species shall be identified in consultation with officials of forest department, giving due importance to local flora. It is recommended to plant mixed species in case of both avenue or cluster plantation. The species for plantation can be supplied by the Forest Department or managed from local nurseries or nurseries of the District Road Office. Costs for providing saplings will be borne by the road construction funds. Planting should be done wherever possible with native species, which are likely to require little maintenance and may prove beneficial in maintaining ecosystem integrity. If the vegetative covers are cleared, they will be re-vegetated by the suitable endemic and indigenous species. The priority of planting Species will be from the endemic species. Through geomorphic reclamation, the	Project/Contract or Consultant/ DoR	SC /DoR/DoF/ DFO/CNP	NRs 225675.00

Activity	Adverse Environmental Impact	Affected Location	Mitigation Measures	Responsibility		Associated Cost
				Implementation	Supervision	
Impacts on the wildlife for crossing	42 km of the road goes through the forest area	51 CH 3 RE and 1 LHF area. Unprotected areas will be constructed in the corridor. New animal crossings will be constructed across the road at 4 locations (Ch 7-350, 7+625, 8+305 and 9+350)	number of trees to be cleared will be further reduced during construction survey when the Contractor and Engineer perform ground clearing. No tree will be cleared without prior approval of the project's DNPWC, CPUG and clearance from the DFO. No construction camps or staging camps including temporary storage will be allowed in the CNP-Buffer Zone which is located from km 07+000 to 30+000. No materials will be stored inside the CNP buffer zone. This includes saw, barrowing, quarrying, and quarry supply. All works will be suspended between sunset and sunrise mainly from Km 07+200 to 31+000. This includes 500m on either side of the existing bridges to ensure the low disturbance for the movement of tiger and other wildlife. Harvesting of logs and saws in the project area will be strictly prohibited and included as a condition in the agreement with the contractor. Speed breakers in terms of temporary barriers and sign boards will be installed to advise motorist of incoming hazards and to reduce vehicle speed at most 40km/hr. There would be provision of speed breakers at every 400 m of roads passing through natural areas such that the speed is regulated in an to avoid accidental death of wild animals. Respective Buffer Zone for competition, and sections office will monitor the strict enforcement of the EMP provisions. Blowing of vehicle horn in the buffer zone will be restricted. This will be enforced through installation of appropriate sign boards. New animal crossings will be constructed across the road at 4 locations (Ch 7+350, 7+625, 8+305 and 9+350). Support will be provided to compensate the disturbance on wildlife movement. This will be in the form of habitat management, and creation/maintenance of movement corridors.	Project Contractor	CSC/ROAD BRIDGE P	

8.3 Organization and Staffing for EMP Implementation

The proponent needs to have an Environmental division within itself headed by a Senior Divisional Engineer rank. The project needs to hire an Environmental Management Consultant (EMC) to deal with the day-to-day tasks related to environmental management. The proposed organogram with key staffs for the Environmental division within the proponent and that of the EMC are presented below in Figures 8.1 and 8.2:

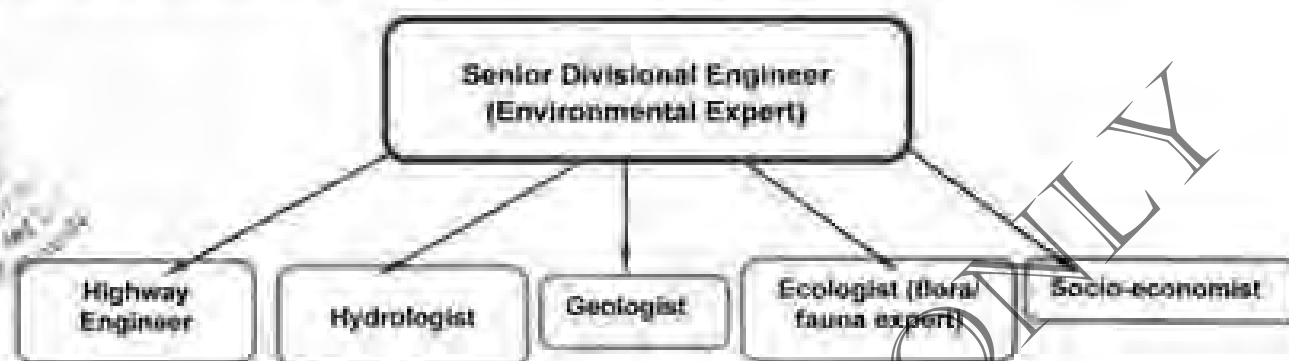


Figure 8.1: Organogram for the Environment Division of the proponent Field office

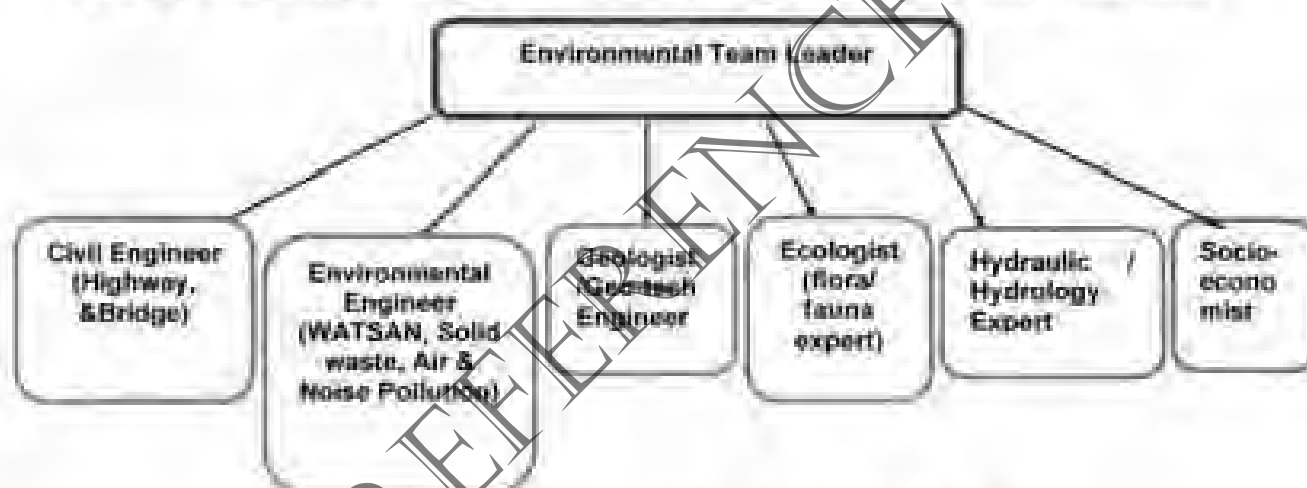


Figure 8.2: Organogram for the EMC at project field office

[Support persons like, lab assistants, site supervisors, chemists, office assistants etc. will be allowed as per the need by the project manager]

A laboratory each in the 4 field offices shall have to be established for the testing of soil, rock, water quality etc. and portable equipments for air sampling shall have to be made available to the environmental monitors during the periodic monitoring works.

8.4 Social Management Plan

A Social Management Plan is a very vital component of the EMP. It normally provides the institutional arrangements and processes of addressing the social issues so as to minimize the adverse impacts. Any development work leaves behind both positive as well as negative consequences to the nature and the society. All large projects need have in place a 'Social Action Plan' to deal with the possible ill impacts of the project on the society and also to



facilitate the works of the project by having a sound relation with the surrounding community. The various task related plans within the Social Action Plan are explained below under various headings:

8.4.1 Public Health Safety Management Plan

The health of the people of the surrounding community should be of utmost concern to the project authorities. Many activities of the project, if not conducted properly or without applying the recommended mitigation measures, are bound to inflict negative consequences on the public health. The contractor should appoint and orient Health Worker to monitor the health and safety issues and activities. The focal person will coordinate with the required stakeholder to better management of Health and safety. Representative of the local health facility and the concerned security personnel Which shall receive complaints on public health, study it and decide for the steps to be taken to abate the situation.

8.4.2 Public Grievances Redress Management Plan

The concern/grievances from local/affected people may come up related to inappropriate implementation of various components of EMP or the overall road upgrading itself. These issues will be addressed through acknowledgement, evaluation and corrective action and response approach. A grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of affected people's concerns, complaints, and grievances about the social and environmental performance of the project. The GRM aims to provide a trusted way to voice and resolve concerns linked to the project, and to be an effective way to address affected people's concerns. The GRM for the project is outlined below, and consists of three levels with time-bound schedules and specific persons to address grievances.

a. First Level GRM

The first level and most accessible and immediate contact for the fastest resolve of grievances are the contractors, and design and supervision consultants on site. Prior to construction of any works, the PIU (PDA/DB) and PIC (Project Manager) will ensure local community meetings are held to notify local residents and businesses of any temporary disturbances, and to inform them of the Project. If a local area committee (LAC) exists in the area, they should also be informed. If any complaints arise, the contractors, consultants, and PIC can immediately resolve the complaint on site. The PIU can also be involved in grievance redress at this stage. The PIU and PIC office phone number will be posted in public areas within the project area and construction sites. Any person with a grievance related to the project works can contact the project to file a complaint. The PIC office will have a safeguards focal person to field and resolve complaints. The safeguards (environment and resettlement) local person will document the complaint, and immediately address and resolve the issue with the contractor within 1-2 days, if the complaint remains unresolved at the field level. The PIC may seek the assistance of the consultant safeguards specialists (the environmental specialist or social safeguards specialist) to resolve the issue. The PIC safeguards focal person will notify the PIU safeguards focal person that a complaint was received, and whether it was resolved. The PIC safeguards focal person will fully document the following information: (i) name of the person; (ii) date complaint was received; (iii) nature of complaint; (iv) location, and (v) how the complaint was resolved.

b. Second Level GRM

Should the grievance remain unresolved, the PIC will forward the complaint to the PIU safeguards focal person. The person filing the grievance will be notified by PIC safeguards focal person that the grievance was forwarded to the PIU safeguards focal person. The PIU will address the grievance. Grievances will be resolved through continuous interactions with affected persons, and the PIU will answer queries and resolve grievances regarding various issues including environmental or social impacts. Corrective measures will be undertaken at the field level by the PIU safeguards focal person within 7 days. He/she will fully document the following information: (i) name of the person; (ii) date complaint was received; (iii) nature of complaint; (iv) location and (v) how the complaint was resolved.

c. Third Level GRM

Should the grievance remain unresolved, the PIU's project director will activate the third level of the GRM by referring the issue (with written documentation) to a Grievance Redress Committee (GRC) constituted by the EA, which will, based on review of the grievances, address them in consultation with the PMU, PIU, PIC and affected persons. The GRC will consist of PIC leadership, affected persons, and local area committee, among others—determined to provide impartial, balanced views on any issues. The GRC should consist of at least five persons. A hearing will be called with the GRC, if necessary, where the affected person can present his/her concern and issues. The process will promote conflict resolution through mediation. The GRC will meet as necessary when there are grievances to be addressed. The GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within 15 days. The functions of the GRC are as follows: (i) to provide support to affected persons on problems arising from environmental or social disruption, asset acquisition (where required), and eligibility for entitlements, compensation, and assistance; (ii) to record grievances of affected persons, categorize and prioritize them, and provide solutions within 15 days; and (iii) to report to the aggrieved parties developments regarding their grievances and decisions of the GRC. The PIC safeguards focal person will be responsible for processing and placing all papers before the GRC, recording decisions, issuing minutes of the meetings, and taking follow-up action to see that formal orders are issued and the decisions carried out.

d. Fourth Level GRM

In the event that a grievance is not addressed by the contractor, CSC, PIC, PIU or GRC, the affected person can seek legal redress of the grievance in the appropriate courts, the fourth level of the GRM, which is the formal legal court system. The GRM however does not prevent affected persons from seeking legal redress at any time.

8.4.3 Permits and Approval

The administration and legal section of the project office shall be dealing with such issues like ; obtaining permits and getting approval of plans from the relevant authorities. Hence, no plan is required for such one- off activities. The permits for quarry sites and crusher plant also be required. The relevant permission and approvals of Quarry site operation, Tree cutting , Crusher establishment, Burrow pits and construction materials management, solid waste disposal sites, relocation of utilities, clearance of Land, Location of storage yards, labor camps , and construction sites, identification and selection of materials sources,

waste and spoil disposal locations, stockpiling locations, and impairment of cultural and historical area etc will require permits and approval.

8.5 Physical and Biological Management Plan

The Physical and Biological Management Plan has been prepared to encompass the organizational set up and the processes that have to be followed while addressing the environmental concerns in the physical and biological environments. It covers the following:

(make such plan for crusher plant installation, operation, production of materials, environment protection, bringing environment to natural condition and decommissioning of crusher plant)

8.5.1 Erosion Abatement and Watershed Management Plan

Continuous sprinkling of water on the exposed dusty cut surfaces of earth in the dry season will definitely curtail the erosion due to wind action. Similarly construction of CSI barricades on the edges of the excavated surfaces reduce the top soil flow to the nearby water bodies. Covering the cut surfaces with tarpaulin sheets and sowing of grass seeds & covering with small meshed nets will also conserve the top soil. The EMC under the supervision of Environmental Division of the proponent will have to chalk out the plans for counteracting the erosion and to well manage the watershed. The cost for the same has been included in the EMP. The supervisors of the EMC shall report of any anomalies in this regard to the hydrologist, geologist and the environmental experts of the team and the EMC will make a proposal to the environmental division of the proponent. The environmental division of the proponent after the field verification will approve the proposal and order the contractor for necessary mitigative actions to abate/ minimize the erosion and improve the condition of the concerned watershed.

8.5.2 Muck / Spoil Site Management Plan

The muck, especially from the cutting section of the road, will have to be managed very carefully in order to minimize the adverse impacts arising thereof. The muck after dumped at the designated sites shall have to be spread in layers of 500mm each and rolled to attain the compaction as per the specification. The construction supervisor i. e. the Design and Supervision Consultant (DSC) will primarily be responsible for this task. The Supervisors of the EMC, assuming secondary responsibility, must be present at site during this activity. They should report of any discrepancy to the project authority and the DSC and the contractor will have to rectify the mistakes after getting orders for the same from competent authorities of the proponent i. e. the Environment Division.

8.5.3 Top Soil Saving Management Plan

The top soil removed while preparing the site for road will be spread over and managed properly at the sites where plantation will be done. The nutrient rich top soil will help the planted tree/ shrub species grow better. The top soil shall also be used while developing nursery to raise saplings/ seedlings for plantation.

It will be the responsibility of the contractor to ensure that no top soil is dumped at places where it is not required. The DSC primarily and the proponent will keep a vigilant eye on this activity of the contractor.

8.5.4 Pollution Abatement Plan (Pertaining to: Water Quality; Air Quality; and Solid Waste)

Pollution Abatement Plan is regarded to be very important for environmental management/ compliance of any development projects of larger size. The mitigation measures and the monitoring modalities, responsibility allocation, frequency of monitoring and the cost of monitoring have already explained in the earlier sections. The plan as shown below in Figure 8.3 is self-explanatory.

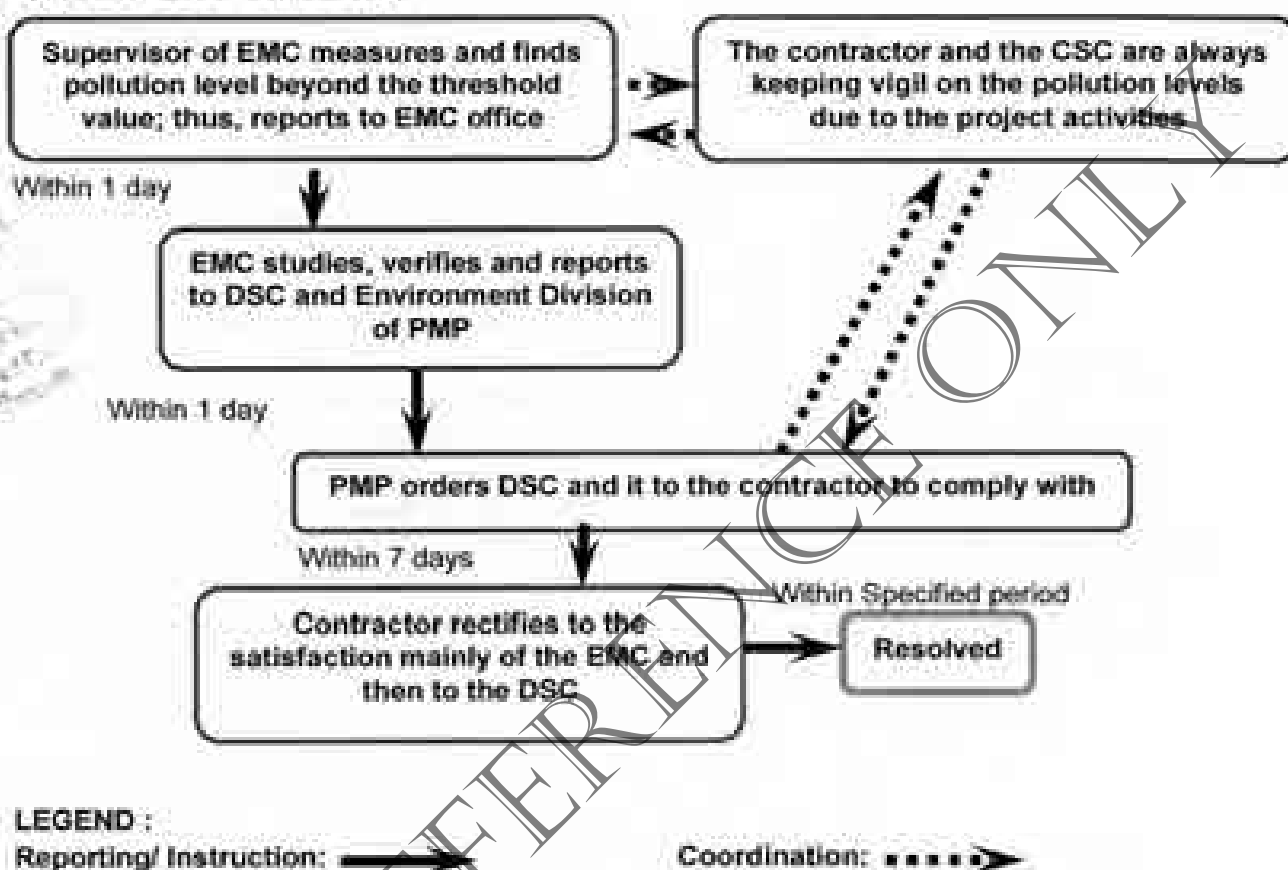


Figure 8.3: Flow Diagram of Pollution Abatement Plan

8.5.5 Toxic and Hazardous Chemical Handling and Management Plan

The toxic and hazardous chemical management plan is also necessary for a better environmental management plan to be functional. Bitumen, Accelerator chemicals, Petrochemical, Oil, Grease, Silica etc. are the main chemicals that shall be used in various stages of construction of the project. The above mentioned chemicals shall be stored in separate stores as per their nature. Accelerator Chemical and Silica can be stored in the same store with cement. Rest of the others can be stored separately in another one. Any spillage and leakage of such chemicals shall readily be cleaned/ removed immediately. The used oils shall be stored separately and shall be sold to the scavengers.

The Field supervisors of the CSC are basically responsible to ensure the compliance as mentioned above. The EMC will oversee such activities and report of non-compliance to the



Environmental Division of the proponent. The Environment Division will instruct the contractor and the CSC of the same and ask the contractor to comply with immediate effect.

8.5.6 Demobilization and Rehabilitation Management Plan

The project after completion of the construction activities shall reinstate the temporarily occupied spaces used for worker's camp, construction material preparation/ processing sites, sheds, warehouses, quarry sites, borrow pits etc. Site clearance activity shall be carried out by the contractor to bring back the outlook of the used spaces to original form. Removal of construction wastes and debris, filling, turfing, protection work if required etc. shall be the possible activities to be done by the contractor and the CSC will ensure the compliance as per this plan. The EMC will be overseeing the activities for their appropriateness and compliance to this plan as well. The EMC shall report to the proponent for the non-compliance if any. The proponent shall order the contractor and the CSC for compliance and such order shall be followed by the contractor both in letter and spirit.

8.5.7 Ecological Conservation/ Management Plan

The ecology includes flora and fauna that are found on the earth surface, the air and water and the interaction between them. Floral management, in this case, mainly consists of felling of trees, poles, saplings, seedlings and translocation of rare endangered species. The cutting of trees involves the steps like: marking, counting, measuring, cutting, stacking, uprooting, transporting and storage in coordination with and consent from concerned CFUGs and concerned District Forest Office (DFO). The representative from the DFO must be present during the cutting and other following activities as mentioned above. This activity will be carried out by the contractor and supervised by the CSC and project proponent authorities. The EMC will be having a bird's eye view of such activities. They will report immediately to the proponent office of any non-compliance. The project shall bring this to the notice of DFO and order the contractor/ CSC for compliance.

Faunal management mainly includes the safety of the wild animals and fish of the nearby aquatic habitat. The construction workers and other related stakeholders shall be asked to adhere to set of rules devised for the safeguard of the wild animals and the aquatic species. The CSC and EMC shall make sure that the rules were obeyed by each and every individual involved in the project. They will report to the project authority of any non-compliance. The project, keeping the DFO in confidence, will ask the concerned to comply with.

8.5.8 Environmental Training Plan to Project Staff and Construction Staff

An EIA training program of 1 week for the benefit of the project officers and staff of the contractor will be conducted in the first year at the beginning of the construction works and follow up/ refresher trainings of 2 days will be conducted every 2 years.

8.5.9 Occupational Health and Safety (OHS) Management Plan

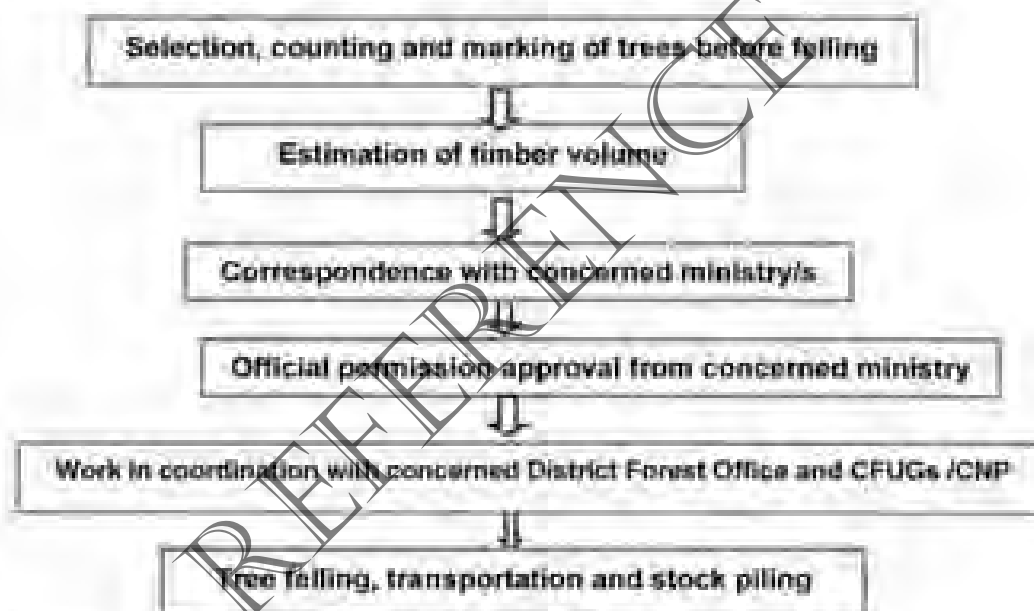
OHS is an area concerned with protecting the health, safety and welfare of people engaged in work or employment. The goals of occupational health and safety programs include to foster a safe and healthy work environment. OHS may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment. All organisations have a duty of care to ensure that employees and any other person who may be affected by the companies undertaking remain safe at all times. Moral

obligations would involve the protection of employee's lives and health. Legal reasons for OSH practices relate to the preventative, punitive and compensatory effects of laws that protect worker's safety and health. OHS can also reduce employee injury and illness-related costs, including medical care, sick leave and disability benefit costs.

The contractor and the project proponent are responsible to ensure adequate provision of OHS. It includes provision of First Aid Kits at each work station and clinic with doctor and nurses at each of the workers' camps. All the employees/ workers must have the PPEs available for them during the work. All the employees and workers must have Insurance and Medical cover provided by the contractor and the project proponent should have a provision of this cost in the Environmental cost.

8.5.10 Tree Felling Plan

The project proponent will be responsible for the control felling of trees to ensure that no trees outside the road alignment are felled illegally and will monitor felling process on a regular basis. After getting official approval from the concerned ministry the proponent should work in close coordination with concerned District Forest Offices and CFUGs to develop tree felling plan schedule and proceed as following:



8.5.11 Construction Camps Management Plan

The construction camp has to be run by the contractor and supervised by the DSC. The contractor should be responsible for cooking gas, food items, electricity, water supply, waste management, transportation, security, medical, recreational facilities, orientation of the workers, fuel supply, maintenance of vehicles/ quarters/ warehouses, safety of employees/ workers' stored construction materials and other miscellaneous provisions/ items.

The CSC primarily and the project proponent in an overall manner will supervise the Camp management activities of the contractor. Rules to run the camp management will be made by the project proponent in coordination with the CSC and the contractor. The local security agencies and the political players shall also be involved if need arises.



8.5.12 Forest Encroachment Control Plan

Temporary settlement development, by the local community, along the constructed highways is a common practice in Nepal. Such constructed highway does not only provide easy and better access, and business opportunities to the local community but is also responsible for forest destruction due to encroachment by constructing new sheds and houses. It is most likely that the same problem will also occur all along the road alignment during construction and will flourish well during operation phase of the road. Therefore, the proponent will implement "Forest Encroachment Control Management Strategy 2068" as endorsed by the Ministry of Forest and Soil conservation, Government of Nepal.

Occurrence of forest encroachment problem can be envisaged in different ways for different purposes. Establishment of local market may occur due to better business opportunity and development of settlements due to better access along the road alignment. Whatever may be the cause of encroachment, ultimately forest resources will be adversely affected due to increased demand on timber and fuel wood. Therefore, following actions will be taken by the project proponent to stop/ prevent forest encroachment:

- A. Coordinate and work with concerned DDC, DAO and DFO to control and prevent the types of forest encroachment as mentioned in the strategy.
- B. Construct local body of representative of DDC, VDC, DFO, CFUGs, Nepal Police etc. to monitor forest encroachment for timely action.
- C. Control vehicular movements during the construction phase in coordination with Zonal Transport Management Office, Traffic Police and local bus/truck committees.
- D. Coordinate with CFUGs to prevent settlement development along the road alignment.
- E. Conduct awareness programs in local communities to prevent encroachment.
- F. Develop alternatives to promote local business and livelihoods opportunities.
- G. Provide barbed wire fencing along the road near sensitive floral and faunal habitats.
- H. Ban on market visit for the workforce of road construction.
- I. Evacuate any illegal settlement developed during or after the road construction in coordination with DAO, DFO and DFO.
- J. Ban on uncontrolled grazing in forest areas.

8.5.13 Traffic Management Plan

It is one of the busy highway of the nation. Hence there is essence of preparation of traffic management plan before starting construction activity in the road section. The EFP of contractor along with support of CSC-ES will prepare and submit the traffic management plan to RE. It will include timing of vehicle movement, rerouting of vehicles through different rural roads, location of diversions and so on, so that the nuisance of traffic obstruction will be minimized.

8.5.14 Emergency Preparedness and Management Plan

The types of emergency that such project might face prominently include landslides during construction, fire hazard in the camps and the nearby forests, floods in the local rivers causing damage to the project and the workers and earth-quake which might happen anywhere- anytime.

A contingency plan has to be made for the relief and response if any emergency situation would arise out of the aforementioned causes. The Nepal Red Cross Society (NRCS) and the local security bodies will be coordinated by the plan. Some items like Tent, Bucket, Mugs, Cooking Utensil sets, adequate amount of cooking gas/ kerosine, sets of cloths, sets of hygiene kits (Soap, tooth brush, tooth paste etc.), sets of First Aid kits etc. shall be prepositioned at the district head quarter with some vendor in coordination with the NRCS. An Ambulance and Fire-fighting Truck, loaded with the support employees at each of the project site offices shall be ensured by the project proponent. There is no need of prepositioning of the heavy machineries as the contractor will be having those in ample quantities. The following Figure 8.4 shows the flow diagram of the Emergency Preparedness and Management Plan.

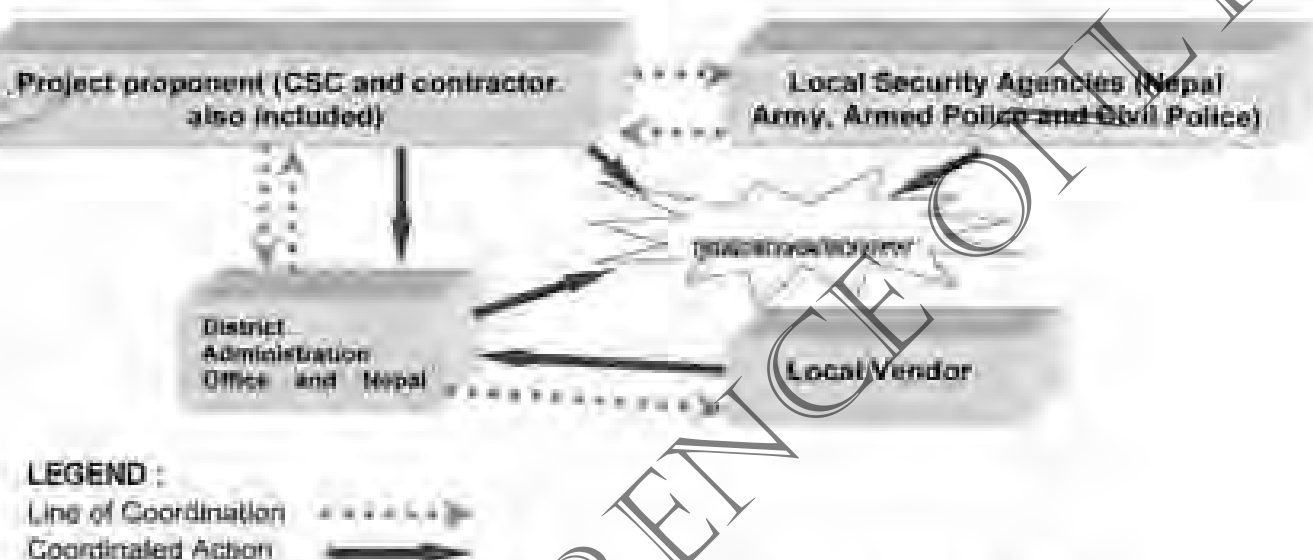


Figure 8.4: Emergency Preparedness and Management Plan

8.5.15 Explosive Handling and Safety Plan

Dry, Reinforced Concrete Underground Bunkers will have to be constructed at each of the worker camps & field sites of the project proponent and shall be transported from the storage site in adequate quantity daily to the sites where blasting has to be done. These all bunkers must be under the security cordon of the Nepal Army. The storage, transportation within the country and blasting of explosive must be done under the safeguards and supervision of the Nepal Army. A cordon of at least 30m radius from the explosion site shall be demarcated during the blasting activities. No unauthorized persons, for security reasons, will be allowed to trespass beyond the cordon towards the blasting site. The contractor in the presence of the CSC and the project proponent field personnel shall be handed over the explosives by the Nepal Army at the site of use. No unauthorized person shall be allowed, during transportation/ storage/ use, to tamper with the explosives or related detonating equipments and accessories. A medical team with First Aid Kit shall be provisioned at each blasting site by the contractor. The CSC and EMC will supervise the compliance. Any theft or misuse shall immediately be reported to the project proponent responsible officer and then to the local security agencies and the District Administration office. The following Figure 8.5 shows the Line diagram for the management of explosives.

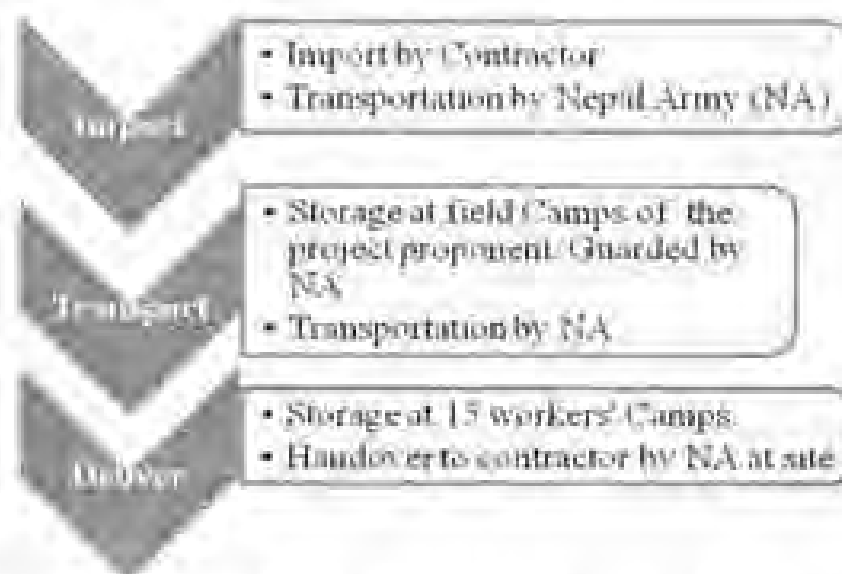


Figure 8.5: Explosives handling and safety Plan

8.5.16 Fire Management Plan

The proposed Fire Management Plan will help prevent, control and mitigate any fire related accidents either due to the construction related activities within construction areas or in the natural plant communities occurring naturally or accidentally. The risk of forest fire is defined as "the chance of the forest fire igniting, spreading and causing damage to assets within the community or reducing the biodiversity of area with inappropriate fire regimes" (Great Lakes Council, NSW, Australia, 2006). The project proponent will implement "Forest Fire Management Strategy 2067" to prevent and control the forest fire as endorsed by the Ministry of Forest and Soil conservation, Government of Nepal.

Risk of fire due to project

Various reasons may cause accidental fire within the project area as well as in surrounding forest areas due to the construction related activities. Therefore, to avoid any kind of accidental fire hazard, special care and attention needs to be provided for fuel management (storage, refueling and transportation). Following criteria should be considered seriously while constructing fuel storage and refilling sites for construction purposes:

- Construction of storage and refueling facilities away from forest area in barren land.
- Slope of the terrain,
- Fuel quantity,
- Proper design for storage and refilling facilities to ensure no leakage.
- Size of combined risk areas (away from settlement and forest area), and
- Provision of enough modern fire fighting equipments

Education and awareness program

Non Formal Education Program is a very important program for education and awareness raising activities to prevent, control and mitigate fire hazards for local communities and work force. Therefore, wildfire awareness and education should be promoted in the local communities and if possible, awareness should be combined with education helps to reduce

the risk of accidental human ignition. Similarly, separate awareness programs should be promoted for workforce and their families in the labor camps. All education and awareness programs should be developed in coordination with DFO, DDC and NGOs of the concerned districts and implement with the help of VDC offices in the highly affected areas. Various reading materials such as posters, leaflets etc. should be developed with the help of DFO and distributed in local communities and schools. Project should also train local community regarding fire combating techniques with simple tools and get involved in controlling any forest fire occurring in project area.

Fire control in project facilities

Following methods are suggested which should be implemented in case of fire incidents in project facilities such as offices, residences etc:

- Do not store fuel near or within office premises or residence areas,
- Install fire fighting equipments (Dry Hydrants) and provide training to all project staffs,
- Develop and implement evacuation plan,
- Post placards clearly marking "fire escape route" and emergency stopping area, and keep the area clear of all materials, especially hazardous and inflammable ones,
- Install a direct phone line with nearby Fire Department,
- Install siren in required locations (camps, Storage, crusher area and major working areas etc) and post "No Smoking" sign in all fire hazardous areas.

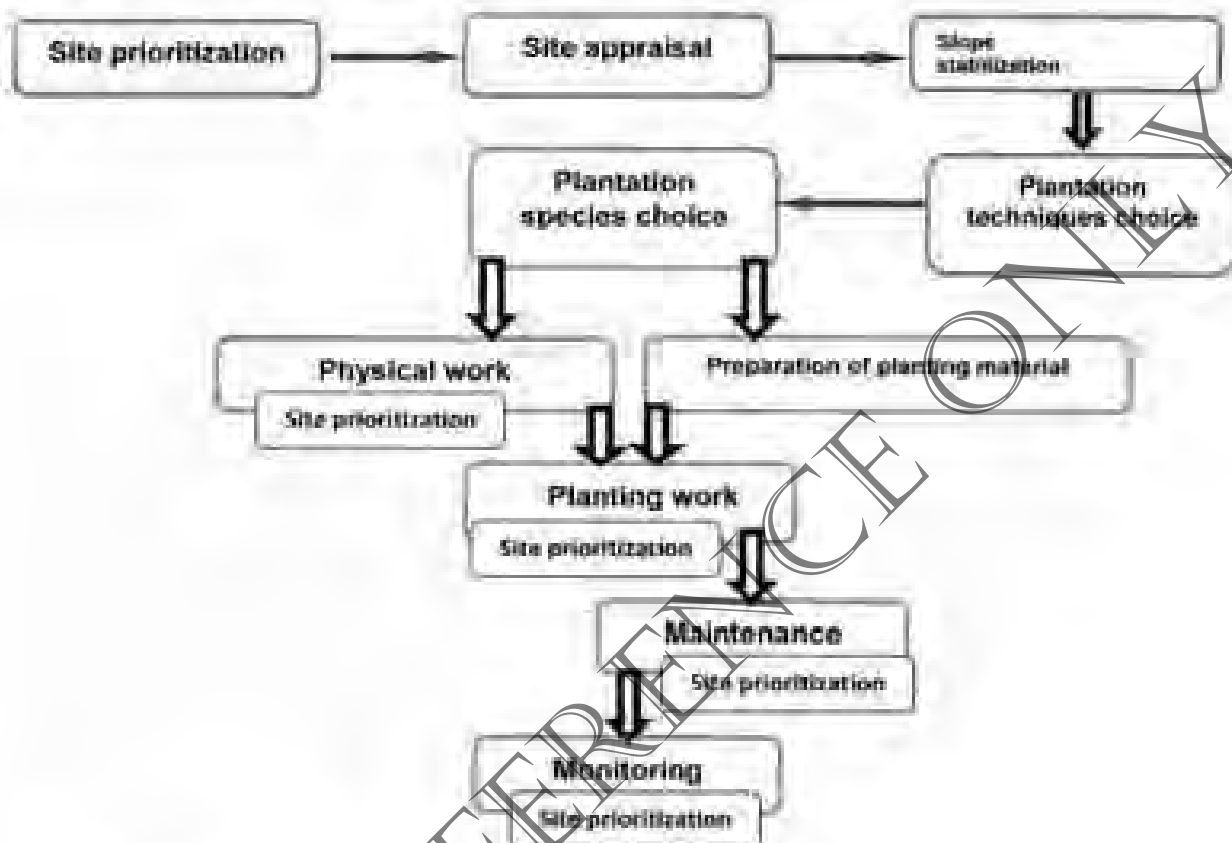
Some other preventive measures to be followed in fire incidents, as follows:

- New road construction should be required to create fire safe access, including fuels reduction along the roadway,
- A pre-plan and a fuel modification project should be implemented for all new roads,
- Thinning or mowing along critical new road corridors should be completed prior to home construction,
- Develop "Shelter in-Place" means to remain inside a home, business, or other permanent building,
- Provide and maintain fuel reduced areas to help prevent the spread of fires and reduce fire intensity,
- Create and/or maintain existing fire advantage lines to provide access for fire fighters,
- Liaison with adjoining communities and DFO for monitoring and management of adjacent zone for forest fire risks and fuel hazards,
- Provide a refuge area for fire fighters, visitors and residents in the event of a fire.



8.5.17 Road Side Plantation Plan Table need to be formed

All plantation activities along the entire road alignment and muck disposal sites should be carried out to prevent slope failure and erosion in future. Plantation procedure should precisely follow as mentioned by Howell et al. 1991, Vegetation Structures for Stabilizing Highway Slopes – A Manual for Nepal. The required tree species should be selected with the consultation of respected Forest Offices.



8.5.18 Afforestation Plan in Project Area

All afforestation activities in the project area should be discussed, coordinated and implemented with concerning District Forest Offices, Chitwan National Park, Buffer Zone Management Committee and NGOs working in the field of nature conservation. If any. Similarly, any afforestation/plantation work targeted in community forests should be planned in advance in close coordination with them with prior approval and all afforestation/plantation work should focus on biodiversity conservation and habitat protection all along the road alignment. This Road Project should also provide technical support and strengthen BZMC and FLUGs capacity for protection, utilization and sustainable management of forest in future.

The project proponent will also strengthen the capacity of CNP, DFOs and NGOs by providing necessary support such as - constructions of check posts along the road, providing simple instruments and equipments related to conservation work.

8.5.19 Reporting Requirements

The Environmental monitoring reports prepared by the EMC shall be made available to the project authority at the field each month. The Department of Road (PD ADB) shall be responsible for sending compiled half- yearly report to the MoPE. The MoSTE can anytime visit the site to validate the report.

8.5.20 Organization of Environmental Management

Figure 8.6 outlines a number of government agencies responsible for environmental management and its monitoring in line with EPR, 1997, Rule13 (Amendment) Department of Roads, ADB Project Directorate under the Ministry of Physical Infrastructure and Transport (MoPIT) is the proponent of the proposed SASEC Road Improvement Project.

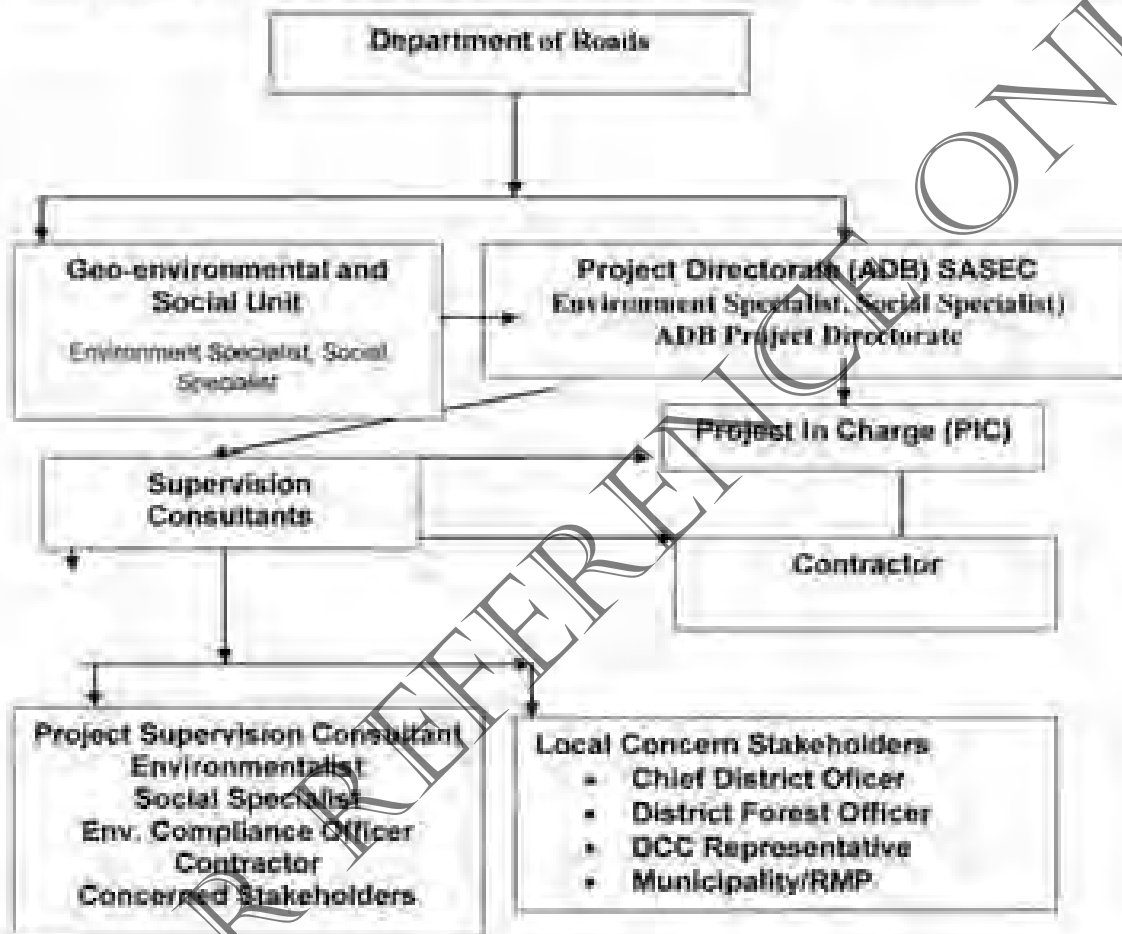


Figure 8.6: Environmental Management Organization Structure



8.5.21 Estimated Budget for Environmental Monitoring

The Project will allocate Environmental Monitoring cost for the Proponent. The Monitoring costs for 3-4 times per year at the construction site are divided as follows.

Table 8.3: Estimated budget for Environmental Monitoring

Specifications	Input (mm)	Rate (per month)	Amount
Environmental Specialist	20	Rs. 150,000	Rs. 3,000,000.00
Sociologist	40	Rs. 100,000	Rs. 400,000.00
Environmental Inspector	10	100,000.00	1,000,000.00
Social Mobilizer	10	70,000.00	700,000.00
Reporting, Logistics, etc.	LS		Rs. 200,000.00
Transport	LS		Rs. 150,000.00
Field Sampling and Lab Tests	LS		Rs. 500,000.00
Sub-Total Costs for Environmental Monitoring Works			Rs. 5,950,000.00
Monitoring Costs for:			
Geo-Environment and Social Unit, DOR	LS		400,000.00
MoPIT/MoPE/PO ADB	LS		400,000.00
Ministry of Forests and Soil Conservation	LS		600,000.00
Sub-Total Costs for Monitoring Agencies			1,400,000.00
Total Estimate			7,350,000.00

8.6 Environmental Auditing

The environmental auditing assesses actual environmental impact, accuracy of prediction, effectiveness of environmental enhancement and impact mitigation measures and functioning of monitoring mechanism.

8.6.1 Type of Auditing:

Although various types of environmental auditing methods have been mentioned, but environmental impact assessment auditing will be carried out. In this case environmental auditing will compare monitoring and evaluation results with baseline data. Comparison made between predicted and actual impacts helps to evaluate the accuracy and adequacy of environmental impact assessment predictions.

8.6.2 Agencies Responsible for Auditing :

According to EPR, the Ministry of Population and Environment (MoPE) shall carry out an audit study (i.e. environmental examination) after two years of completion of the project. The audit study will focus mainly on the proposed mitigation measures whether that had been adopted properly and beneficial impacts were enhanced and adverse impacts were curbed or not. The MoPE will maintain such information on audit report.

8.6.3 Elements in the Audit Report

An auditing plan will be prepared to audit the effectiveness of the mitigation measures and the effect of unforeseen impacts. The auditing plan describes the auditing parameters and indicators, its location, schedule and methods. The parameters will be considered as mentioned in EMP of the EIA study report.

The required human resources and indicative budget to carry out the audit report are presented in following Table:

Table No: 8.4 Estimated budget for Environmental Auditing

SN	Audit Unit Quantity(	Month)	PM Rate (NRs)	Amount (NRs)
1	Environmentalist/Team Leader	1.5	250,000	375,000
2	Road Engineer	0.8	200,000	160,000
3	Sociologist	1.0	200,000	200,000
4	Forest Expert	0.8	200,000	160,000
5	Hydrologist	0.8	200,000	160,000
6	Support Staff	1.5	40,000	60,000
7	Per diem	LS		150,000
8	Transportation and lodging	LS		200,000
9	Reportprinting binding	LS		50,000
10	Grand Total			1,515,000



CHAPTER 9: CONCLUSION

The proposed Narayanghat-Butwal Road is an existing road which will offer heavy traffic uninterrupted road for the upcoming days may be due to the higher number of Traffic and population. This road section will open for the Lumbini a worldwide religious area with the capital city of Nepal. The proposed road project is classified as environment category for EIA requirement as per the EPA 93 (with amendment) of Nepal. About 24.0 km of the existing road passes along the edge of the buffer zone, of the Chitwan National Park. The CNP is a first World Heritage site of Nepal for the habitat protection.

Although the road does not pass through the Core Zone of CNP and also does not cross the buffer zone area, it passes along the edge of the Buffer Zone of CNP bordering it with National forest and other land use. After exhaustive consultation with DoR, CNP, BZMC and local people effective EMP has been prepared to ensure no net loss of the affected biodiversity. Specific measures have been included in the project to: i) improve wildlife habitat through compensatory afforestation, ii) improve the movement of the wildlife especially Tiger through the establishment of Wildlife under Pass 4 in numbers, iii) improve awareness and stewardship amongst the local people for the CNP iv) enhance road design to make road users aware on the existence of important wildlife species, and (v) establish inter-agency coordination with agencies and NGOs who are presently implementing their programs in Chitwan National park and Forest area of the project site. With such measures the project offers an opportunity to bring improvements to wildlife conservation in the project area.

Community-based participation is mobilized to strengthen biodiversity protection of the CNP. Other impacts of the project outside the CNP Buffer Zone are unlikely to cause any significant environmental impacts and are localized and temporary in nature and easy to mitigate. Several community forests were traversed and 9027 Nos. of trees will be cleared and 22, 5675 Nos. of trees will be compensated at the mandatory rate of 1:25. Significant impacts during construction are air quality deterioration due to increase in fugitive dust emissions from materials hauling and unloading, ground shaping, hot mix plant operation, quarry operation, and unpaved road travel and Travel through the diversion. During construction phase the noise from the operation of heavy equipment, Traffic divergence, increase in movement of traffic and stacking of construction materials may cause nuisance and hindrance to the local residence. No change in land use from agricultural or residential to business type may occur due to expansion of road. There is already the area have been taken from the DoR. Health and safety risk due to increase in heavy equipment and traffic movement particularly to children and pedestrian crossing may rise. During operation stage, the main impact may be crossing for the pedestrians. The high speed of the vehicles may cause accident risk to pedestrians and livestock, hindrance in accessibility, increased noise due to increase in traffic.

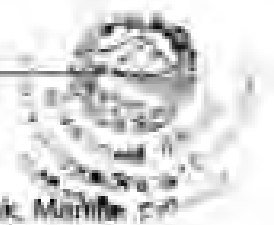
All identified impacts are of short-duration and co-terminus with the construction phase, and are easy to mitigate. 1733 sqm land is will be taken and no structures will get disturbed to be demolished or relocated only the public utilities are there which will be relocated through the project budget.

In general, the project was supported by the local people. The local people appreciated that besides providing an good transportation to the local this road may be a backbone for the economic improvement of the whole country, it will bear out several other socio-economic positive benefits. The total Environmental management cost for this project is NRs 206,029,842.00

The environmental impact assessment of the project indicates that the significant adverse impacts can be mitigated and is unlikely to cause any significant residual environmental impacts. The Executing Agency shall ensure that EMP and EMoP is included in Bill of Quantity (BOQ) and forms part of bid document and civil works contract. The same shall be revised if necessary during project implementation or if there is any change in the project design and with approval of concern authority.

Meanwhile this EIA report ensures that the implementation of the proposed EMP will not be the cause of significant environmental impacts. The EIA also directs to the concern authority to implement the EMP and EIA properly.

FOR REFERENCE ONLY



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Annex 1: Environmental Management Plan for Narayanghat - Butwal Road (Section – 2) from Km 65+000 to Km 113+535

Environmental issues / Components	Mitigation Measures	Location	Time Frame	Approx. Mitigation Cost (NRs.)	Institutional Responsibility	
ImplementationSupervision						
Construction Stage/ Physical Environment						
Air, Noise and Water Quality	Monitoring of air, noise and water quality parameters	Throughout the road corridor mainly nearby settlements, bazaar, religious, cultural and archeological sites	During Construction Stage	150,000.00	Supervision Consultant and Contractor	SC, DOR/PD
Landslide and Soil Erosion Occurrence of landslide and soil erosion due to natural and induced phenomena.	- Apply civil and bioengineering techniques to stabilize landslide and soil erosion.	Throughout the road corridor of impact(COI) at landslide and erosion prone area	During Construction Stage	16,822,322.00	Contractor	SC, DOR/PD
Borrow Pits and Quarry Sites Likelihood of slope failure, sedimentation, water logging, change in the aesthetic values of the landscape, damage to sensitive areas	- Operate borrow pits and quarry sites avoiding protected and sensitive areas, nearby settlements, water sources, forest areas and fertile agriculture lands and - Rehabilitate properly after their usage.	Throughout the sub-project corridor	During Construction Stage	Contract Documents	Contractor	SC, DOR/PD
Management of Construction Spoils/Wastes Generation of spoils due to the excavation of existing roads that constitute bitumen and other pavement materials	- Prepare a detailed management plan including suitable disposal locations for spoils/waste and receive approval from the SC, and implement accordingly.	Throughout the road COI wherever spoils need to be managed	During Construction Stage	Contract Documents	Contractor	SC, DOR/PD
Biological Environment						
Forestry and Biodiversity Clearance of trees (2,321 nos.), shrubs and bushes along the roadside	- The Contractor will determine number and types of trees to be felled through the detailed design/or its verification and will coordinate with CFUGs then apply to DFO for clearance process	Throughout the road alignment especially at forest areas	At the beginning of construction	4,307,300.00	Contractor	SC, DOR/PD
Socio-economic Environment						
Impact on Common Property Resources Likely damage to common properties such as public utilities and facilities, etc.	- Reinstate the services damaged by the project implementation	Throughout the road COI	During Construction	115,754,000.00	Contractor	SC, DOR/PD

Note: COI = Corridor of Impact, CFUG = Community Forest Users Group, DFO = District Forest Officer, SC = Supervision Consultant, DOR/PD = Department of Roads/Project Directorate (ADB)

Appendix 3 – Resettlement Plan

FOR REFERENCE ONLY

Resettlement Plan

July 2016

NEP: SASEC Roads Improvement Project

Narayanghat-Butwal Road

FOR REFERENCE ONLY

Prepared by Department of Roads, Ministry of Physical Infrastructure and Transports,
Government of Nepal for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 27 May 2016)

Currency unit	–	Nepalese rupee (NPR)
NPR1.00	=	\$ 0.00931
\$1.00	=	107.432

ABBREVIATIONS

ADB	-	Asian Development Bank
Aps	-	Affected Persons
BPL	-	Below Poverty Line
CBO	-	Community Based Organization
CBS	-	Central Bureau of Statistics
CDC	-	Compensation Determination Committee
CDO	-	Chief District Officer
Col	-	Corridor of Impact
DAO	-	District Administration Office
DDC	-	District Development Committee
DLSO	-	District Land Survey Office
DLRO	-	District Land Revenue Office
DoR	-	Department of Roads
CSC	-	Construction and Supervision Consultant
EA	-	Executing Agency
FGD	-	Focus Group Discussion
GDI	-	Gender Development Index
GEU	-	Geo- Environment Unit
GRC	-	Grievance Redress Committee
GoN	-	Government of Nepal
HDI	-	Human Development Index
HPI	-	Human Poverty Index
HHs	-	Households
IA	-	Implementing Agency
INGO	-	International Nongovernment Organization
MoF	-	Ministry of Finance
MoPIT	-	Ministry of Physical Infrastructure and Transport
NGO	-	Non-governmental Organization
PDP(s)	-	Project Affected Family (Families)
PD	-	Project Director, PID
PIU	-	Project Implementation Unit
PPTA	-	project preparatory Technical Assistance
RoW	-	Right of Way
RP	-	Resettlement Plan
R&R	-	Resettlement and Rehabilitation
RS	-	Resettlement Specialist
SPAF	-	Severely project Affected Family
SPS	-	Safeguard Policy Statement (ADB 2009)
Sqm	-	Square meters
TPPF	-	Transport Project Preparatory Facility
VDC	-	Village Development Committee
ZoI	-	Zone of Influence

GLOSSARY

Affected Person	–	Any person including Vulnerable encroachers/squatters, households, business affected by the project through the acquisition of land or other assets or disruption in business irrespective of legal or ownership title. This includes any person whose rights, standard of living, subsistence and income-generating capacity are adversely affected because of the disruption in the acquisition of assets or business, whether full/partial, or permanent/temporary.
Compensation	–	The payment in cash or kind for private property acquired by the government for the project, based on replacement value
Corridor of Impact	–	Minimum width of land required for the construction of roads and provision of shoulder, width plus safety zone on either side of the road. Col is generally within the RoW, except where construction requirements and topography necessitate the acquisition of wider area.
Cut-off Date	–	The date of census survey to count the DPs and their affected business and assets.
Entitled Person	–	Any person physically or economically displaced as a result of (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas.
Local Consultative Groups	–	Municipalities/village level committees established to assist the affected population, legally constituted committees for land acquisition and project authorities, monitoring of implementation issues and community reactions and grievance resolution.
Poverty Line Income	–	The cost of maintaining basic minimum needs. PLIs have been defined by different organizations and the government departments, using factors such as per Capita calorie requirements and expenditures on housing and other non- food items.
Rehabilitation	–	The measures taken to mitigate social impacts, including compensation, resettlement and rehabilitation allowances where required
Replacement Cost	–	The calculation of full replacement cost will be based on the following elements: (i) fair market value; (ii) transaction costs; (iii) interest accrued, and (iv) other applicable payments,
Right of Way Titleholder	–	The legal right to use the land by the Department of Road.
	–	The person in whose name the project-affected business, land and/or building business is legally registered and who is authorized to receive the compensation granted for the loss of business or acquisition of the land
Tenant		A person occupying or utilizing buildings of a titleholder/house owner on rent.
Vulnerable persons		They are the disadvantaged persons such as disabled, women headed households, handicapped, orphans, destitute, independent elderly persons above 60 years of age, landless laborers, wage earners and people living below the poverty line.

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EXECUTIVE SUMMARY

A. Project Description

1. The Government of Nepal has requested financial assistance from the Asian Development Bank (ADB) to implement the SASEC- Road Improvement Project (SRIP). The project will finance improvements of two strategic high-priority highways in the central and western region of Nepal: i) Narayanghat – Butwal highway (115 km 4 lane highway), and ii) Bhairahawa-Lumbini-Taulihawa feeder road (45 km – 4 and 2 lane feeder road). The project will contribute to poverty reduction and support the economic development of rural communities through (i) improved connectivity and accessibility of markets, headquarters and other centers of economic activity; (ii) year round all weather road connections; and (iii) improving DOR capacity for managing road construction/ improvement and maintenance. The project will affect 49 households (271 persons) among whom 29 (188 persons) will be physically displaced. Given its moderate involuntary resettlement impacts, the project is categorized as B for resettlement impacts as per ADB's Safeguards Policy Statement (SPS) 2009.

2. This document is the Resettlement Plan for the Narayanghat-Butwal road. It is expected that the Narayanghat – Butwal highway improvements will impact 36 households (199 persons). The road improvements will consist in upgrading and widening of the existing road into four lanes with intermediately service lane in both side, additional road side structures, geometry improvement, pavement construction with Asphalts Concrete, drainage improvement, retaining structures, slope protection/stabilization; bridge construction, works on traffic management and road safety.

Table 1: Details of Narayanghat- Butwal

Districts Covered	Length	Construction Details
Chitwan, Nawalparasi and Rupandehi district	115	Upgrading and widening of existing road in to 4 lanes with intermediately service lane in both side, additional roadside structures, slope protection works, bioengineering works, drainage/cross drainage works, and pavement construction with Asphalts Concrete. The Department of Roads (DoR) intends to improve this Narayanghat- Butwal road to an all-weather asphalts concrete four-lane Asian Highway Standard.

B. Resettlement Impacts

3. The Narayanghat-Butwal road is the part of East West Highway. It passes through Chitwan, Nawalparasi and Rupandehi districts. The road starts at Pulchowk of Narayanghat (Chitwan district) and ends at Chauraha of Butwal (Rupandehi district). The total length of the road is 115 km. The road is a national highway and the existing Right of Way (RoW) is 25 meter on either side of the road. The Right of Way belongs to DOR, this has been confirmed in writing by the Land Records Office. The project includes major activities, which includes drainage improvement, minor realignment, pavement improvement and widening of the existing road in to 4 lanes with intermediately service lane in both sides.

4. All efforts have been to avoid involuntary resettlement wherever possible by adopting an appropriate technical design that minimized social impacts. Although the RoW is 50 meters, its utilization was minimized and the resettlement impacts are limited to the Corridor of Impact (COI) which is 46 meter in built-up sections, 30 meters in jungle areas and 20 meter in the hilly

section of the Daunne area (around km 70). Structures and private land acquisition have been avoided to the extent possible.

5. The road improvements will require minor land acquisition where the existing alignment is insufficient to meet the requirement of new design, usually for intersection improvement, bridges and services lanes. The land to be acquired mostly comprises small strips of uncultivated land on either side of the existing road. There is no major impact on the income of affected households due to loss of land. A total 19 private land parcels equivalent to 1733.5 square meters and belonging to 17 households will be affected by the project. Moreover, a total of 21 structures belonging to 20 households will also be affected, most of them (17) belong to non-titled holders. No crops of private trees are expected to be affected. The table below summarizes total affected households in road alignment.

Table 2: Summary of Affected Asset

Type of Asset Affected	No of affected HHs
Land only	16
Land with residential house	2
Residential house without land	9
Commercial only	8
Commercial cum Residential structure	1
Total	36

C. Information Disclosure, Consultation and Participation

6. Consultations were undertaken at different levels, in particular with affected persons, but also with local level social workers, representatives of political parties, civil-based organizations, business men, and representatives of vulnerable groups. At least one meeting was held in each major settlement to get feedback of people's perceptions of the project and suggestions. A total of 189 persons were consulted for the preparation of this RP.

7. A one-page leaflet of impacts, entitlements, grievance redress mechanism and contact information will be distributed to affected persons and a summary of the RP will be translated into Nepali and will be made accessible to the affected people through the respective District Development Committee (DDCs) and Chief District Officer (CDO) The RP will be disclosed to the EA's and ADB's websites.

D. Grievance Redress Mechanism

8. The Grievance Redress Mechanism proposed for this project is composed of three level committees to ensure issues can be addressed at the local level and if necessary escalated to the higher project authority. The first level committee will be site specific (village development committee or municipality level), the second committee will be at the field-level road-specific PIU led by DoR Project Manager, and the third level will be at the project directorate level in Kathmandu. In the first and second level committee, the representation of project affected persons, including women is ensured.

E. Legal Framework

9. The Resettlement Plan (RP) is guided by the ADB Safeguard Policy Statement 2009, Land Acquisition Act of Nepal 2034 (1977) and other relevant policies and guidelines. The main objective of the RP is to identify impacts and mitigation measures to address the various losses

due to the project road. The RP has been prepared based on the findings of the field reconnaissance survey, verification of land records with the land revenue offices, the census and socioeconomic survey of affected households and consultations with affected persons, broader community residents and line agencies at district and local levels.

F. Entitlement, Assistance and Benefits

10. ADB's Safeguard Policy Statement (2009) on involuntary resettlement requires the compensation for the loss of land and assets on land at replacement cost, relocation assistance, assistance for the loss of income and livelihoods as well as special measure for vulnerable affected households defined as household headed by women, disabled persons, ethnic or indigenous persons, and household living below the poverty line. SPS considers non-titled holders as eligible for resettlement assistance for loss of income and assets other than land. The entitlement matrix (EM) has provisions in line with the requirements mentioned above. In addition, APs will receive other cash grants, resettlement assistance, such as transportation allowances, reconstruction allowance.

G. Resettlement Budget and Financing

11. The total estimated resettlement budget for the implementation of this RP is NRs. **42,909,592** (US \$ 408,663 @ NRS. 105). This cost includes all cost related to compensation for land, structures, economic rehabilitation of vulnerable group, RP implementation, external monitor and 10 % contingencies for the total cost of resettlement and rehabilitation. All cost related to the land acquisition and resettlement budget will be borne by the Government. The EA will ensure that adequate funds are delivered on time to the CDO for timely implementation of RP.

H. Institutional Arrangement

12. The Ministry of Physical Infrastructure and Transport (MoPIT) will be the executing agency (EA) and the Department of Roads (DOR) will be the implementing agency (IA) of this project. A Project Implementation Unit (PIU), based in Kathmandu, headed by the Project Director will be responsible for the overall execution of the project. Second class senior divisional engineer from PD will be deputed as Project Manager who will work as project in charge for the IA. The Project Manager (PM) will play a crucial role in coordinating with other line agencies for the verification of affected households and determination of the rate of affected assets. The PM will be also effective in resolving the grievances at local or district levels.

13. The RP will be implemented by the team of resettlement experts and field-level social mobilizers hired under the Supervision Consultant. They will be responsible for confirming the list of affected households and assets, identifying vulnerable households, preparing the affected household ID cards, supporting DOR in finalizing the compensation and assistance package for each affected household, facilitating payments, and preparing and conducting the livelihood training program. The SC team will also be responsible for facilitating the submission and documenting grievances, setting up an internal monitoring system and baseline, and conducting a training program to DOR staff on resettlement activities. preparing and conducting the livelihood training program to vulnerable

I. Implementation Schedule

14. Construction activities are expected to start from the first quarter of 2018 and be

completed at the end of 2021. Major activities to be carried out prior to construction activities are: (i) the payment of compensations and other rehabilitation assistance to the APs and (ii) handing over sections free of encumbrances to the contractor. Advance actions to accelerate the implementation of the resettlement plan are the establishment of the project office, the recruitment of the Project Manager and supervision consultant resettlement staff, and the establishment of grievance redress committees. Affected persons will not be asked to relocate prior to receiving compensation and resettlement assistance.

J. Monitoring and Reporting

15. The RP implementation will have both internal and external monitoring systems. Internal monitoring will be the regular activity of the PIU and supervision consultant in charge of implementing the RP. The PIU will maintain a record of all transactions in the resettlement database. The project office will be responsible to keep the record of the baseline, socioeconomic, census and land acquisition and compensation payment data for field level monitoring.

16. An external professional/individual/researcher or consulting agency, university department or development NGOs will be recruited by DoR to carry out an independent bi-annual review of the implementation of resettlement activities.

17. The Department of Road will submit biannual internal monitoring reports of the RP implementation to ADB. The independent monitoring individual/agency will submit bi-annual external monitoring reports directly to ADB with a copy to the EA to determine whether or not the resettlement goals have been achieved.

I. PROJECT DESCRIPTION

A. General Description of the Project and objectives of the RP

1. The government of Nepal has requested financial assistance from the Asian Development Bank (ADB) to implement the SASEC Road Improvement Project (SRIP). The project will finance improvements of two strategic high-priority highways in the central and western region of Nepal: i) Narayanghat – Butwal highway (115 km 4 lane highway), and ii) Bhairahawa-Lumbini-Taulihawa feeder road (45 km – 4 and 2 lane feeder road). The project will contribute to poverty reduction and support the economic development of rural communities through (i) improved connectivity and accessibility of markets, headquarters and other centers of economic activity; (ii) year round all weather road connections; and (iii) improving DOR capacity for managing road construction/ improvement and maintenance. The project will affect 49 households (271 persons) among whom 29 (188 persons) will be physically displaced. Given its moderate involuntary resettlement impacts, the project is categorized as B for resettlement impacts as per ADB's Safeguards Policy Statement (SPS) 2009.

2. This document is the Resettlement Plan for the Narayanghat-Butwal road. It is expected that the Narayanghat – Butwal highway improvements will impact 36 households (199 persons).

B. Description of the project road

3. Narayanghat – Butwal road Section is a part of East West Highway, designated as a National Highway (H01 as per DoR and AH02 as per the Asian Highway network). The project road starts from Pulchowk in Naraynghat of Chitwan District, Narayani Zone, Central Development Region at about km 473+280 of the East West Highway (189 m amsl) and passes through mostly plain and rolling sections of Nawalparasi and Rupandehi Districts - except Daunne hills of Nawalparasi district, and ends at Lakhan Chowk, Butwal, at about Km 587+280 (167amsl) in Rupandehi district.

4. The Narayanghat-Butwal Road is currently a bituminous surface with 6.0-7.0 meter carriage width, crossing numerous rivers, community forests, buffer zone of Chitwan National Park, and several large settlements.

5. Figure 1 Indicates location Map of the Narayanghat – Butwal road section. Detail survey and descriptions of selected road salient features and specification is given in Table 3.



Figure 1: Location of Narayanghat – Butwal road

6. The total road length is 115 km. The road is located in Chitwan, Nawalparasi and Rupandehi districts in the Narayani and Lumbini Zone, Central Development Region and Western Development Region of Nepal. The road alignment passes through 2 Sub Metropolitan Cities, 7 Municipalities and 5 VDCs. The road provides connectivity to major settlements, market centers and agriculture production pockets and crosses various forest areas as well as touches the Buffer Zone of the Chitwan National Park. Salient feature of the project road are presented in Table 3 below.

Table 3: Salient Features of the Narayanghat-Butwal Project Road

Table 6: Current Features of the Narayangad-Butwal Project Road		
Name of the Road Section	Upgrading to 4 lane EWH Narayangad-Butwal Section ,115 km	
LOCATION		
Start Point	Gaidakot Municipality of Nawalparasi District	
End Point	Butwal, Butwal Sub metropolitan City, Rupandehi District,	
Major markets/urban center	Gaidakot, Beldehia, Rajahar, Pragatinagar, Dadldale, Kawasoti, Danda, Arunkhola, Chormara, Dumkibas, Badraghat, Bhumahi, Sunuwal, Devdaha, Butwal	
GEOGRAPHICAL FEATURES		
Section:	Plain Section (i) Km 0+670 to Km 63+270; (ii) Km75+270 to Km 114+670	Steep Section (ii) Km 63+270 to KM 75+270
Terrain	Plain	Mountain/Steep
Alignment	Plain	Steep
Altitude	From 120 m to 550 m amsl	
Climate	Subtropical/Tropical	Subtropical/Tropical
Road Type		
Classification of road	Asian Highway Class I	Asian Highway Class II
Length of Road	100 km	15km

Type of Pavement	Asphalt Concrete	Asphalt Concrete
Standard of Pavement	Overseas Road Note 31 (RN 31) and/or AASHTO design method	
Design Parameters		
Design Speed	100 km/hr	40km/hr
No. of Lanes	Four Lane	Double Lane
Right of Way	50 m	50m
Median Width	4 m	NA
Carriageway Width	14m	7m
Total Formation (Road Way) Width	26.50m	12.00m
Shoulder Width	3.75m	2.50m
Camber of Carriage way	2.5%	2.5%
Camber of Shoulder	3%	3%
Minimum Horizontal Curve Radius	350m	50m
Gradient		
Maximum Gradient	4 %	7%
Maximum Gradient at Bridge Approach	4%	4%
Maximum Maximum(critical) Length, m	600m	300m
Hairpin Bends		
Design Speed	NA	40 km/hr
Min. spacing between centers of bends	NA	200 m
Maximum Gradient	NA	4%
Minimum Gradient	NA	0.5 %
Maximum super elevation	NA	7%
Minimum Radius of Curve	NA	50 m
Extra widening	NA	1.50m
No. of Major Bridges	21 no.	
No of Minor Bridges	26 no	

Source: Consultants Report, 2016

C. Measures to avoid or minimize impact

7. Efforts to avoid or minimize involuntary resettlement impacts have been made by adopting a technical design using the best utilization of the available space in the available width and limiting impacts to the corridor of impacts. Although the RoW is 50 meters, its utilization was minimized and the resettlement impacts are limited to the Corridor of Impact (COI) which is 46 meter in built-up sections, 30 meters in jungle areas and 16- 20 meter in the hilly section of the Daunne area (around km 70). Structures and private land acquisition have been avoided to the extent possible. The land to be acquired mostly comprises of small strips of uncultivated land on either side of the existing road. There is no major impact on the income of affected households due to loss of land.

D. Objective and Methodology of the Resettlement Plan

8. The objective of this resettlement plan (RP) is to assess and document impacts as well

as develop mitigation, compensation and rehabilitation measures to restore the assets and livelihoods of all persons affected by this project. The resettlement plan covers the Naranyanghat-Butwal road improvement and complies with the Land Acquisition Act of Nepal 2034 (1977) and ADB's Standard for Involuntary Resettlement outlined in the Safeguards Policy Statement (2009).

9. **Cadastral survey and land records verification:** DOR's ownership of the ROW was verified (see Appendices 1.A, 1.B and 1.C). A cadastral survey of the likely affected land parcels done under the leadership of Cadastral Surveyor from the District Land Survey Office. The Cadastral Surveyor with the knowledge of engineering design identified upgrading requirements and likely areas of land to be acquired. The team pegged the alignment and impact boundaries and verified the affected land areas, assets and structures. The affected lands and other assets were determined at the site and the cadastral surveyors enumerated and measured other affected assets (e.g. structures, etc) within the premises of affected land parcels. The cadastral survey revealed that available road width is enough for the road construction but some of the intersection of the services lane required a nominal land acquisition. Therefore, additional 018 ha land is required for the implementation of the project road.

10. **Consultations:** Some of the key stakeholders consulted included local community members, family members of affected households, local key informants, officials of relevant district level agencies (i.e. District Land Survey Office, District Land Revenue Office, District Forest Office, local political leaders, and representatives of local level institutions, etc...). The Resettlement Specialist in charge of the RP preparation, supported by Cadastral Surveyor and other team members conducted field survey on the road alignment. Qualitative socio-economic information such as perceptions about the project, potential benefits and likely negative impacts (especially to vulnerable groups), likely resettlement issues, key issues related to women and children, and other local issues were also asessed during the census survey. Such information was collected through discussion with the family members of the affected households, local community, representative of local level institutions and political parties, and other key informants (e.g. VDC/ward representatives, significantly affected persons, women, school teachers etc.) individually or in groups.

11. **Census survey:** To obtain the socioeconomic information of project affected households, a census survey was undertaken in the month of February 2016 based on the detailed designs. For carrying out the census surveys of APs, a household level questionnaire was used, containing structured questions for the generation of the desired data. The census was carried out based upon the detailed design drawings prepared by the technical team. The census survey of all affected households was conducted. Information on family members were collected through the census of project affected households and their family members was acquired through the survey. Information about sources of income and average annual income of the affected households, education level, vulnerability status, etc. was collected. The cut-off date of February 1st, 2016, which is the start of the survey was communicated to affected persons during the census.

12. **Affected Asset Inventory:** The resettlement team with the support of the local community and APs prepared the list of affected assets and their owners that are located within the Col. The list contained the name of households head, address, types of owned along the road corridor.

II. SCOPE OF LAND ACQUISITION AND RESETTLEMENT

A. Project benefits

13. The project road traverses through three districts as a part of the East – West Highway. Reductions in travel time due to the improvement of the project road and direct linkage with the Indian border and Gauttam Buddha International airport are two of the major benefits of the project road. The improvement of the project is expected to increase the number of tourists in the area. It will bring economic benefits to local people through savings in vehicle operating costs, time savings for passengers and goods transit, and savings in road maintenance cost. It is anticipated that the improvement of this road will bring several positive socioeconomic impacts contributing to the poverty reduction in the area, foremost among which are the followings:

- Employment opportunity during construction period
- Increase of income-generating activities like development of market center, and tourist centers.
- Easy transport facilities to export and import goods from and to the project road districts
- Increase of land price along the road alignment
- Development of other infrastructures and
- Development of economic diversification activities.

14. The project has some negative socioeconomic impacts primarily related to loss of land and structures, which will be discussed below.

B. Summary of negative Impacts

15. Total of 36 households will be affected by the project, of which 25 households were interviewed during the census survey. Among affected households, 16 households will lose land only, 1 household will lose land with structures and 19 households will lose structures only. Among the affected structures, 9 residential structures, 9 commercial, and two are commercial cum residential house. The detail of affected structures is presented in below table.

16. Altogether 199 people will be affected from 36 households. Of the total 36 affected households, 25 households were interviewed and 12 were absentees at the time of the survey. – Some landowners were absent during the survey but the impact on their land has been measures and their names included in the list of affected households after verification with the land records department. The total list of APs has been presented in Appendix 2.

Table 4: Number of Affected People

Types of Affected Assets	Affected Households	Affected Peoples	Land Parcels	Land Area to be acquired (sq. m)
Land only	16	82	19	1733.5 Sq. meter
Land with structures	2	10		
Structure only	18	97		
Total	36	199		

Source: Field Surveys, Feb 2016

C. Scope of land acquisition

17. This road is classified as National Highway and was constructed about three decade ago. The right of way (RoW) of 50 m (25 meter either side from centerline of road) for this road is declared by His Majesty Government (now Government of Nepal) through gazette publication in 1977. The entire RoW was acquired and owned by the government and subsequently all private land was transferred to the Government of Nepal. Legal ownership belongs to DOR.

18. The project has received letter mentioning the no-objection letter stating that RoW is clear and that it belongs to DoR clearance of RoW from Land Survey and Divisional Road office from respective office Nepal (See Appendix 1). The improvement works are mostly limited to DoR's existing RoW except in a few stretch of intersections improvement. Based on detail design and field verification from cadastral surveyors the project need to acquire 0.18 ha of land from 18 households for major intersections improvement. All the land to be acquired is homestead land. Most affected landowners will lose less than 10% of their total land holding. Only one household will lose between 10-20%.

Table 5: Extent of Loss of Land

Section	Extent of land loss of the total land holdings		
	Less than 10 %	10-20%	More than 20%
No. of households	17	1	0
No. of affected people	199	0	0

D. Impacts on private structures

19. A total of 21 structures belonging to 20 affected households will be affected by the project. All will be fully affected. Most structures (17) belong to non-titled holders in the existing RoW and 3 structures (two residential and one commercial) belong to title-holders. 20 households, representing 128 persons will have to physically relocate from their commercial or residential structures.

20. Among the affected structures 10 are residential structures, 9 are commercial structures, two residential cum commercial structure. The following Table 6 and 7 provides details of the structures loss and type.

Table 6: Types of assets by loss and structure type

Type of Asset Affected	No of affected HHS	No of affected structures	No. of APs
Residential Structures	11	10	50
Commercial Structure	8	9	53
Residential cum commercial structure	1	2	5
Total	20	21	128

Source: Field Surveys, Feb 2016

21. **Affected structures by construction materials.** Among the affected residential structures, three are constructed with frame (i.e. concrete with pillars) structure and ten are bricks wall with tin zinc roofing and remaining eight are block bricks and tin roof.

22.

23. Table 7 provides a breakdown of the affected structures as per construction materials type.

Table 7: Types of Affected Structures

S.N	Types of Structures	Affected households *	
		Number	Percent
1	Frame structures with concrete	3	14
2	Brick wall with tin roof	10	58
3	Temporary wooden wall with zinc roof	8	28
	Total	21	100

Note: * There is enough public land nearby for non-title holders to relocate. For legal owners, they all have sufficient remaining land to relocate their house.

E. Impact on Community Structures

24. The census reveals that 357 community structures are affected by the project road. There are ten Public toilet, 160 passenger sheds, 52 water tap, 25 Temple stair and extended part (i.e. small shed for sitting) and public/Chautara (resting place under the tree) etc. These community properties need to be relocated during the implementation phase in close coordination and collaboration with the local community. The community structures will be rebuilt by the project. The replacement cost for reconstruction has been incorporated into the engineering cost estimates. The detailed list of community structures is attached in Appendix 3.

Table 8: Affected Community structure

S.N	Resources	Numbers
1	Public Toilet	10
2	Chautara (Big & small)	85
3	Passenger Waiting shed	160
4	Public Tap	52
5	Temple's stairs, front place etc	25
6	Nozzle of Petroleum filling stand	10
7	Public figure personal status & Map of Nepal etc.	5
8	police check post Entrance Gate Traffic direction post etc	10
	Total	357

Source: field survey 2016

F. Other impacts

25. The inventory of lost assets confirmed that no other assets, such as crops, trees and fish ponds will be affected. The only trees affected are trees belonging to DoR planted along the alignment during the construction of the road in the late 1970s.

G. Impact on Socially Vulnerable Groups

26. Out of 36 total households 25 households were interviewed, 20 among whom were identified as vulnerable, representing 76% of surveyed affected households. The most important vulnerability categories are Indigenous People (IP), households below the poverty level (BPL) and female-headed households. Table 9 presents details on the vulnerability categories identified during the survey.

Table 9: Vulnerability Status of the APs of Affected Households

Vulnerability Category	Number of HH
Female Headed Households	4
Having Disabled Members	0

Vulnerability Category	Number of HH
Having Elderly Members	1
Below Poverty Level	4
Indigenous households	10
Dalit household	1
Headed by orphans	0
Landless (who are not already included in the above categories)	0
Total Vulnerable Peoples (APs)	20

Note: # about 68 % of the total affected households were interviewed during the census survey. Absentees land owner (32%) will be updated during project implementation

27. Based on ADB SPS, the RP has special provisions and additional financial assistance for vulnerable affected households. They will receive financial assistance for the 90 days at local wage rate as a transitional allowance to bear any additional cost related to the relocation process. They will also be eligible to participate in the livelihood training program.

H. Indigenous people

28. All affected IPs are titled holders (the land ownership certificate was verified during the survey). Based on the census and field observation all IPs are losing less than 10% of the land as a result of the project and two also fall into the BPL category. IPs in this area are assimilated with the mainstream society, sharing common social values, norms and culture, having similar occupations and income-generation activities. This is explained in further details in the socioeconomic chapter in section III.

III. SOCIOECONOMIC INFORMATION AND PROFILE

29. This chapter presents an overview of the project road area and an analysis of the impacts based on the census of affected persons.

A. Social profile of affected households

30. **Demography.** The average family size of the affected household is 5.12, which is higher than national average 4.8. With regard to age distribution of households, 66 percent population comes under the category 15 - 60 years where as 26.5 percent are below 15 years age group and 7 percent above 60 years age. Age-wise distribution of the household members of the project road is given in Table 10.

Table 10: Age Wise Distribution of Household Members

Reported HHs	Not Reported HHs	Total Family Members	HH Population by Age Group					
			Below 15 Yrs.		15-60 Yrs.		Above 60 Yrs.	
			No.	%	No.	%	No.	%
25	12*	128	34	26.5	85	66.4	9	7.0

Source: Field Surveys, February 2016

* Absentee land owners

31. **Social classification.** Out of 25 interviewed affected households, 10 are identified as indigenous including 2 Thakali and 1 Newar households, which is categorized as advanced IP. Other occupational caste group Dalit consists of 1 family. Others caste groups including Brahmin, Chhetris were 14 households. Based on the census and field observation, the IP households and Dalit are assimilated and absorbed with the mainstream society, sharing common social values, norms and culture. Table 11 provides the distribution of affected households by IPs and caste group categories.

Table 11: Affected households by Ethnicity

Affected households Type	No. of Affected HHs	Percentage
Janajati/ IPs including Advanced IP Newar/ Thakali	10	40.00
Dalit	1	4.00
Brahmin/Chhetries	14	56.00
Total	25	100.00.00

Source: Field Surveys, February 2016

32. **Literacy and education.** Out of a total 25 interviewed household heads, one is illiterate, followed by 5 households functionally literate (can read and write). The remaining 76 percent comprise of a mixed group of people with primary, lower secondary, secondary, and SLC level of education. Table 12 provides the distribution of literacy and educational status levels of surveyed affected households.

Table 12: Educational Status of the Respondents of Affected households

Educational Status	No.	Percent
Illiterate	1	4.00
Literate (can read and write)	5	20.00
Primary	3	12.00
Lower Secondary	3	12.00
Secondary	8	32.00

Educational Status	No.	Percent
SLC	2	8.00
Above SLC	3	12.00
Total	25	100.00

Source: Field Surveys, Feb 2016

33. The male literacy status among affected household was 96.50% whereas it was reported 87.7% in the case of female respondents. Table 13 indicates the distribution of male/female literacy status in the project road area.

Table 13: Literacy Status of the Family Members of the Households

Reported HH No.	Total Literate Family Members	Male Literate		Female Literate		Not reported HHS
		No.	Percent	No.	Percent	
25	128	57	96.49	57	87.71	12

Source: Field Surveys, Feb 2016

* Absentee land owners

B. Economic profile

34. **Occupational background of the households.** The survey of affected persons revealed that a majority of the affected households are by and large dependent on more than one source of income for the fulfillment of their livelihood needs. Agriculture with occupations (mainly business) are the main sources of livelihood. The most important occupation among the affected households is business (40%), followed by agriculture (20%). Other sources include foreign employment (16%), services (12%) and 8% are retired from military service. Table 14 provides the main source of income of the interviewed households.

Table 14: Main Sources of Income of Interviewed Households

Sources of Income	Affected households Reported	
	In No.	In Percentage
Agriculture	5	20.0
Business	10	40.0
Labor	1	4.0
Service	3	12.0
Foreign employment	4	16.0
Pension	2	8.0
Total	25	100.00

Source: Field Surveys, February 2016

35. Out of total 128 APs (34 populations belong below 15 years and not counted in economic active population) 94 persons are economically active. Among them 47% female population have been reported as economically active against the male population (53%). This indicates that the females in the project road area are playing a crucial role in income-generating activities.

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39. Table 15 provides the number and percentage of economically active population of the affected households by sex.

Table 15: Economically Active Population by Sex

Total Number of Female Involved in Income Generation		Total Number of Male Involved in Income Generation		Total number of APs Involved in Income Generation	
No.	Percent	No.	Percent	No.	Percent
45	47	49	53	94	100

Source: Field Surveys, Feb 2016

40. **Poverty Status.** According to the Nepal Living Standard Survey 2011, an individual is considered poor if his/her per capita total annual consumptions is below Rs. 19,261. It has also categorized the food items and non-food items and the expenses required to be above the poverty line. Accordingly, the income required for providing adequate calories (2,220 kilocalorie) for an average Nepali to be active is Rs 11,929. For non-food items, on average, the average income required is Rs. 7,332. For the food item only, this has been calculated as NRs.11, 929 per person per year (National Planning Commission of Nepal, Nepal Living Standard Survey 2010/2011). The poverty line for Nepal, in average 2010/11 prices has been estimated at Rs. 19,261 (NLSS). On this baseline and calculating price inflation of Nepal Rastra Bank and considering the average HH size of 4.8 (national standard of CBS 2011) for whole project roads, the poverty line for this project has been assumed as Rs. 130,500 per household of a year.

41. Based on this calculation, 4 households (out of 25 households interviewed) were identified to be Below Poverty Level (BPL) in terms of their average annual household income as reported by them. Table 16 provides the breakdown of income levels of affected households as per the average annual income range.

Table 16: Average Annual Income of the affected households (NRs)

Income Range	Affected households	
	In No.	In Percent
<50,000	0	0.00
50,000- 130,000	4	16.00
130,000 – 200,000	0	0.00
200,000 – 300,000	2	8.00
300,000-400,000	5	20.00
400,000 - 500,000	6	24.00
Above 500,000	8	32.00
Total	25	100.00

Source: Field Surveys, February 2016

42. Of the 25 respondent households, 10 (40%) are the indigenous people. Other caste groups are 60%. Of the total IPs, 2 households reported of falling under Below Poverty Level (BPL). In other castes 2 are in below poverty level.

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46. Table 17 provides the poverty status of the affected households by indigenous,

occupational and other caste groups.

Table 17: Poverty Status by Ethnic/Indigenous & Other Caste Groups

Affected households Type	Ethnic/Indigenous/ Occupational Caste Groups		Other Caste Groups		Total	
	Number	Percent	Number	Percent	Number	Percent
BPL HHS	2	20	2	13.33	4	16
Above BPL HHs	8	80	13	86.67	21	84
Total	10	1000	15	19	25	100.00

Source: Field Surveys, February 2016

C. Socioeconomic profile of IP households

47. The census data of affected households' survey shows that 10 IP households (Janajatis) will be affected. Among the affected 40% are Magar, 20% are Thakali and Gurung. Similarly, 10% constitute Newar and Kumal. None are in the Endangered Indigenous People Category, which is the category that the Government of Nepal considers at risk of extinction. The table below shows IP list among project affected families.

Table 18: Indigenous People (Janajatis) IP

S.N	Ethnicity	Number	%
1	Magar	4	40.00
2	Thakali	2	20.00
3	Gurung	2	20.00
4	Newar	1	10.00
5	Kumal	1	10.00
	Total	10	100.00

Source: Field Survey, February 2016

48. The socioeconomic census survey shows that affected IP households show similar cultural traits as the mainstream population: most of them are of Hindu religion (70%), the rest being Buddhists and Christians, they have the same income-generation activities as the rest of affected households (50% are in business, 20% in services, and the rest in agricultural and other activities), and 20% are also below poverty level. Therefore we can conclude that these indigenous households are assimilated into the mainstream society and that no specific indigenous peoples plan is required for this project. More details on the socioeconomic data is provided in Appendix 4.

D. Gender analysis of affected women

49. Women are not disproportionately affected by the project. There are a total of 56 women among the 189 affected persons. Among the 36 affected households 4 are female-headed: 2 will lose land (less than 10%) and 2 will be physically displaced as they will be losing their commercial structures. 3 out of the 4 female-headed households own title to the land.

50. Illiteracy, lack of ownership of property, lack of decision making authority, extensive involvement in household activities are some of the basic indicators of female's socioeconomic

status in the project road area. With a view to assess different gender related issues and impacts associated with the project road, special focus was made during the social impact analysis in the project road to look into the gender status in the concerned districts. As Nepal is a patriarchal society, male members mainly own household property. However, there are some variations within the country, which is mainly because of the cultural reasons. For instance, the empowerment of women within the family is considered high among the indigenous people compared to other caste groups. The government has introduced a rebate of 10 % in the cost of land deeds registration in the name of women in Fiscal year 2004. This may be the reason of some increase in the ownership for land in the name of women. Now the rebate has been increased to 20 % from 2005. The census report 2011 shows that women's ownership on land has been rapidly increasing 19.71% noted 9.11% in 2001 and 2011. Based on the consultations and surveys, the following gender indicators of affected women are discussed below.

51. The survey shows that 45% of affected women are economically active. Women affected by the project are extensively involved in hotel, highway based business, grocery shops, farming, cattle rearing and household activities. However, the engagement of women in salary-based job is increasing with the establishment of private industries and business has created opportunity from women in income generating sectors. Such as, hotel, mobile traders and settled traders, operating tea and other small shops vegetable farming and dairy products.

52. A total of 13 consultations with women mixed with men were conducted at different places of the project areas. One of the most important benefits as perceived by women with regard to the project road is that the improvement of road will provide easy access to reach health facilities particularly during childbearing. Besides, discussions among the women revealed that the improved transport facilities would greatly benefit their mobility by reducing the travel time. Similarly, improvement of the road has been as an opportunity by women engaged in small trade for selling and purchasing goods. Likewise, they were also of the opinion that the project may also provide them employment opportunity during construction phase.

IV. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Introduction

53. This Resettlement Plan has been prepared in close consultation with stakeholders at different levels including affected households represented by head of the households, local people along the corridor, local level social workers, representatives of political parties, business men, and civil based organizations. Some of the basic objectives of these consultations were:

- Assessment of socioeconomic information required for the study
- Information dissemination on the project's impacts and resettlement mitigation measures
- Understanding the perceptions of affected persons, local residents
- Understanding expectations of affected people
- Assess support for the project and willingness to get involved
- Inform affected persons about the cut-off date

B. Methods of public consultation

54. Public consultations were carried out during the entire process of the RP preparation, from the field reconnaissance survey to the period of carrying out the census. Table 19 gives a description of the type of stakeholders consulted and methods adopted for the consultations according to their specific purposes.

Table 19: Methods Employed During the Course of Consultations

Stakeholders	Purpose	Method
Department of Roads at central level	To collect government's policy, guidelines priorities on the project, and to seek advice for initiating work.	Frequent individual meetings with the officials of DOR and Project Directorate.
Local Community in the different locations of the project road area (Gaidkot, Pargatinagar, Daldale, Arunkhola, Bhumai, Sunawal, Devdaha and Butwal	To assess overall social perception about the importance of the project road and local peoples felt need for improvement and applying road safety infrastructures	Consultation and discussion with local people at different road locations during the reconnaissance survey, social survey and census survey.
District level line agencies (Divisional Roads Office, Land Revenue Office, Land Measurement Office)	To assess the existing operational status of roads, to verify the land likely to be acquired based on design drawings, to collect cadastral maps and to collect land price	Individual meetings with the officials of respective offices.
Affected persons based on the design drawing	To prepare the inventory of affected assets, get measurements and conduct interviews with affected families	Individual interviews of the affected households by means of a structured questionnaire

Stakeholders	Purpose	Method
NGOs and other stakeholders at the local level	Assess the level of social willingness to be involved in the project activities	Representatives of local NGOs and other stakeholders including community members were consulted at different sections of the road during field visits by the domestic and international team members in order to assess the overall social perception about the road project and also to assess their willingness to cooperate in the study.

C. Key Issues Raised During Social Consultation

55. The consultant team carried out 13 consultation meetings with communities along the road alignment. 189 persons participated to these meetings (139 men and 50 women). The feedback from these consultations is summarized in the table below (Table 20).

Table 20: Public Consultation matrix

Name of Place	VDC/ Municipality	Consulted Persons	Questions/Issues Raised and Discussed	Answers Given /Measures adopted in RP to Address the Issues
Bhedabari	Gaidkot NP Ward No. 11	Male : 17 Female : 4	- Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Bhedabari chok - If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by the community. - If the private structure are affected early notice should be given to structure owners	- DoR will arrange early Information dissemination before the construction phase. - DoR will build over crossing or under crossing etc. - DoR/ CSC will arrange road safety programs - The public structures likely to be affected by the project will be relocated during constructions activities at project cost in collaboration with local community
Harkapur Chour	Gaidkot NP Ward No. 12	Male :15 Female : 2	Road safety designs and awareness campaigns should be	DoR will arrange early Information dissemination before the

Name of Place	VDC/ Municipality	Consulted Persons	Questions/Issues Raised and Discussed	Answers Given /Measures adopted in RP to Address the Issues
			included in project. There should be an overhead crossing bridge in Bhedabari chok. If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community.	construction phase. - DoR will build over crossing or under crossing etc. - DoR/ CSC will arrange road safety programs - The public structures likely to be affected by the project will be relocated during constructions activities at project cost in collaboration with local community
Harkapur	Devchuli--1 Ward No. 13	Male :11 Female : 5	- Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Harkapur chok - If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community. - The existing RoW of the road is 50 m width if there should be required extra land for road construction. Hence, the compensation should be arranged in reasonable cost - The existing private structures will be affected due to project, reasonable compensation cost should be provided	- The public structures likely to be affected by the project will be relocated during constructions activities at project cost in collaboration with local community - Compensation for affected land and other assets will be paid by the Government and the compensation rate will be fixed at replacement cost by the Compensation Determination Committee (CDC) to be formed under the chairmanship of the Chief District Officer (CDO) - DoR/ CSC will arrange a road safety program - DoR will arrange early Information dissemination before the construction phase.

Name of Place	VDC/ Municipality	Consulted Persons	Questions/Issues Raised and Discussed	Answers Given /Measures adopted in RP to Address the Issues
			Early Information should be provided before the construction phase	
Pragatinagar	Devchuli NP Ward No. 15	Male :9 Female : 2	- If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community. Optical fiber and electric poles should be managed properly. - Early Information should be provided us before construction phase - Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Pragatinagar chok	- The public structures likely to be affected by the project will be relocated during the implementation phase in collaboration with local community - DoR/ CSC will arrange a road safety program during the implementation phase. - DoR will arrange an early information campaign before construction phase
Thanachok	Kabaswati NP Ward No. 1	Male :13 Female : 3	- If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community. - Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Thana chok - The existing RoW of the road is 50 m width	- Compensation for affected land and other assets will be paid by the Government and the compensation rate will be fixed by Compensation Determination Committee (CDC) to be formed under the chairmanship of the Chief District Officer (CDO) - DoR will arrange necessary action to provide the employment to the affected people as far as possible. - DoR will arrange an early information

Name of Place	VDC/ Municipality	Consulted Persons	Questions/Issues Raised and Discussed	Answers Given /Measures adopted in RP to Address the Issues
			if there should be required extra land or road construction. Hence, the compensation should be arranged in reasonable cost • Employment opportunities should be provided to the local during construction phase as per the community capacity	campaign before construction phase
Darbhora Chok	Nawabelahi VDC Ward No. 7	Male :11 Female : 4	• Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Darbhara chok • Early Information should be provided before construction phase • Employment opportunities should be provided to the local during construction phase as per the community capacity	• Compensation for affected land and other assets will be paid by the Government and the compensation rate will be fixed by Compensation Determination Committee (CDC) to be formed under the chairmanship of the Chief District Officer (CDO) • DoR will take necessary steps arrange necessary action to provide the employment to the affected people as far as possible. • DoR will arrange an early information campaign before the construction phase.
Aarungkhola	Nawabelahi VDC Ward No. 8	Male : 11 Female : 4	• If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community. • The existing RoW of the road is 50 m width if there should be	• Compensation for affected land and other assets will be paid by the Government and the compensation rate will be fixed by Compensation Determination Committee (CDC) to be formed under the chairmanship of the Chief District Officer (CDO) • DoR will take necessary steps arrange

Name of Place	VDC/ Municipality	Consulted Persons	Questions/Issues Raised and Discussed	Answers Given /Measures adopted in RP to Address the Issues
			required extra land for road construction. Hence, the compensation should be arranged in reasonable cost - Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Thana chok - Employment opportunities should be provided to the local during construction phase as per the community capacity	necessary action to provide the employment to the affected people as far as possible. DoR will arrange an early information campaign before the construction phase
Daunne	Dumkibash VDC, Ward No. 5	Male : 7 Female : 4	- Early Information should be provided before construction phase - Employment opportunities should be provided to the local during construction phase as per the community capacity - The existing private structures will be affected due to project, the reasonable compensation cost should be provided. - If the private structure will be affected partially compensation should be provided whole structure	- DoR will facilitate interaction with the likely affected people and help settle controversial issues before implementation phase. - DoR will take necessary steps arrange necessary action to provide the employment to the affected people as far as possible - DoR will arrange an early information campaign before the construction phase
Bardhghat	Bardhaghat, Ward No. 4	Male : 8 Female : 4	If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a	Compensation for affected land and other assets will be paid by the Government and the compensation rate will be fixed by Compensation Determination Committee (CDC) to be

Name of Place	VDC/ Municipality	Consulted Persons	Questions/Issues Raised and Discussed	Answers Given /Measures adopted in RP to Address the Issues
			convenient places as requested by community. Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Thana chok	formed under the chairmanship of the Chief District Officer (CDO)
Bhutaha	Bardhaghat, Ward No. 9	Male : 10 Female : 5	- If public structures & public utility such as optical fiber, cable network, drinking water pipe are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community. - Road safety designs and awareness campaigns should be included in project. There should be an overhead crossing bridge in Thana chok	DoR will arrange an early information campaign before the construction phase
Sunwal Bazar	Sunwal NP Ward No. 1	Male: 7 Female; 5	- If public structures & public utility such as optical fiber, cable network, drinking water pipes are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community. - Road safety measurement should be taken, as far as possible such as overhead bridge/crossing.	- DoR will arrange an early information campaign before the construction phase - DoR will facilitate interaction with the likely affected people and help settle controversial issues before implementation phase.
Bhaluhi Bazar	Devdaha NP Ward No. 10	Male: 15 Female; 5	Road safety designs and awareness campaigns should be included in project. There should be an	- DoR will arrange an early information campaign before the construction phase - DoR will facilitate

Name of Place	VDC/ Municipality	Consulted Persons	Questions/Issues Raised and Discussed	Answers Given /Measures adopted in RP to Address the Issues
			overhead crossing bridge in Thana chok • If public structures & public utility such as optical fiber, cable network, drinking water pipes are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community.	interaction with the likely affected people and help settle controversial issues before implementation phase.
Sukhanagar	Butwal NP Ward No. 10	Male: 7 Female; 4	• If public structures & public utility such as optical fiber, cable network, drinking water pipes are going to be affected within the 25m either side, such structures should be relocated in a convenient places as requested by community. • Road safety and overcrossing should be implemented as much as possible.	• DoR will arrange an early information campaign before the construction phase • DoR will facilitate interaction with the likely affected people and help settle controversial issues before implementation phase.

D. Disclosure of the resettlement plan and further consultations

56. It is the responsibility of the EA to disclosure the RP to the affected households. A summarized translated version of the RP in Nepali will be made available to affected and local people through the respective DDCs and CDO offices. A one-page leaflet summarizing key impacts, the entitlements, payment processes, grievance redress committee and contact information will be translated into Nepali and distributed to the affected people through the CSC social mobilizers and resettlement specialists. The full resettlement plan will be The RP will be disclosed on the EA's and ADB's websites.

57. In order for the implementation of the RP to be effective, several additional rounds of consultative meetings with the APs will be carried out during project implementation. Such consultations will be carried out by the CSC resettlement staff in coordination with field based DOR staff.

V. GRIEVANCE REDRESS MECHANISMS

58. DOR will establish a grievance redress mechanism (GRM) to voice and resolve social and environmental concerns linked to the project and ensure greater accountability of the project authorities towards all affected persons. This mechanism is not intended to bypass the government's own legal process, but is intended to provide a time-bound and transparent mechanism that is readily accessible to all segments of the affected people. The aggrieved party should be free to approach national legal system at any time. All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the Project. The complaints and problems related to resettlement that are likely to rise during and before the implementation of a project include the following:

- Project affected persons are not listed in the compensation list;
- Losses that are not identified correctly
- Compensation/assistance inadequate or not as per the entitlement matrix
- Dispute about ownership
- Delay in disbursement of compensation/assistance and
- Improper distribution of compensation/assistance in case of joint ownership

59. Through public consultations, the APs will be informed that they have a right to grievances redress and provided with the local and project-level contact information to submit their complaints. The APs will be eligible to call upon the support of the social mobilizer to assist them in submitting or presenting their grievances or queries to the GRC.

A. Proposed grievance redress mechanism for the project road

60. The table below illustrated the proposed grievance redress mechanism of the SASEC-Road Improvement Project of Narayanghat – Butwal road section.

Table 21: Proposed Grievance Redress Mechanism

Field-Level Committee	Local-Level Committee	Project-Level Committee
• Social mobilizers • Contractor Environmental/Social Focal Point	• DoR site engineer • Village Development Committee Representative • CSC Social mobilizer • 2 representatives designated by affected community local level (man/woman)	• PM DOR • Chief District Officer • Local Development Officer • CSC Resettlement Expert • CSC Environmental Expert

B. Grievance redress Procedures

61. The following steps of grievance redress procedures were adopted in the implemented phase for the Narayanghat – Butwal sub project. However, affected persons are free to approach the country's legal system at any time.

Step 1 Field-level Grievance Committee	In case of any grievances, the complainant approaches the field level social mobilizers or officials for clarification, or submits any formal complaints. The social mobilizer will provide clarification to the affected person and try to resolve the problem at local level with the involvement of the PIU resettlement representative if necessary. The social mobilizer and environment focal point person from the contractor will document the cases and call a Meeting with GC engineer and affected persons. If this is not resolved (maximum 7 days), The social mobilizer will recommend that the affected person submit his/her complaint to the local-level GRC.
Step 2 Local-Level GRC	The local level GRC committee will be formed at site specific on the road alignment at each VDC/municipality level. For the Narayanhath-Butwal road, 12 VDCs/municipalities are involved. The APs may submit their concerns or grievances verbally or in writing to this Committee. The committee shall make a field-based assessment to verify/examine the grievances, if necessary. After proper examination/verification of the grievances the Committee, a proposed action/decision will have to be made and complainant informed orally and in writing within 7 days. All complaints/grievances will be documented properly by the CSC Resettlement specialist who is part of this Committee.
Step 3 Project-Level GRC	If the complainant is not satisfied, s/he with the support of the CSC resettlement specialist will forward the grievance to the project-level GRC. The DoR project manager will play as lead role to settle the complaint.
Step 4 - A	If the grievances cannot be solved by this level, it will be referred to the Home Ministry. The Ministry of Home Affairs is normally required to make decision on a complaint within 15 days, unless further information is required, or unless the complaint has to be solved in a court of law (e.g. ownership disputes). The CSC resettlement specialist will assist the complainant in filing the claim (maximum 7 days).
Step 4 - B	If the complainant does not accept the project-level Committee decision, he/she may want to submit directly (in writing) to the ADB's Resident Mission on Nepal or South Asian Transport and Communication Division (maximum 7 days)
Step 4 -C	Should efforts to resolve the issue fail, the affected person may submit their complaint in writing directly to the ADB Accountability Mechanism: http://www.adb.org/Accountability-Mechanism/default.asp .

C. Government Policy for Grievance Redress

62. There are provisions of compensation for losses or any damages during land acquisition under the Land acquisition act of Nepal 1977. The Act allows for interested persons (i.e. APs) during a land acquisition process to file or represent their cases to the Chief District Officer (CDO), raise objection against the acquisition by a notice to the Ministry of Home and get redressed under the LA Act clause 11 Section 1, 2 and 3.

VI. LEGAL FRAMEWORK

A. Legislation

63. Prior to 1990, the Government had no constitutional obligation to pay compensation for the acquisition of private assets. There was no right to receive compensation for private property. The Constitution of Nepal (1990), Article 17 established the right to property. In addition, the fundamental rights of a citizen were strengthened by the Interim Constitution of Nepal (2007), Article 19.

B. The Constitution

64. The Constitution of Republic of Nepal (2015), Article 25 (1) guarantees the fundamental right of a citizen, i.e. right to acquire, own, sell and dispose of the property. Article 25 (2) describe that the state cannot acquire the property of any person except in case of public interest. Article 25 (3) also state that compensation shall be provided for any loss of individual property for public interest.

C. Land Acquisition Act of 1977

65. The Land Acquisition Act (1977) specifies the procedures for land acquisition and compensation. The Act empowers the government to acquire any land for public interest or for the execution of any development works. There is a provision of Compensation Determination Committee (CDC) under the leadership of Chief District officer, which will fix the rate of compensation for the affected property. The other members in the committee are the Chief of Land Revenue Officer, representative from District Development Committee (DDC), concerned Project Director/Manager. The committee can also invite representatives from among the affected persons, representative from affected VDC/Municipality.

66. The basic function of the CDC is to review the verification of lands to be acquired, review and determine the compensation rate, identify the proper owners, distribution of compensation and address the issues related to land acquisition and compensation distribution. District Administrative Office (DAO) is also responsible to notify the public regarding the details of the land area, structure affected and other assets affected in the concerned VDC/Municipality for project purposes.

67. The Land Reform Act (1964) is relevant in the compensation distribution modality. It specifies the compensation entitlements for the registered tenant. Where the tenancy right is legally established, the owner and tenant each will be entitled to 50% of the total compensation amount. Section 42 of the Land Reform Act states that Guthi (religious/trust) land acquired for development work must be replaced with another land.

D. Land Acquisition, Rehabilitation and Resettlement Policy of 2015

68. The Government of Nepal has recently formulated Land Acquisition, Rehabilitation and Resettlement Policy 2071 (2015) to facilitate the land acquisition process for infrastructure project. The policy outlines the need to conduct an economic and social impact assessment (SIA) of the development project, which was not a requirement under the Land Acquisition Act

1977. Based on this assessment, projects will be categorized as high-, medium- and low-risk.¹ The act also provisioned for the project affected families to be entitled to compensation if works like installation of transmission, telephone and underground drinking water pipe lines affect livelihood. And in case the projects affect yields of registered commercial crop, fruit or flower producers, compensation equivalent to five years of revenue must be given in cash.

69. The policy adds that all expenses related to land acquisition, compensation and the implementation of resettlement and rehabilitation plans should be considered as project cost and interest should be paid on compensation amount depending on the days it took to release funds to those affected by the project. The interest calculation begins from the day a formal decision was taken to operate the project, says the policy.

70. The compensation amount for those affected by the project will be fixed by a five-member compensation committee formed under the chief district officer. The committee can form a technical team to determine the compensation amount. This team should derive the compensation amount as close as possible to the minimum market rate by working closely with members of families that are likely to be displaced.

71. Those not satisfied with land acquisition, resettlement and rehabilitation processes can lodge complaints at a body formed at the project office and complaint hearing offices at district and regional levels. If verdict issued by the regional level complaint hearing office is also deemed unsatisfactory, the person can knock on the doors of appellate court.

E. ADB Resettlement Policy

72. According to the ADB Safeguard Policy Statement (2009), the basic objectives of the safeguards requirements are to avoid involuntary resettlement wherever possible; to minimize involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all affected persons in real terms relative to pre-project levels; and to improve the standards of living of the affected poor and other vulnerable groups. ADB's main policy guidelines are:

- Involuntary Resettlement (IR) should be avoided wherever possible;
- Where IR is unavoidable, minimize involuntary resettlement by exploring project and design alternatives;
- Enhance or at least restore the livelihoods of all affected persons in real terms relative to pre-project levels;
- Improve the standards of living of the affected poor and other vulnerable groups;
- Gender analysis is required to identify related resettlement impacts and risks;
- Resettlement Plans (RP) should be prepared in full consultation with affected persons (APs), host communities, and concerned nongovernment organizations (NGOs) including disclosure of the RP and project related

¹ High-risk projects refer to those which displace 50 or more households in the mountainous region, 75 or more households in the hilly region and 100 or more households in the Tarai. Medium-risk projects, on the other hand, are those that force relocation of less than 50 households in the mountainous region, less than 75 households in the hilly region and less than 100 households in the Tarai. Likewise, low-risk projects refer to those which cause productive property to shrink by up to 10 per cent.

information;

- Preference will be given to land-based resettlement for affected persons whose livelihoods are land-based. However, if the land is not the preferred option or the land is not available at reasonable price, the DPs will be provided opportunities for employment, or self-employment, in addition to the reasonable cash compensation for land and other assets lost;
- Cash compensations for the loss of structures, other assets and incomes should be based on full replacement cost;
- Absence of formal legal title to land or non-recognized or recognizable claims to such land by the affected persons should not be a bar to compensation;
- The rate of compensation for land, structures and other assets should be calculated at full replacement cost on the basis of fair market value; transaction cost; interest accrued; transitional and restoration cost, and other applicable payments, if any.
- All compensation payments and related activities must be completed prior to the commencement of the civil work;
- Special attention to be paid to the needs of vulnerable groups especially those below the poverty line, the landless, the elderly, women and children and indigenous people and those without legal title to land.

F. Nepal and ADB resettlement policy differences and measures to bridge the gaps

73. The following table summarizes the main differences between ADB and government of Nepal's legislation in terms of involuntary resettlement and measures included in this resettlement plan to bridge the gaps.

Table 22: Comparison of differences & gaps between Government Law, ADB SPS and Measures Recommended in the Resettlement framework

Key Issues	Government Laws	ADB SPS	Measures recommended in the RP
Loss of more than 10% of the total landholdings and income	Do not consider the percentage loss of income or total land holdings	Income restoration programmed such as training and other measures to restore and improve the standard of living of the affected households	Provision has been made to provide training and measures in the EM
Squatters/illegal occupants/non-titled land users	Do not consider squatters/encroachers/ non-titled land users for compensation	Non-title holders are not entitled for the compensation of land but for replacement cost of assets on land and resettlement assistance business and other assistance	Provision has been made to provide compensation for the structures/houses/ business in the EM

Key Issues	Government Laws	ADB SPS	Measures recommended in the RP
Valuation of affected land , houses & other structures and trees	Compensation rate will be determined by CDC, consisting of (i) CDO (ii) representative from DDC (iii) Chief of Land Revenue Office (iv) Project Manager	All compensation is based on the principle of replacement cost	Provision has been made for the replacement value for the loss of land, houses/structures. The methodology for assessing the replacement cost of land and structure is explained in paragraphs 74 and 75 APs are allowed to take salvaged materials. CDC will make final decision on the rates in the presence of representatives from DPs, VDCs, civil society, who will attend the meeting as an observer
Other assistance for relocation of the houses	No provision	All the eligible DPs including tenants, employees are entitled to receive financial assistance to cover physical and economical displacement	Provision has been made for the transitional allowances, transport allowances and one time financial assistance to the tenants, employees
Vulnerable groups	No provision	Focused on the poor and vulnerable group to avoid future impoverishment and create new opportunities	Provision has been made for income restoration programme and other financial assistance

VII. ENTITLEMENT, ASSISTANCE AND BENEFITS

A. Entitlement policy

74. Based ADB Safeguard Policy 2009 and Land Acquisition Act of 1977 the project has prepared entitlement framework in which GoN and ADB has agreed. ADB's Safeguard Policy Statement (2009) on involuntary resettlement requires compensation for the lost assets at replacement cost to both titled and non-titled holders and resettlement assistance for lost income and livelihoods. Further, the principles adopted herein contains special measures and assistance for vulnerable DPs, such as household headed by women, disabled persons, ethnic/indigenous groups, and household living below poverty line.

B. Entitlement matrix

75. All the APs will be compensated at current market value or replacement costs. For the loss of agricultural land, cash compensation will be made. Additional compensation will be given for the loss of crops/vegetation. It will be calculated on the basis of net production of one crop in the affected area. Rehabilitation allowances will be paid to the severally affected families (who have lost more than 10 % of their productive lands holdings and income) in terms of livelihood/skill development training for income restoration to the households. Similarly, additional assistance to vulnerable groups will be provided for restoring their livelihoods.

76. The cut-off date is February 1st, 2016, which is the start of the census survey. This cut-off date mostly applies to non-titled holders, as titled-holders will be officially notified by the district commissioner. This was communicated to the affected persons during the survey process. However, concessions should be made for enumerator errors and absentees during the survey process on a case-by-case basis. Moreover, if there is a significant time lag between the completion of the census and implementation of the RP, a repeat census may have to be conducted.

77. A detailed Entitlement Matrix has been provided in the following Table 23.

Table 23: Entitlement Matrix

No.	Type of Loss	Application	Eligible Persons	Entitlements	Responsibilities
A-1	Permanent loss of agricultural/ residential/ commercial land	land no longer viable for continued use or does not meet the expected yield	Titleholders with land records	▪ Cash compensation based on replacement cost ▪ If the loss is equivalent to 10% or more of the total agricultural land of the household is affected, see Item No. E-1 below. ▪ Affected household will be notified 2 months in advance of the actual date of acquisition	▪ DOR/CDC/ CSC ▪ DOR/CSC ▪ DOR/CSC
A-2	Permanent loss of agricultural/ residential/ commercial land	land no longer viable for continued use or does not meet the expected yield	Renter or share-cropper of land with legal lease	▪ Fifty percent cash compensation to the share cropper/ tenants of the affected plots as per the prevailing laws (LA Act Clause 20) ▪ Cash compensation for loss of net income from subsequent crops that cannot be planted with in the remaining lease/assigned period. ▪ Affected households and share cropper will be notified 2 months in advance	▪ DOR/CDC/ CSC ▪ DOR/CSC
A-3	Temporary loss of land temporarily due to construction activities, access roads and diversions	Land is occupied temporarily and will be viable after construction activities	Title holders with land records Renter or share-cropper of land with legal lease	▪ Payment as per the contract rental rate for the temporary use of land agreed between the owner and contractor ▪ Land should be returned to the owner at the end of use period, and restored to its original condition.	▪ DOR/CSC/contractor ▪ Contractor
B-1	Residential and Commercial Structures	Marginal impact (i.e. un affected portion of the house is still viable for use and no relocation required) This will be confirmed by the implementing agency	Owners of the structures with or without acceptable proof of ownership over the land, including squatters and encroachers	▪ Cash compensation at replacement cost for the affected portion. ▪ Affected household will be notified 2 months in advance of the date of construction ▪ Affected households will be able to salvage materials	▪ DOR/CDC/CSC ▪ DOR/CSC ▪ DOR/CSC

No.	Type of Loss	Application	Eligible Persons	Entitlements	Responsibilities
		and concurred with by the affected household during the DMS			
B-2		<u>Severe impact</u>(i.e., house is no longer viable for continued use and the entire structure is to be acquired) This will be confirmed by the implementing agency and concurred with by the affected household during the DMS	Owners of the structures with or without acceptable proof of ownership over the land, including squatters and encroachers <u>who have to physically relocate</u>	▪ Cash compensation at replacement cost for the entire structure. ▪ Reconstruction and shifting allowance equivalent to 10% of replacement cost of the structure, or equivalent to the actual cost of repair or allowances and transportation cost ▪ Affected household will be notified 2 months in advance of the date of construction ▪ Affected households will be able to salvage materials	▪ DOR/CDC/CSC ▪ DOR/CSC ▪ DOR/CSC ▪ DOR/CSC
			<u>Renters who have to physically relocate</u>	▪ Equivalent of 2 month rent to find alternative place to stay ▪ Affected household will be notified 2 months in advance of the date of construction ▪ Affected households will be able to salvage materials ▪ Rental deposit – if any- to be reimbursed to renter (deducted from structure owner's entitlement)	▪ DOR/CSC ▪ DOR/CSC ▪ DOR/CSC
B-3	Secondary structures (kitchen, latrine, etc.)	Loss of, or damage to, assets	Owners of the structures with or without acceptable proof of ownership over the land, including squatters and encroachers	▪ Cash compensation at replacement cost	▪ DOR/CDC/CSC
B-4	Mobile commercial structures	Change of structure location	Owners of the structures with or without acceptable proof of ownership over the land, including squatters and	▪ One-month notice to move structure out of the corridor of impact	▪ DOR/CSC

No.	Type of Loss	Application	Eligible Persons	Entitlements	Responsibilities
			encroachers		
C-1	Crops and trees	Loss of or damage to assets	Owners regardless of tenure status, including squatters and encroachers	- Compensation for crops for one harvest at current market value - Cash compensation for timber tree at current market price - Compensation for loss of fruit bearing trees for average fruit production for 5 years at current market value and replacement cost for sapling	- DOR/CDC/CSC - DOR/CDC/CSC
D-1	Public facilities, common property structures and facilities	Loss of, or damage to, assets	Owners	Will be rebuilt by the project on land provided by the community	DOR/Contractor /CSC
E-1	Loss of income/ livelihood due to loss of agricultural land	Loss of 10% or more of total productive land	Person(s) with land records, renter or share-cropper of land with legal lease	- One time assistance allowance of 3 months minimum wage per affected person - Entitled to take part in income restoration program.	- DOR/CSC - DOR/CSC
E-2	Loss of income/ livelihood due to disruption of business or employment	<u>Marginal impact</u> (i.e., disruption of business due to reorganization of the shop on the residual and; disruption of employment of less than 3 months)	Shop owners (regardless of tenure status) and employees/laborers of affected assets	One time assistance allowance of 1 month monthly income or one month minimum wage	DOR/CSC
E-3		<u>Severe impacts</u> (i.e., disruption of business due to relocation of shop; and disruption of employment for more than 3 months)	Shop owners (regardless of tenure status) <u>who have to physically relocate</u>	One time assistance allowance of 3 months monthly income for shop owners based on nature of business or three months minimum wage	DOR/CSC
F-1	Higher risks of impoverishment due to vulnerability	Loss of land and non-land assets and income	- Affected vulnerable households defined as: Indigenous households - Dalit-headed household - Female-headed	- One time assistance allowance of 3 month minimum wage per affected vulnerable person - Entitled to take part in income restoration program.	- DOR/CSC - DOR/CSC

No.	Type of Loss	Application	Eligible Persons	Entitlements	Responsibilities
			▪ Male below poverty levels ▪ Disabled-headed ▪ Orphan-headed household ▪ Landless² ▪ *Vulnerable household can only qualify to one of the categories above		

CDC=Compensation Determination Committee

CSC=Construction Supervision Consultant

DMS= Detailed Measurement Survey

DoR=Department of Roads

LA= Land Acquisition

² Landless status will have to be demonstrated through affidavit from relevant district office

VIII. RELOCATION PREFERENCES

78. According to the census survey, a total of 29 households (128 affected persons) will have to physically relocate their residence or shop. The affected households were asked their preferences for relocation assistance by the project. Most of them (85%) preferred cash compensation. The following table shows the compensation choice of project affected families.

Table 24: Preference for relocation assistance

Type of Compensation	No. of Households	Percentages
Cash	17	85.00
Land for Land	1	5.00
House for House	2	10.00
Total	20	100.00

79. In addition to the replacement cost of the structure, this Resettlement Plan proposes the following shifting and reconstruction assistance measure equivalent to 10% of the replacement cost of the structure affected, or equivalent to the actual cost of repair or allowances and transportation cost. Moreover, all affected household will be notified 2 months in advance of the date of construction.

80. The resettlement implementation team will encourage affected households to relocate on their own land, as most of them own land further away from the road or rent spaces close to the road that are privately owned. Individualized assistance to each physically displaced household will be provided by the resettlement team in the form of a relocation plan where the alternative locations, options discussed and provided by the resettlement team, and relocation preference of the physically affected household will be discussed and documented in the social monitoring reports. Should the affected household decide to purchase land, the resettlement team will support it in collecting the proper documentation for purchase and dealing with the district commissioner's office. The monitoring of the post relocation period will assess the effectiveness of the guidance provided by the resettlement team in finding sustainable relocation options.

IX. LIVELIHOOD RESTORATION MEASURES

81. The entitlement matrix has various provisions for the loss of income (loss of business income, loss of wages, loss of crops and loss of fruit trees. According to the survey, 11 shop owners will lose their income as their commercial structure will be fully affected. No crops or private fruit trees have been identified to be affected. The following income restoration provisions are thus proposed in this RP.

Table 25: Income Restoration Measures

Type of Allowance	Entitlement Description	Financial assistance provided in this RP
Allowance for loss of income for shop owners whose commercial premise is fully affected	10 shop owners will have to fully relocate their commercial structures. According to the entitlement matrix, they are eligible to minimum district rate wages for three months (per day Rest 400.00) or 3 months income level, whichever is higher.	According to socioeconomic survey the average monthly income of affected shop owner in NR 22,000/month and three months wages is NR 66,000. The minimum district wage for 90 days is NR 36,000/month. NR 66,000 will be provided as financial assistance for loss of income.

82. The Livelihood Improvement Training will be provided for one member of each of the 9 vulnerable households as well as the significantly affected household. Training courses will be identified during the implementation of the RP through a needs assessment of the participants. Examples of training courses are vegetable farming (Off seasonal vegetable production), poultry farming, cattle rising, sewing classes, etc. The CSC livelihood expert will conduct the assessment and facilitate the training program in the implementation; coordination with line agency like was District Agricultural Development Office, District small and Cottage Industries development council etc....

X. RESETTLEMENT BUDGET AND FINANCING PLAN

83. This chapter will provides cost estimates for the RP activities described in preceding chapters under the following items:

A. Cost for Land Acquisition

84. According to the engineering estimates, a total of 1733.5 sq. m of land is required at different location of from Narayanghat to Butwal for service land of the settlement areas the road.

85. The estimate of the land cost used for this RP are based on an assessment of recent transactions of land from government office and recent market price confirmed via consultations with key stakeholders (i.e. APs and with district level officials to know the prevailing rate). There are two different types of valuation systems; (i) one based on Government rate, and (ii) one based on current local market rate. As being practiced, Government rate use fixed by the District Land Revenue Office (DLRO)³ in accordance to the location of land, type of land, the rate of land quoted on the current land transaction documents and land revenue paid by the public. Official land prices are different from the market price. Please see Appendix 6 on the land evaluation methodology. The following are the estimate of land price and total cost of land by affected areas. (EM: A-1, 2).

Table 26: Estimated Compensation Cost for Land

Road Name	Land required (in sq.m.)	Unit cost (NRs.) per sq. m	Tentative cost
Narayanghat-Butwal	1733.5	15500	26,869,250.00

Source: Census Survey, February 2016

Note: Compensation amount determined by CDC meeting but reference taken from Land Revenue office of project affected district fiscal year 2071/72, and local market areas of the East West highway

B. Cost for Private structures

86. There are 21 private structures going to be affecting in the project road. As provisioned in the entitlement matrix (EM: B-1 and B-2), compensation cost for the affected structures have been calculated based on the measurement of the affected structures taken out during the field survey and construction type of affected structures. Furthermore the social survey team held consultation with local construction contractors, local community, and key stakeholders those who have constructed new houses within one year, to investigate the market rate of the construction work like; private housing and other structures. Based on these investigations the technical team members provided technical ideas to estimate cost of affected structures. Guidelines of the Department of Urban Development and Building Construction (DUDBC) & DDC have also been taken into account while calculating the cost for affected structures⁴ The

³ There are District Land Revenue Offices (DLRO) in all (75) district and responsible for also fixing land price of the respective districts based on land transaction made in the district and update them annually.

⁴ The Government of Nepal, Department of Urban Development and Building Construction (DUDBC) is the authorized Government body for the valuation of structures through the Government Gazette (Nepal Rajpatra, Section IV, number 50, Date 2045/12/6 (1988). The Department regularly updates its rate based on current market price and provides basis for calculating the cost of different types of structures.

structures were valued without deducting any depreciation in material use. The estimated cost for the private structure is presented in Table 27. Appendix 6 provides calculation methodology for affected structures. The compensation rate for the affected buildings and structures were estimated according to the type of structures such as frame structures, cement mortar RCC/RBC structure, mud mortar RCC/RBC structure, block bricks and cement mortar with zinc roofed and temporary structure. Twenty -one structures, including one is commercial structure, were affected for the project purpose. The total cost for 21 structures is estimated based on recent increase in the price of the construction materials as, NRs.5, 717,205.00

Table 27: Estimated Compensation Cost for Structures

S.N.	Type of Structure	Present Use	Area (Sq. ft)	Amount (NRs.)
1	Private (21)	Residential/Trade	3141.3	5,717,205
Total				5,717,205

Source; Field Survey, February 2016

C. Assistance to Reconstruction and Rehabilitation Allowances

87. The reconstruction and rehabilitation allowance covers the housing displacement and business displacement allowances. The Entitlement matrix (EM: B-1- F-1 b,c) provisions cash compensation for such vulnerable households equivalent to three Months wage rate for restarting their livelihood. Households whose houses need to be relocated will receive a reconstruction and shifting allowance equivalent to 10 % of replacement cost of structure or equivalent to the actual cost of the transportation allowances. Owners of commercial enterprises requiring relocation will receive a business displacement allowance. Estimated cost for the displacement and rehabilitation allowances is presented below. However, transportation allowance will not be estimated to the structure having partial loss.

Table 28: Displacement and Rehabilitation Allowances

N.	Allowances	Unit	Quantity	Amount (NRs.)
1	Reconstruction and shifting allowance of the structure	Number	20	571,720.00
3	Business displacement	Number	11	726,000.00
3	Income restoration program	LS		1,400,000.00
Total				2,697,720.00

Source; Field Survey, February 2016

D. Additional Assistance to the Vulnerable Groups

88. Based on the census data, there are about 28 vulnerable households of different categories. The Entitlement matrix (EM: B-1-E-1. E-2, E-3 and F-1-b,c) provisions cash compensation for such vulnerable households equivalent to three Months wage for restarting their livelihood. However, additional assistance to such vulnerable groups need to be distributed only after the finalization of resettlement impact and its extent, and confirmation of the vulnerability of the households in close collaboration with the local communities and CDC. The census survey found that 28 households are vulnerable. Different rehabilitation measures as per EM for such households are as below:

Table 29: Additional Assistance to Vulnerable Groups

S.N.	Vulnerable Categories	No of Households	One Time Cash Assistance at the Local Agricultural Wage Rate (NRs.)	Total cost for assistance
1	Women Headed Households	4	36,000.00	144,000.00
2	Dalit Groups	1	36,000.00	36,000.00
3	Elderly Headed Households	1	36,000.00	36,000.00
4	Below Poverty line	4	36,000.00	144,000.00
5	Indigenous Group	10	36,000.00	360,000.00
Total				720,000.00

Source: Census Survey, Feb 2016

[a] No. of HHs x 90 days x NRs. 400=36000

[b] No. of HHs NRs. 8,000

E. RP Implementation and Management Cost

89. There are also several RP implementation activities that need to be carried out at project road level by the Project Manager (PM). Some of such activities are: (i) public consultation, and information dissemination, (ii) organizing CDC meetings, and implement CDC decision, field verification, and updating RP, (iii) organizing and mobilizing local grievance redress committee meetings, (iv) Deed Transfer and required land surveying so on. In order to ensure such expenses, RP implementation cost also been calculated and incorporated in resettlement in following.

Table 30: Cost Estimate for Resettlement Implementation Activities

S.N.	Description of Tasks	Quantity	Rate (NRs.)	Estimated Costs (NRs.)
1	Information dissemination about the project, resettlement impacts, and compensation provision	1	100,000	100,000
2	Organizing CDC meeting and follow up activities	8	20,000	300,000
3	Organizing GRC meetings and follow-up activities	30	5,000	150,000
4	Establishing Sub-local level committees and their mobilization (@NRs.5,000 per committee)	35	5,000	175,000
5	Public notification of Affected assets and invitation to receive compensation (@ NRs. 50,000)	5	50,000	250,000
6	If required, Surveyor/Amin Mobilization/ Malpot for Field Verification and Deed Transform (NRs. 60,000 Per Man month)	2	60,000	120,000
7	Sub-total (1-5)	-	-	1,095,000
8	Contingency	10%	-	109,500
	Total			1, 204,500

Source: Census Survey, Feb/ April 2016

90. RP implementation covers the cost for the implementation and management of

resettlement-related activities. It includes information dissemination, campaign, public consultation, CDC meeting, local grievance redress committee formation and conducting meetings with Aps etc.

F. External monitor

91. An amount of NRs. 1,800,000.00 has been budgeted for two monitoring exercise by the university teachers/ researchers or Individual consultant. For detail attached at Appendix 8 of external monitoring terms of references.

G. Contingencies

92. A contingency amount of 10 % of compensation and rehabilitation costs include for the widening and upgrading of existing road.

H. Total cost estimate

93. The total cost estimate for the widening and upgrading of existing road from Narayanghat to Butwal and total estimated cost including land acquisition made up as follows:

Table 31: Summary of Compensation Costs

S.N	Items	Total estimated cost (in NRs.)
1	Compensation of Land	26,869,250.00
2	Compensation of structures	5,717,250.00
3	Displacement and rehabilitation cost	2,697,720.00
4	Assistance to vulnerable groups	720,000.00
5	RP implementation	1,204,500.00
6	External monitor	1,800,000.00
7	Total (A)	39,008,720.00
8	Contingencies (10 %) (B)	3,900,872.00
9	Grand Total estimated (A+B)	42,909,592.00
10	Total \$ @105.00	408,663

I. Financing Plan

94. All costs related to land acquisition and resettlement budget would be borne by the Government. The EA will ensure that adequate funds are delivered on time to the CDO for timely implementation of RP.

XI. INSTITUTIONAL ARRANGEMENTS

A. Central level Project Implementation Unit (PIU), Department of Roads (DOR):

95. The Ministry of Physical Infrastructure and Transportation (MoPIT) will be the executing agency (EA) and the Department of Road (DoR) the implementing agency (IA) for this project. DoR has established a Project Directorate PIU at the central level (Kathmandu). For resettlement activities the PIU will be supported by a resettlement consultant who will review the monitoring data, conduct his/her own field level data verification and consultation with affected persons and provide advice to DoR in follow-up actions. The central level PIU Project Director of the central will assume the following responsibility for RP implementation:

- Establish the two field offices headed by Project Managers (PM) responsible for the implementation of the Narayanghat-Butwal road improvement project;
- Establish the third tier Grievance Redress Committee (GRC);
- Establish and approve the procedures for the resettlement and compensation activities;
- Review the monthly monitoring report prepared by the field PIUs and supervision consultant
- Prepare the semi-annual monitoring report

B. Field-level PIU, DOR

96. The IA will establish two field-level PIUs headed by Project Managers (PM) with officer in rank of Senior Divisional Engineer. The Project Manager will be responsible for implementing the resettlement activities at the field level with the help of the resettlement team from the Supervising Consultant (SC). The PM will coordinate with the CDO in formation of CDC at district level and keep coordination with other line agencies at district level for the implementation of RP. Key activities of the PM are:

- Approve the survey verification and update of affected persons and entitlement cards
- Liaise with CDO and participate in CDC
- Distribute resettlement benefits
- Verify the field and prepare RP addendums and updates
- conduct and document regular and meaningful consultations with affected persons – including the dissemination of entitlement benefits
- conduct internal monitoring of RP activities and prepare monthly progress reports
- Establish the second tier Grievance Redress Committee (GRC);
- convene the GRC

C. Compensation Determination Committee (CDC)

97. The Land Acquisition Act (1977) specifies the procedures for land acquisition and compensation. The Act empowers the government to acquire any land for public interest or for the execution of any development works. There is a provision of Compensation Determination Committee (CDC) under the chairmanship of Chief District officer which will fix the rate of compensation for the affected property. The other members in the committee are the Chief of Land Revenue Officer, representative from District Development Committee (DDC), concerned Project Director/Manager. The committee can also invite representatives from among the

affected persons, representative from affected VDC/Municipality. The committee will be responsible for dealing with the issues related to compensation and rehabilitation. The main responsibilities of the committee are:

- To verify the loss of land and other assets due to project implementation
- Publish notice for land and other assets acquisition by the project
- Determine the price of all kinds of loss incurred
- Hold meetings with the affected people
- Notify the DPs to collect compensation
- Pay compensation for all losses
- Hear grievances if any and
- Implement rehabilitation measures

D. Grievance redress committee (GRC)

98. There will be two level of GRC. One will be according to the clause 11 of Land Acquisition Act 1977 which will be chaired by the CDO. Under the LA Act, any DPs can raise objection against acquisition of land by a notice to Ministry of Home. There are normal procedure and rules and regulation to address the complaints/grievances. There will be another GRC at local level (each VDC). DPs can submit grievances verbally or written to this committee for resolution. If the grievances resolved at local level, it will not refer to CDO. In case, it is not resolved, it will refer to GRC at district level which is chaired by CDO.

E. Supervision consultant (SC)

99. A team of one resettlement specialist, one livelihood expert and 4 field social mobilizers will be responsible for the day-to-day implementation of the land acquisition process and resettlement activities. More specifically, the SC resettlement team will perform the following activities. The TOR of the RS has been provided in the Appendix 7.

- Inform affected persons of entitled compensation and methods of receiving compensation payment;
- support the survey verification and update of affected persons and assets prepare identification and entitlement cards
- provide assistance to the District Commissioner's office for land acquisition activities
- Assist CDC in determining the compensation for various affected assets;
- provide support to the affected persons in gathering their documentation to collect their award payment at the district's office
- support the PIU in the distribution of resettlement benefits
- support the field data gathering for the preparation of RP addendums and updates
- conduct and document regular and meaningful consultations with affected persons – including the dissemination of entitlement benefits
- conduct internal monitoring of RP activities and prepare monthly progress reports;
- Keep and update all resettlement activities and submit monthly resettlement implementation progress report to PIU, DoR;
- address grievances at local level
- act as secretary in grievance redress mechanism and document grievances and resolution process

- support affected persons in filing grievances
- Identify vulnerable group and severely affected persons and recommend additional assistance and livelihood assistance and skill development training to them;
- Arrange skill development training through recognized training institution at project level;

F. Staff training at PIU

100. At present, there are no sufficient experienced personnel involved in land acquisition, resettlement and rehabilitation activities at PIU, though Geo-Environment Unit (GEU) of DoR looks at the social and resettlement aspect of the project. The unit comprises of one Senior Divisional Engineer, 2 Assistant Engineers and 1 Sociologist. They are involved in all the social and environmental aspects of the project under DoR. However, most of them are not familiar with the ADB new Safeguard Policy. After the SC resettlement team is mobilized, a 2 days orientation and training regarding the ADB new Safeguard Policy 2009 and management and the resettlement activities to be implemented under this project will be conducted for the DoR staff involved in the implementation of resettlement and rehabilitation activities of this project (including the field staff). The training/orientation session will be repeated in the field offices, DDCs and VDCs either by grouping the adjacent districts or individually as per convenience of the field staff

XII. IMPLEMENTATION SCHEDULE

101. The project is expected to be implemented from the fourth quarter of 2017 to the fourth quarter of 2017. Advance actions such as the establishment of the field-level PIU two offices, the appointment of the two Project Managers, the recruitment and mobilization of the SC resettlement team, the establishment of grievance redress committee and the formation of the CDC are required. Disbursement of compensation and resettlement assistance activities will be completed before each section is handed over by DoR to the contractor. However, income rehabilitation measures may continue and be completed even after civil works begin. Table 32 provides the timeline for project resettlement activities.

Table 32: Implementation Schedule of the Resettlement Plan Implementation

S.N. A	Activities	Time period	Responsibility
1	Establishment of PIU field office	Last quarter 2016	DOR
2	Mobilization of Supervision Consultant resettlement team	First Quarter 2017	DOR
3	Formation of CDC	Second Quarter 2017	DOR, CDO
4	Dissemination of information, public consultation, distribution of summary of RP in Nepali	Second Quarter 2017	DOR, SC
5	Determination of compensation of affected assets	Second Quarter 2017	DOR, SC, CDO
6	Joint survey with contractor	Second Quarter 2017	PM/CSC
7	Recruitment of External independent monitoring agency	Second quarter 2017	DOR
8	Publication of structure Acquisition Notice	Second Quarter 2017	DAO, Kapilvastu+ Rupendhi
9	Formation of GRC	Second Quarter 2017	DOR, SC
10	Publish notice to collect compensation	Third Quarter 2017	DOR, DAO
11	Distribution of compensation	Third Quarter 2017 onwards	DOR, DAO
12	Payment of rehabilitation allowances to SPAF & Vulnerable groups	Third Quarter 2017	DOR, SC
13	Transfer of land already acquired but remaining to deed transfer in the name of DOR/Government	Fourth Quarter 2017 onwards	DAO, DLRO, DLSO, DOR
14	Beginning on construction activities	Fourth Quarter 2017	DOR

XIII. MONITORING AND REPORTING

A. Internal monitoring System

102. An internal monitoring system will be established by DOR, the PIU and the CSC resettlement staff. A set of process, outcome and baseline indicators will be developed and the baseline gathered at the onset of RP implementation. The PIU and CSC resettlement staff will maintain record of all activities related to the resettlement in a database. Indicative indicators for the resettlement plan can be found in Table 33.

Table 33: Monitoring issues and Indicators

Monitoring Issues	Monitoring Indicators
Budget and time frame	- Has all resettlement staff been appointed and mobilized for field and office work on schedule? - Have capacity building and training activities been completed on schedule? - Are resettlement implementation activities being achieved according to agreed implementation plan? - Are funds for resettlement being allocated to resettlement agencies on time? Have resettlement offices received the scheduled funds? - Have funds been disbursed according to RP? - Has the land been made encumbrance-free and handed over to the contractor in time for project implementation?
Delivery of entitlements	- Have all affected persons received entitlements according to numbers and categories of loss set out in the entitlement matrix? - How many affected households have relocated and built their new structures at new locations? - Are income and livelihood restoration activities being implemented as planned? Have affected businesses received entitlements? - Have the community structures been compensated and rebuilt at new sites? - Have all processes been documented? - Are there discrepancies between the estimated number of affected persons as per the RP/RP addendum and actual numbers - Share of compensation disbursement vs total Title-Holders affected - Share of Titled-holders who have received their entire compensation packages (compensation and other resettlement allowances) vs total Title-Holders affected - Share of non-titled holders who have received compensation of structures vs total non-titled holders identified - Share of non-titled holders who have received their other resettlement allowances vs total non-titled holders identified - Is the rate for compensation for land and structure equivalent to replacement cost?
Relocation assistance	- Has NGO prepared a list of alternative places to rent/buy? - Have affected households benefitted from support of NGO to find alternative place to rent/buy? If so, how many and what services were provided?
Consultation, grievances, and special issues	Have resettlement information brochures/leaflets been prepared and distributed? Have consultations taken place as scheduled, including meetings, groups, and community activities?

Monitoring Issues	Monitoring Indicators
	▪ Have any affected persons used the grievance redress procedures? What grievances were raised? What were the outcomes? ▪ Have conflicts been resolved? ▪ Have grievances and resolutions been documented? Have any cases been taken to court?
Resettlement Benefit/ Impacts	▪ What changes have occurred in patterns of occupation compared to the pre-project situation? ▪ What changes have occurred in income, expenditure and livelihood patterns compared to pre-project situation? ▪ How many physically displaced households have relocated? Where are they relocated (i.e. remaining plot of land, newly purchased plot, rented plot/structure) ▪ How many households have purchased plot? ▪ What was compensations/resettlement benefits spent on? ▪ Have the participants of the livelihood-training program used their new skills? What was the seed grant spent on?

103. The central level GESU under the DoR will also carry out internal monitoring. Among others, the GESU monitoring will also be focused on process monitoring.

B. External monitoring

104. An external professional/individual/researcher or consulting agency, university department or development NGOs will be recruited by DOR to carry out an independent bi-annual review of the resettlement implementation process as well as the post resettlement completion evaluation. Two monitoring surveys (biannually) of a sample of affected households (minimum 20% of affected households) will be undertaken by independent the external monitoring agency/researchers. The main objective of this monitoring will be to measure the extent to which households' standards of living have been restored or improved. The external monitoring agency will also carry out a final ex-post evaluation to ensure that all RP implementation activities have been completed. Any problems or issues identified are followed-up (including recommendation of mitigation measures and supplementary budget if required); and learning from such issues must be recorded which would help to deal with issues such as these more effectively. A sample Terms of Reference (ToR) for the external monitoring agency with cost estimate have been included in Appendix 7.

Table 34: Scope of External Monitoring

Independent Monitor	Conduct a field-based assessment of the implementation of the resettlement plan on a bi-annual basis: ▪ Conduct sample survey of 20% affected households ▪ Reconciliation of data provided by DOR/CSC resettlement team with field and records verification; ▪ Assess progress of land acquisition and resettlement activities; ▪ Assess progress vis-à-vis indicators; ▪ Assess compliance of RP implementation with SPS Interview affected persons to assess their views on the resettlement process; and ▪ Propose corrective/remedial actions.
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C. Reporting

105. The PIU/CSC resettlement staff will prepare Monthly Progress Report (MPR) highlighting progress, issues, constraints, targets for every month. These reports will closely follow the resettlement monitoring indicators as mentioned above. The project directorate Resettlement team will review the MPRs and produce a Semi-annual resettlement report. Table 35 provides details on the contents and timing of various progress monitoring reports.

Table 35: Reporting Requirements

Type of Report	Content	Frequency	Responsibility	To be disclosed
Monthly progress report	Progress on land acquisition and resettlement activities, progress on indicators, results, issues affecting performance, constraints, variation from RP (if any) and reason for the same and corrections recommended	Monthly	PIU/CSC	Not required
Semi-annual resettlement monitoring report	Progress on land acquisition and resettlement activities, indicators, and variations if any with explanation and outcome, recommended corrective actions.	Semi-annually	DOR/CSC	Yes
External monitoring report	Progress on land acquisition and resettlement activities, indicators, variations if any with explanation and outcome, affected person's satisfaction with process, compliance with ADB's SPS, corrective actions recommended	Semi-annually	External Monitor	Not required
Resettlement completion report	Overall narrative of the land acquisition and resettlement process, outputs and outcomes of indicators from baseline, key variations/changes, lessons learned	Once	External Monitor	Not required

APPENDIX 1: INFORMATION OF THE RIGHT OF WAY & LAND ACQUISITION

Narayanghat-Butwal Road



नेपाल सरकार
भौतिक पूर्वाधार तथा यातायात मन्त्रालय
सडक विभाग
डिभिजन सडक कार्यालय
बुटवल, रुपन्देही

फोन : ०७१-४४०७४६
फ्याक्स : ०७१-४४६४१४

पत्र संख्या : ०७२/०७३
चलानी नं.: ४५६६

मिति: २०७२/११/९

विषय: जानकारी सम्बन्धमा ।

श्री/सडक विभाग
आयोजना निर्देशनालय (ए.डि.वि.)
विशालनगर, काठमाण्डौ ।

प्रस्तुत विषयमा यस कार्यालयको क्षेत्राधिकार भित्र रहेको निम्न सडक खण्डहरूको सडक सिमा तथा सो भित्र पर्ने जग्गाहरूको स्वामित्वको स्थिति निम्नानुसार रहेको व्यहोरा जानकारीको लागि अनुरोध गरिन्छ ।

सि.न.	सडक खण्डहरू	सडक सिमा	जग्गा स्वामित्वको स्थिति
१	नारायणगढ-बुटवल सडक खण्ड	२५ मि.दुवै तर्फ	सडक सिमा भित्र पर्ने
२	भैरहवा तौलिहवा सडक खण्ड (बुद्धचोक देखि भैरहवा एअरपोर्ट खण्ड)	२५ मि.दुवै तर्फ	अधिकांश जग्गाहरूको लगत कट्टा भई डिभिजनको नामा
३	भैरहवा तौलिहवा सडक खण्ड (भैरहवा एअरपोर्ट देखि कोठी भेदी खण्ड)	१५ मि.दुवै तर्फ	स्वामित्व ग्रहण भईसकेको ।

(सविन जोशी)

Appendix 2: List of Affected Landowners

S. N.	Name of Land Owner	Address	Ward No/. Sheet No	Total land holding in Sqm	Plot No.	Area to be acquired in Sqm	Loss %
1		Kawaswati	6 Gha	1454	542	63	4.33
2		Kawaswati	6 Gha	1442	815	50	3.47
3		Kawaswati	6 Gha	1254	816	53	4.23
4		Kawaswati	6 Gha	1213	190	42	3.46
5		Kawaswati	6 Gha	1420	188	75	5.28
6		Prgati nagar	1 Ka	1083	173	153	14.93
7		Prgati nagar	1 Ka	1983	271	84	4.24
8		Prgati nagar	1 Ka	1460	268	54.9	3.76
9		Prgati nagar	1 Ka	1740	263	154	8.85
10		Prgati nagar	1 Ka	1413	270	54.9	3.89
11		Prgati nagar	1 Ka	1459	364	54.9	3.76
12		Prgati nagar	1 Ka	1393	1155	42.9	3.08
13		Prgati nagar	1 Ka	1286	1156	42.9	3.34
14		Rajahar	6 Ka	1365	31	45	3.30
15		Rajahar	6 Ka	1356	30	50	3.69
16		Tamsarya	6 Kha	2565	761	240	9.36
17		Tamsarya	6 Kha	1989	639	148	7.44
18		Tamsarya	6 Kha	2323	636	201	8.65
19		Tamsarya	6 Kha	2012	981	125	6.21
					Total Sqm	1733.5	
					ha	0.18	
	Per Sqm Rate (average)	15500		26,869,250.00	Total Cost	26,869,250.00	

APPENDIX 3: LIST OF AFFECTED STRUCTURES

S.N	T S. No.	House Owner Name	Chanage	Address	Present use	Structure Type	Roof Type	No of Story	Total Area of Structure			Affected area (Sqm)	Percentage	Types of wall	Affected Types	R/L	Center Line
									L(M)	B(M)	Total area (Sqm)						
1	41		7+000	Gaidakot 9 Thumsi	1	1	2	1	6.2	4.2	26.04	26	99.85	6.00	2	L	14
2	120		23+240	Devchuli 13 Daldale	1	4	2	1	10.2	7.7	78.54	38.5	49.02	4.00	1	L	20
3	121		23+255	Devchuli 13 Daldale	1	1	2	1	10.7	5.3	56.71	26.5	46.73	9.00	1	L	20
4	122		23+285	Devchuli 13 Daldale	1	1	2	1	7.5	7.8	58.5	39	66.67	9&2	1	L	20
	166		34+150	Kawasoti 16 Purano kawaswati	1	1	2	1	8.5	4	34	20	58.82	9.00	2	L	20
5	168		34+130	Kawasoti 16 Teenghare	1	1	2	1	7	5	35	25	71.43	9&2	1	L	20
6	169		34+440	Kawasoti 16 Teenghare	1	1	2	1	6	4.5	27	22.5	83.33	3.00	1	L	20
7	170		34+450	Kawasoti 16 Teenghare	1	1	2	2	5	4	40	40	100.00	2&9	1	L	20
8	269		67+250	Dumkibas 5 Daunneko	2	2	2	1	3.7	3.5	12.95	12.96	100.08	6.00	2	L	9
9	270		67+256	Dumkibas 5 Daunneko	2	15	2	1	7.4	5.5	40.7	40.7	100.00	7.00	1	L	8.6
10	271		67+266	Dumkibas 5 Daunneko	2	2	2	1	8.5	6.5	55.25	55.25	100.00	7.00	1	L	8
11	272		67+280	Dumkibas 5 Daunneko	2	2	2	2	5.8	5	58	58	100.00	5&6	1	L	8
12	273		67+287	Dumkibas 5 Daunneko	2	2	2	1	6.7	3.3	22.11	22.11	100.00	5&6	1	L	6.5
13	274		67+257	Dumkibas 5 Daunneko	2	15	2	1	9	8.5	76.5	76	99.35	5.00	1	R	9
14	275		67+290	Dumkibas 5 Daunneko	2	15	2	1	4	3	12	12	100.00	5.00	1	R	9
15	278		67+375	Dumkibas 5 Daunneko	2	2	2	1	9.5	8.5	80.75	80.76	100.01	6.00	1	L	9
16	279		37+385	Dumkibas 5 Daunneko	2	2	2	1	6.8	4.8	32.64	32	98.04	6.00	1	L	7.5
17	283		67+715	Dumkibas 5 Daunneko	3	1,2	2	2	11	4.5	99	99	100.00	4.00	1	L	8
18	461		105+840	Devdaha 10 Bhaludi	1	1	2	1	8.3	5.4	44.82	32.4	72.29	2.00	2	L	19
20			105+840	Devdaha 10 Bhaludi	1	1	3	1	6.5	6	39	36	92.31	3.00	2	L	19
21			105+840	Devdaha 10 Bhaludi	1	1	3	1	8	5	40	30	75.00	3.00	2	L	19
Total		5,734, 494.85	Rate	2120								824.68	2705	Sqft	3.28		

Types of structure: 1- Residential, 2-Commercial, 3- Community , 4- Shed, 5- toilet, 6- wall, 7- Empty House/ hut, 8- Kitchen, 9-Community res, 10- Temple, 11- Waiting shed ,12- Public tap,13- Well/ tubewall,14- Gate, 16- Different status& Park, 1&2 – Res+ Commercial, 4& 6- Wall& gate etc

Roof Type : 1- Slate 2- Zink sheet, 3-RRC Dhalan, 4- Straw, 6- Tripal

Wall Type: 1-Stone & mud mortar plaster by Mud, 2- Stone & mud mortar plaster by Cement, 3-Stone and cement mortar by cement plaster, 4- Bricks & cement mortar by cement plaster, 5- Bamboo& wood, 6- Zink sheet, 7-stone , mud, wood and Zink sheet , 8- Zink sheet & wood, 9- Block , 10-Stone cement, and metal pipe mix

Use: 1-Self settlement, 2 -Commercial, 3- Res+ Commercial, 4- Rented , 5- under construction, 6-Empty house, 7- common uses, 8- etc

Affected Situation: 2 Fully, 1- Partially

APPENDIX 4: LIST OF COMMUNITY STRUCTURES

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
5	Samudayik Sewa Kendra Bhawan	0+685	Gaidakot 2	1	3	1	13	8	104	2066	2	R	11
7	Yatru Pratikshyalaya	0+800	Gaidakot 2	7	11	1	9.4	3.3	31.02		2	L	10
9	Jhailakalika Mandir Prabesh Dwar	0+950	Gaidakot 2	7	14				0	2069	2	R	18
11	Yatru Pratikshyalaya	1+000	Gaidakot 2	7	11	1	11.8	2.7	31.86	2046	2	L	17
12	Durga Mandir	1+000	Gaidakot 2	7	10	1	2.5	2	5		2	L	17
13	Park	1+100	Gaidakot 1	7	6		25		0	2050	2	R	12
14	Yatru Pratikshyalaya	1+130	Gaidakot 1	7	11	2			0		2	R	10
20	Public Tap	1+280	Gaidakot 5 Kali Gandaki Chowk	7	12				0	2060	2	L	17
21	Public Tap	1+300	Gaidakot 5 Kali Gandaki Chowk	7	12				0	2055	2	L	18
22	Pratikshyalaya	1+650	Gaidakot 4	7	11	1	5	4	20	2057	2	R	8
24	Pratikshyalaya	2+030	Gaidakot 5 Buddachowk	7	11	1	5	4	20	2068	2	L	9
25	Pratikshyalaya	2+320	Gaidakot 5 Congress Chowk	7	11	1	5	4	20	2071	2	L	20
26	Mane	3+450	Gaidakot 5 Bijaychowk	7	10				0	2065	2	L	18
27	Pratikshyalaya	3+455	Gaidakot 5 Bijaychowk	7	11	1	5	5	25	2058	2	R	20
28	Shivalayako Mandir	3+550	Gaidakot 8 Bijaychowk	7	10	1	5	4	20	2041	2	R	21
29	Pratikshyalaya	3+120	Gaidakot 8 Bijaychowk	7	11	1	4	4	16	2047	2	R	16
30	Public Tap	3+400	Gaidakot 8 Bijaychowk	7	12				0	2051	2	R	20
32	Sadak Board ko Dastur Sankalan Kendra	5+010	Gaidakot 7	7	3	1	7	5	35	2072	2	L	7
33	Pratikshyalaya	5+030	Gaidakot 7	7	11	1	7	4	28	2062	2	R	7
35	Pratikshyalaya	5+280	Barpipal Chowk	7	11	1	6	4	24	2063	2	L	9
43	Biswokarma Mandir	7+270	Gaidakot 9 Thumsi	7	10	3	6	6	108		2	L	17
44	Public Tap + Chautara	7+550	Gaidakot 9 Thumsi	7	12				0	2040	2	L	12
45	Pratikshyalaya	9+570	Gaidakot 10 Pitauji	7	11	1	6	5	30	2060	2	L	15
47	Pratikshyalaya	10+630	Gaidakot 10 Pitauji	7	11	1	4.3	3.3	14.19	2060	2	L	14
48	Pratikshyalaya	11+00	Gaidakot 10 Pitauji	7	11	1	3.8	3.8	14.44	2059	2	L	16
49	Pratikshyalaya	11+320	Gaidakot 10 Mukundapur	7	11	1	3.6	3.6	12.96	2062	2	R	16
50	Pratikshyalaya	11+680	Gaidakot 10 Sangam	7	11	1	5.5	3.3	18.15	2060	2	R	13

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
			Chowk										
51	Pratikshyalaya	12+000	Gaidakot 10 Bhaishakhori	7	11	1	5	3.7	18.5	2063	2	R	10
52	Pratikshyalaya	12+150	Gaidakot 10 Bhaishakhori	7	11	1	4	2.9	11.6	2060	2	R	12
53	Pratikshyalaya	12+620	Gaidakot 11 Bhedabari	7	11	1	4.5	3.4	15.3	2072	2	R	16
54	Pratikshyalaya	13+030	Gaidakot 12 Harkapur	7	11	1	6	5	30	2040	2	L	8
55	Public Tap	14+600	Gaidakot 13 Beldidabazar	7	12				0	2062	2	R	18
56	Pratikshyalaya	14+820	Gaidakot 13 Beldidabazar	7	11	1	3	2.4	7.2	2055	2	R	10
57	Pratikshyalaya	14+850	Gaidakot 13 Beldidabazar	7	11	1	3.3	3	9.9	2063	2	L	11
58	Public Tap	14+900	Gaidakot 13 Beldidabazar	7	12				0	2050	2	L	20
59	Pratikshyalaya	15+100	Gaidakot 13 Beldidabazar	7	11	1	4	3.7	14.8	2064	2	L	11
60	Pratikshyalaya	15+120	Gaidakot 13 Beldidabazar	7	11	1	4	3.5	14	2064	2	L	15
61	Public Tap	15+120	Gaidakot 13 Beldidabazar	7	12				0	2050	2	L	12
62	Pratikshyalaya	15+200	Gaidakot 13 Beldidabazar	7	11	1	6.1	4.3	26.23	2064	2	L	11
63	Pratikshyalaya	15+720	Gaidakot 16 Amarapuri	7	11	1	4.1	3.5	14.35	2067	2	L	11
64	Pratikshyalaya	15+980	Gaidakot 15 Amarapuri	7	11	1	4	2.7	10.8	2063	2	R	11
65	Pratikshyalaya	16+030	Gaidakot 16 Amarapuri	7	11	1	4	3.4	13.6	2065	2	L	11
66	Tulsi Pratikshyalaya	16+440	Gaidakot 15 Jotishichowk	7	11	1	4	3.3	13.2	2064	2	R	9
67	Mandir	16+630	Gaidakot 16	7	10	1	2	2	4	2065	2	L	14
68	Pratikshyalaya	16+700	Gaidakot 16 Amarapuri	7	11	1	5	3	15	2055	2	L	9
69	Pratikshyalaya	16+700	Gaidakot 15	7	11	1	4	2	8	2068	2	R	9
70	Public Pani Tanki+Tap	16+715	Gaidakot 15	7	12	1	2	1.5	3	2061	2	R	9
71	Pani Tanki+Tap	17+040	Gaidakot 15 Amarapuri	7	12	1	3	3	9	2062	2	R	12
73	Pratikshyalaya	17+050	Gaidakot 15 Amarapuri	7	11	1	5	3	15	2059	2	R	8
74	Pratikshyalaya	17+140	Gaidakot 16 Amarapuri	7	11	1	5	3.5	17.5	2055	2	L	8
75	Pratikshyalaya	17+280	Gaidakot 16 Amarapuri	7	11	1	5	3.3	16.5	2061	2	R	8
76	Pratikshyalaya	17+770	Gaidakot 16 Amarapuri	7	11	1	4	3.5	14	2055	2	L	11
77	Shiv Mandir	17+775	Gaidakot 15 Amarapuri	7	10	1	4.5	4.5	20.25	2065	2	R	18
79	Pratikshyalaya	18+000	Rajhar 8 Jharahikhola	7	11	1	4	2.5	10	2065	2	R	13
80	Pratikshyalaya	18+000	Rajhar 6 Jharahikhola	7	11	1	7	3	21	20	2	L	14

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
81	Pratikshyalaya	18+480	Rajhar 6 basantpur	7	11	1	4.5	4	18	2069	2	L	15
82	Ganesh Mandir Wall	18+495	Rajhar 8 Gauripur		6		22	6	0	2069	2	R	22
84	Pratikshyalaya	18+675	Rajhar 5 faram	7	11	1			0	2071	2	L	18
85	Pratikshyalaya	19+100	Rajhar 1 Taikot Chowk	7	11	1	4	3.8	15.2	2065	2	L	13
86	Pratikshyalaya	19+700	Rajhar 1 Kumarwanti Chowk	7	11	1	4.4	4.2	18.48	2065	2	R	12
87	Pani Tanki+Tap	19+700	Rajhar 1 Rajhar Bazar	7	12	1	3	2	6	2065	2	L	12
88	Public Tap	19+780	Rajhar 7 Bazar	7	12				0	2060	2	R	18
89	Public Tap	19+810	Rajhar 7 Bazar	7	12				0	2059	2	R	18
90	Public Tap	19+840	Rajhar 7 Bazar	7	12				0	2059	2	R	18
91	Public Tap	20+020	Rajhar 7 Bazar	7	12				0	2059	2	R	18
92	Public Tap	20+120	Rajhar 7 Bazar	7	12				0	2059	2	L	23
93	Public Tap	20+240	Rajhar 1 Rajhar Bazar	7	12				0	2059	2	L	16
94	Public Tap	20+240	Rajhar 7 Bazar	7	12				0	2059	2	R	16
95	Public Tap	20+320	Rajhar 1 Rajhar Bazar	7	12				0	2059	2	L	16
96	Pratikshyalaya	20+340	Rajhar 1 Rajhar Bazar	7	11	1			0	2065	2	L	12
99	Public Tap	20+440	Rajhar 7 Bazar	7	12				0	2059	2	R	15
100	Public Tap	20+440	Rajhar 1 Rajhar Bazar	7	12				0	2059	2	L	15
106	Pratikshyalaya	21+190	Devchuli 2 Kumarwati	7	11	1	4.6	3.3	15.18	2060	2	R	15
107	Public Tap	21+550	Devchuli 2 Dumkauli	7	12				0	2065	2	R	16
108	Public Tap	21+825	Devchuli 2 Dumkauli	7	12				0	2055	2	L	14
109	Pratikshyalaya	21+850	Devchuli 2 Dumkauli	7	11	1	5	3.5	17.5	2066	2	L	10
111	Pratikshyalaya	22+550	Devchuli 1 Keurenichowk	7	11	1	4.5	3.5	15.75	2068	2	L	14
112	Pratikshyalaya	22+590	Devchuli 1 Keurenichowk	7	11	1	4.2	3	12.6	2069	2	R	12
113	Pratikshyalaya	22+700	Devchuli 3 Keureni	7	11	1	5	3.5	17.5	2056	2	R	22
114	Public tap	22+700	Devchuli 3 Keureni	7	12				0	2056	2	R	20
115	Pratikshyalaya	22+780	Devchuli 3 Keureni	7	11	1	5	3	15	2058	2	R	10
123	Pratikshyalaya	23+600	Devchuli 13 Daldale	7	11	1	4	4	16	2060	2	L	9
125	Pratikshyalaya	23+950	Devchuli 13 Daldale	7	11	1	4	4	16	2065	2	R	14
126	Bhimsen Mandir	24+030	Devchuli 13 Daldale	7	10	1	2	2	4		2	R	17
127	Pratikshyalaya	24+080	Devchuli 13 Daldale	7	11	1	4	4	16		2	R	13
128	Pratikshyalaya	24+380	Devchuli 13 Daldale	7	11	1	3.5	3.5	12.25		2	R	11
129	Pratikshyalaya	24+450	Devchuli 13 Daldale	7	11	1	4	3	12		2	L	13
130	Pratikshyalaya	24+620	Devchuli 13 Daldale	7	11	1			0		2	L	14
131	Pratikshyalaya	24+980	Devchuli 15 Campus Chowk	7	11	1	3.5	3	10.5		2	L	12
132	Pratikshyalaya	25+375	Devchuli 15 Pragatinagar	7	11	1	3.8	3.1	11.78	2057	2	R	10

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L(M)	B(M)	Sqm				
133	Public Tap	25+378	Devchuli 15 Pragatinagar	7	12				0	2065	2	R	11
134	Pratikshyalaya	25+680	Devchuli 15 Dhaulagiri Chowk	7	11	1	4.8	3.2	15.36		2	R	10
135	Pratikshyalaya	25+970	Devchuli 15 Dhaulagiri Chowk	7	11	1			0		2	R	15
136	Pratikshyalaya	26+390	Kawasoti 11 Lokaha	7	11	1	4	3	12	2058	2	R	8
137	Pratikshyalaya	26+390	Kawasoti 11 Lokaha	7	11	1	6	4	24	2052	2	L	9
138	Pratikshyalaya	27+720	Kawasoti 11 Lokaha	7	11	1	5	4	20		2	L	12
139	Pratikshyalaya	28+275	Kawasoti 11 Lokaha	7	11	1	4.5	4	18		2	L	11
140	Pratikshyalaya	30+530	kawasoti - Thala Tole	7	11	1			0	2068	2	L	10
141	Pratikshyalaya	30+790	kawasoti 1 Thala Tole	7	11	1	5	4	20		2	R	9
147	Ganeshman ko Salik	31+210	Kawasauti 8 Kawasoti Bazar	7	16				0	2068	2	L	14
148	Ka. Pupalal ko Salik	31+500	Kawasauti 8 Kawasoti Bazar	7	16				0		2	L	12
149	Pratikshyalaya	31+580	Kawasoti 3 Kawasoti Bazar	7	11	1	3	3	9		2	R	8
150	Pratikshyalaya	31+730	Kawasoti 2 Shivmandir Chowk	7	11	1			0	2069	2	R	12
151	Pratikshyalaya	32+090	Kawasoti 8 Majorchowk	7	11	1			0	2068	2	L	15
152	Pratikshyalaya	32+670	Kawasoti 3 Thakali Chowk	7	11	1	6	3	18	2065	2	R	14
153	Pratikshyalaya	33+150	Kawasoti 3 Ram Nagar Chowk	7	11		4.3	3.2	0	2061	2	R	9
155	Pani Tanki	33+680	Kawasoti 3 Purano Bazar	8	16	1	2	2	4	2055	2	R	16
156	Pratikshyalaya	33+680	Kawasoti 3 Purano Bazar	7	11	1			0	2063	2	R	9
163	Kumari Smriti Club ko Bandai gareko Bhawan	30+708	Kawasoti 1 Thanachowk	4	12	1	10	7	70	2070	1	R	23
165	Pratikshyalaya	33+950	Kawasoti 9 Puranokawasoti	7	11	1	5	3	15	2060	2	L	7
171	Pratikshyalaya	34+540	Kawasoti 16 Teenghare	7	11	1	5	6	30	2061	2	R	7
174	Pratikshyalaya	35+350	Kawasoti 16 Danda	7	11	1	5	5	25		2	L	12
175	Gaida Ko Murti	35+375	Kawasoti 16 Danda	7	16				0		2	L	
177	Pratikshyalaya	35+520	Kawasoti 16 Danda	7	11	1			0	2068	2	R	12

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
179	Pratikshyalaya	35+600	Kawasoti 16 Danda	7	11	1	5	4	20	2068	1	L	15
187	Pratikshyalaya	36+010	Kawasoti 16 Danda	7	11	1	4	3.5	14	2069	2	L	0
190	Pani Tanki+Tap	43+130	Kawasoti 16 Danda	8	12		2	1.5	0		2	R	13
191	Public Toilets	43+135	Madhyabindu 7 Chorvara	7	5	1	5	4	20	2062	2	R	13
192	Pratikshyalaya	43+180	Madhyabindu 7 Chorvara	7	11	1	7	4	28	2070	2	R	10
193	Pratikshyalaya	43+290	Madhyabindu 7 Chorvara	7	11	1			0	2069	2	L	18
195	Public Toilets	43+350	Madhyabindu 7 Chorvara	7	5	1	3	1.5	4.5	2057	2	L	19
197	Public Tap	43+800	Madhyabindu 8 Chaurangi	7	12				0	2065	2	L	23
198	Public Tap	43+810	Madhyabindu 8 Chaurangi	7	12				0	2065	2	L	16
199	Public Tap	43+860	Madhyabindu 8 Chaurangi	7	12				0	2065	2	R	16
200	Durga Mandir	43+870	Madhyabindu 8 Chaurangi	7	10	1	3	2.5	7.5	2064	2	L	19
202	Pratikshyalaya	44+020	Madhyabindu 8 Chaurangi	7	11	1	5.2	4	20.8		2	R	8
203	Public Tap	44+170	Madhyabindu 8 Chaurangi	7	12				0	2061	2	L	14
208	Public Tap	44+360	Madhyabindu 8 Phulbari	7	12				0	2062	2	L	16
212	Pratikshyalaya	45+300	Madhyabindu 8 Phulbari	7	11	1	4	3	12		2	R	16
215	Public Tap	49+840	Nayabelahani 7 Damarchowk	7	12				0	2069	2	L	13
225	Pratikshyalaya	50+000	Nayabelahani 7 Laxmi Chowk	7	11	1	6	3	18	2060	2	L	10
226	Public Tube Well	49+990	Nayabelahani 7 Laxmi Chowk	7	12				0	2068	2	L	10
227	Public Tube Well	50+000	Nayabelahani 7 Laxmi Chowk	7	12				0	2068	2	R	22
231	Public Toilets	50+450	Nayabelahani 8 Aarungkhola	7	5	2	7	5	70	2068	2	R	10
232	Pratikshyalaya	50+470	Nayabelahani 8 Aarungkhola	7	11	1	6.8	3.3	22.44	2067	2	R	8
235	Pratikshyalaya	50+770	Nayabelahani 8	7	11	1	5	4	20	2069	2	L	18

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L(M)	B(M)	Sqm				
			Aarungkhola						0				
236	Public Tap	50+780	Nayabelahani 8 Aarungkhola	7	12				0	2058	2	R	19
237	Public Well	50+820	Nayabelahani 8 Aarungkhola	7	13				0	2065	2	R	14
238	Public Tap	50+950	Nayabelahani 8 Aarungkhola	7	12				0	2058	2	R	19
239	Pratikshyalaya	51+030	Nayabelahani 8 Aarungkhola	7	11	1	5	4	20	2056	2	R	15
240	Pratikshyalaya	59+990	Dumkibas 1	7	11	1	4	3	12	2062	2	R	17
241	Pratikshyalaya	60+030	Dumkibas 1	7	11	1	3	3	9	2070	2	R	12
242	Pratikshyalaya	60+030	Dumkibas 1	7	11	1	3	3	9	2071	2	L	13.2
246	Shiv Mandir + Durga Mandir	60+460	Dumkibas 1	7	10	1	2	1	2	2065	2	L	20
247	Public Toilets	60+580	Dumkibas 5 Jyamire	7	5	1	5	2	10	2071	2	L	18
249	Pratikshyalaya	60+855	Dumkibas 5 Jyamire	7	11	1	4	2.2	8.8	2069	2	R	12
266	Pratikshyalaya	63+540	Dumkibas 5 Daunneko Jungle	7	11	1	4	3	12		2	L	20
267	Biswokarma Mandir	63+540	Dumkibas 5 Daunneko Jungle	7	10	1	4	3	12		2	L	20
268	Pani Tanki	63+540	Dumkibas 5 Daunneko Jungle	7	18	1	3	2	6		2	R	19
277	Public Tap 4 Ota	67+350-370	Dumkibas 5 Daunneko	2	12				0	2070	2	L	7
284	Pachim Nepal Truck Bebasayi Ghar	75+170	Badeghat 4 Kisiyan Chowk	7	3	1	6	4	24	2069	2	L	20
285	Pani Tanki+Tap	75+180	Badeghat 4 Kisiyan Chowk	7	12	1	2.7	1.7	4.59	2065	2	R	22
286	Pratikshyalaya	75+220	Badeghat 4 Kisiyan Chowk	7	11	1	7	5	35	2059	2	R	21
296	Public Toilet	75+900	bardghat 4	7	5	1	10	4	40	2063	2	R	19
298	Pratikshyalaya	76+000	bardghat 4	7	11	1	7	4	28	2069	2	R	9
299	Kali Mandir	76+080	bardghat 4	7	10	1	2	2	4	2050	2	L	16
301	Pratikshyalaya	76+790	bardghat 4	7	11	1	3	2	6	2058	2	R	21
304	Pratikshyalaya	76+980	bardghat 4	7	11	1			0	2066	2	R	11
305	Pratikshyalaya	77+180	bardghat 4	7	11	1	3	3	9	2068	2	R	17
306	Pani Tanki+Tap	77+180	bardghat 4	7	12	1	2	2	4	2068	2	L	14
307	Pratikshyalaya	77+180	bardghat 4	7	11	1	4	3	12	2045	2	L	12
308	Pratikshyalaya	77+220	bardghat 4	7	11	1	6.5	4.5	29.25	2068	2	L	12

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
311	Pratikshyalaya	77+630	Bardghat 2 Chisapani	7	11	1	4	3	12		2	L	12
312	Pratikshyalaya	78+490	bardghat 10 Nandantriz	7	11	1	3	3	9	2062	2	R	13
314	Pratikshyalaya	79+020	Bardghat 10 Mauraha Tandi	7	11	1	3	3	9	2055	2	R	12
315	Pratikshyalaya	79+080	Bardghat 11 Mauraha Tandi	7	11	1	5	4	20	2065	2	L	14
316	Pratikshyalaya	79+690	Bardghat 10 Dhurbtole	7	11	1	4	4	16	2065	2	R	13
317	Pratikshyalaya	79+690	Bardghat 9 Dhurbtole	7	11	1	3	3	9	2063	2	L	11
323	Public Tap 3 Ota	80+380	Bardghat 9 Bhutada Bazar	7	12				0	2062	2	L	15
324	Public Tap	80+460	Bardghat 10 Bhutada Bazar	7	12				0	2062	2	R	15
325	Shivalaya Mandir	80+460	Bardghat 10 Bhutada Bazar	7	10	1	7.8	4	31.2	2050	2	L	17
327	Pratikshyalaya	80+870	Tilakpur 2 Saalbass	7	11	1	5	2	10	2050	2	R	12
330	Pratikshyalaya	81+180	Tilakpur 4 Jhagada	7	11	1	4	4	16	2057	2	L	12
332	Pratikshyalaya	82+280	Tilakpur 1 Tulsinagar	7	11	1	4.3	3	12.9	2072	2	L	20
333	Pratikshyalaya	82+640	Tilakpur 6 Baasbasahi	7	11	1	4	2.5	10	2050	2	L	10
334	Public Tap	82+650	Tilakpur 6 Baasbasahi	7	12				0	2065	2	L	15
337	Public Tap	82+780	Tilakpur 5 Baasbasahi	7	12				0	2060	2	R	20
340	Public Tap	83+300	Tilakpur 5	7	12				0	2059	2	R	13
341	Public Tap	83+420	Tilakpur 5	7	12				0	2059	2	R	11
342	Pratikshyalaya	83+470	Tilakpur 5	7	11	1	4	4	16	2062	2	L	12
343	Santoshi Matako Mandir	83+570	Ramnagar 1 Harkaha	7	10	1	5	3	15	2048	2	L	19
344	Public Tap	83+940	Ramnagar 1 Harkaha	7	12				0	2060	2	L	14
345	Durga Mandir ko Wall+Mandir 2 ota	83+970	Ramnagar 1 Harkaha	7	10				0		2	R	12
346	Durga Mandir ko Toilet	83+970	Ramnagar 1 Harkaha	7	5	1	2	2	4		2	R	12
347	Pratikshyalaya	84+020	Ramnagar 1 Harkaha	7	11	1	6	4	24	2058	2	L	12
348	Shivjiko Mandir	84+020	Ramnagar 1 Harkaha	7	10	1	7	7	49	2047	2	L	20
349	Public Tap	84+020	Ramnagar 1 Harkaha	7	12				0	2060	2	L	16
350	Pratikshyalaya	84+030	Ramnagar 1 Harkaha	7	11	1	3	3	9	2068	2	L	12
351	New Harkatta Pratikshyalaya	84+560	Ramnagar 1 Harkaha	7	11	1	4	3	12	2069	2	L	18
354	Pratikshyalaya	85+270	Ramnagar 1 Bhumahi	7	11	1			0	2064	2	R	16
355	Public tap	85+290	Ramnagar 1 Bhumahi	8	12				0	2055	2	L	21
357	Pratikshyalaya	85+480	Ramnagar 1 Bhumahi	7	11	1	3	2	6	2068	2	R	22

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
358	Pratikshyalaya	85+645	Ramnagar 1 Bhumahi	7	11	1	4	2.5	10	2069	2	L	18
359	Pratikshyalaya	85+685	Ramnagar 1 Bhumahi	7	11	1			0	2064	2	R	13
360	Pratikshyalaya	86+190	Ramnagar 2 Suryabasti	7	11	1			0	2068	2	L	15
361	Pratikshyalaya	86+430	Ramnagar 2 Badera	7	11	1			0	2067	2	L	14
362	Pratikshyalaya	86+820	Ramnagar 2 Badera	7	11	1			0	2067	2	R	20
363	Pratikshyalaya	87+020	Ramnagar 2 Badera	7	11	1	5	4	20	2065	2	L	14
364	Pratikshyalaya	87+340	Ramnagar 2 Badera	7	11	1			0	2068	2	L	12
365	Public Tap	87+345	Ramnagar 2 Badera	7	12				0	2068	2	L	13
366	Pratikshyalaya	87+370	Ramnagar 2 Badera	7	11	1	4	4	16	2045	2	R	12
367	Public Tap	87+790	Ramnagar 2 Badera	7	12				0	2061	2	L	14
368	Public Tap	87+820	Ramnagar 2 Badera	7	12				0	2061	2	L	14
373	Buddha Ko Prativa	89+150	Sunbal 5 Bankatti		16				0	2062	2	R	16
378	Pratikshyalaya	90+990	Sunbal 3 Nadubauchowk	7	11	1	4	3.5	14	2062	2	L	14
383	Pratikshyalaya	91+520	Sunbal 1 Somnath	7	11	1	4	3	12	2068	2	L	16
384	Pratikshyalaya	91+625	Sunbal 1 Somnath	7	11	1			0	2066	2	L	19
385	Pratikshyalaya	91+830	Sunbal 1 Rupauliya Tole	7	11	1			0	2062	2	L	11
385	Pratikshyalaya	91+950	Sunbal 1 Rupauliya Tole	7	11	1	5	4	20	2055	2	R	11
387	Pratikshyalaya	92+270	Sunbal 1 Rupauliya Tole	7	11	1	5	4	20	2065	2	R	20
393	Public Toilet	92+363	Sunbal 1	7	5	1	8	6.2	49.6	2064	2	R	16
400	Durga mandir	92+410	Sunbal 1 Sunbal Bazar	7	10	1	3	3	9		2	R	15
405	Pratikshyalaya	93+150	Sunbal 4 Turiya	7	11	1	4	2.5	10	2053	2	L	12
406	Narhari Pritko Naamma Banayeko Mandir	93+280	Sunbal 4 Turiya	7	10	1	3	3	9	2058	2	L	18
407	Pratikshyalaya	93+290	Sunbal 4 Turiya	7	11	1			0	2064	2	L	13
408	Pratikshyalaya	93+575	Sunbal 4 Ramaiwapur	7	11	1	4	3	12	2058	2	L	6
409	Pratikshyalaya	94+080	Sunbal 4 Ramaiwapur	7	11	1	5	4	20	2065	2	L	12
410	Pratikshyalaya	94+240	Sunbal 4 Ramaiwapur	7	11	1	6	4	24	2055	2	L	14
411	Pratikshyalaya	94+580	Sunbal 4 Ramaiwapur	7	11	1	4.2	3	12.6	2058	2	L	11
413	Pratikshyalaya	98+540	Devdaha 6 Khaireni	7	11	1	4	3	12		2	L	9
415	Pratikshyalaya	98+610	Devdaha 6 Khaireni	7	11	1	4	3	12	2063	2	L	9
422	Devdaha Park Buddha ko Mandir- 2	99+030	Devdaha 8 Buddhachowk	7	10	1	4	4	16	2069	2	L	13
423	Pratikshyalaya	99+290	Devdaha 8 Buddhachowk	7	11	1	4.5	4	18	2066	2	L	11

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
424	Kul Mandir	99+530	Devdaha 8 Pipal Chowk	7	10	1	4	3	12	2050	2	L	14
425	Pratikshyalaya	99+595	Devdaha 8 Pipal Chowk	7	11	1			0	2062	2	L	12
428	Pratikshyalaya	100+020	Devdaha 8 Shitalnagar	7	11	1	4	4	16	2058	2	L	12
429	Shiv Mandir	100+020	Devdaha 8 Shitalnagar	7	10	1	3	3	9	2060	2	R	15
430	Pratikshyalaya	100+170	Devdaha 8 Kula Nanda Marg	7	11	1	4	2.5	10	2057	2	R	8
431	Laxmi Narayan ko Mandir	100+270	Devdaha 8 Kula Nanda Marg	7	10	1	5	5	25	2040	2	R	20
433	Pratikshyalaya	100+310	Devdaha 8 Shitalnagar	7	11	1	5	3.5	17.5	2058	2	L	13
434	Pratikshyalaya	100+430	Devdaha 8 Shitalnagar	7	11	1	3	2	6	2060	2	L	20
435	Pratikshyalaya	100+700	Devdaha 8 Shitalnagar	7	11	1	4.5	3	13.5	2055	2	L	18
436	Pratikshyalaya	101+270	DevDaha 10 Ghodaha	7	11	1	4	3	12	2058	2	R	13
438	Pratikshyalaya	101+500	DevDaha 10 Ghodaha	7	11	1	4	3	12	2060	2	L	11
440	Pratikshyalaya	101+060	DevDaha 10 Ghodaha	7	11	1	4	4	16	2060	2	L	10
443	Shiv Mandir	105+090	Devdaha 10 Bhaludi	7	10	1	4	4	16	2037	2	L	22
451	Pratikshyalaya	105+120	Devdaha 10 Bhaludi	7	11	1	5	3	15	2060	2	L	11
453	Pratikshyalaya	105+475	Devdaha 10 Bhaludi	7	11	1	4	2.5	10	2063	2	L	9
458	Pratikshyalaya	105+640	Devdaha 11 Bhaludi	7	11	1	5.5	3	16.5	2060	2	R	13
459	Pratikshyalaya	105+780	Devdaha 11 Bhaludi	7	11	1	3	3	9	2050	2	L	9
462	Pratikshyalaya	106+300	Devdaha 10 Bhaludi	7	11	1	4	3	12	2065	2	L	12
463	Pratikshyalaya	107+925	Devdaha 10 Bhaludi	7	11	1	4	3	12	2065	2	L	12
464	Pratikshyalaya	110+165	Devdaha 10 Bhaludi	7	11	1	5	4	20	2068	2	R	10
466	Raod Tax Collection Centre Butwal	110+785	Butwal 9 Ramnagar	7	3	2			0	2071	2	R	2
472	Durga Mandir	112+275	Butwal 12 Ramnagar	7	10	1	3	3	9	2065	2	R	20
474	Pratikshyalaya	112+310	Butwal 12 Ramnagar	7	11	1			0	2070	2	R	20
475	Pratikshyalaya	112+295	Butwal 12 Ramnagar	7	11	1	5	4	20	2051	2	R	12
476	Mahagyan Boudha Bihar Butwal	112+380	Butwal 12 Ramnagar	7	14				0	2048	2	R	23.5
477	Pratikshyalaya	112+475	Butwal 12 Ramnagar	7	11	1	5	3.5	17.5	2060	2	L	10
481	Pratikshyalaya	112+670	Butwal 10 Sukkhanagar	7	11	1	5	2	10	2067	2	L	14
482	Pratikshyalaya	112+660	Butwal 10 Sukkhanagar	7	11	1	4.5	3	13.5	2066	2	R	15
484	Pachimanchal Chetriya Prahari Talim Kendra Wall+Gate	113+210	Butwal 10 Sukkhanagar	7	6		19		0	2034	2	L	20
485	Pachimanchal	113+230	Butwal 10	7	3	1	8.5	5.25	44.62	2034	2	L	22.5

Total S.No .	Community Structure Name	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
							L (M)	B(M)	Sqm				
	Chetriya Prahari Chamena Griha		Sukkhanagar						5				
486	Pachimanchal Chetriya Prahari Nagarik Sahayata Kachya	113+240	Butwal 10 Sukkhanagar	7	3	1	5.3	5	26.5	2034	2	L	22.5
487	Pachimanchal Chetriya Prahari M gate	113+260	Butwal 10 Sukkhanagar	7	14				0	2034	2	L	21.5
489	Public Toilet	113+375	Butwal 10 Sukkhanagar	7	5	1	10.7	10.7	114.49	2055	2	R	18
491	Pratikshyalaya	113+425	Butwal 13 Chauraha	7	11	1	5	1.5	7.5	2072	2	R	17
492	Pratikshyalaya	113+450	Butwal 13 Chauraha	7	11	1	5	1.5	7.5	2070	2	L	16
493	Pratikshyalaya	113+435	Butwal 13 Chauraha	7	11	1	5	1.5	7.5	2070	2	R	16

APPENDIX 5: INVENTORIES OF GOVERNMENT STRUCTURES

S.N	Form S. N.	Description of structure	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
								L (m)	B(m)	Sqm				
1	8	Ban Bivag ko Renj Post	0+800	Gaidakot 2	7	11	2	5.8	3.3	38.28	2057	2	L	10
2	10	Prabesh Gate	1+020	Gaidakot 2		14				0	2065	2	R,L	
3	83	Prabesh Gate	18+670	Rajhar 5 faram	7	14				0	2062	2	L	14
4	118	Arm police Industrial protection Aaudhyogik Chetra)ko Sandri Post	23+190	Devchuli 13 Daldale	1	16	1	2.5	2.3	5.75	2070	2	L	18
5	119	Sastra Prahari Office Ghar	23+190	Devchuli 13 Daldale	1	16	1	11.7	8.9	104.1	2070	1	L	20
6	142	Prahari Entry Post	30+900	kawasoti 1 Thala Tole	7	3	1	3	3	9	2072	2	L	11
7	143	Elaka Prahari Karyalaya Nawalpur ko Office Ghar	30+900	kawasoti 1 Thala Tole	7	3	1	5.4	3.4	18.36	2070	2	L	15
8	144	Elaka Prahari Karyalaya Nawalpur Post	30+900	kawasoti 1 Thala Tole	7	3	1	2	2	4	2070	2	L	11
9	145	Elaka Pra. Ka Ko Durga Mandir	30+940	kawasoti 1 Thala Tole	7	10	1	3	3	9	2041	2	L	14
10	146	Pratikshyalaya	30+915	kawasoti 1 Thala Tole	7	11	1			0	2068	2	R	13
11	243	E.Pra.Ka Nayabelhani ko Mandir	60+040	Dumkibas 1	3	10	1	4	3	12	2060	2	R	19.5
12	244	E.Pra.Ka Nayabelhani ko Pratikshyalaya	60+060	Dumkibas 1	3	3	1			0	2060	2	R	22
13	276	Nepal Prahari Asthai Bit	67+320	Dumkibas 5 Daunneko	1	3	1	8.5	3.5	29.75	2071	2	R	5
14	287	Prabesh Gate	75+400	Badeghat 4 Kisiyan Chowk	7	14				0		2	L,R	5
15	335	Prahari Bit	82+670	Tilakpur 5 Baasbasahi	7	3	1			0	2062	2	R	12
16	356	Prabesh Gate	85+360	Ramnagar 1 Bhumahi	7	14				0		2	L	8
17	380	Elaka Prahari Karyalaya Sunbal ko	91+080	Sunbal 1 Somnath	8	3				0	2072	2	R	21

S.N	Form S. N.	Description of structure	Chanage	Address	Present use	Structure Type	No of Story	Total Area of Structure			Built year	Affected Types	R/L	Center Line
								L (m)	B(m)	Sqm				
		Pratikshyalaya												
18	381	Elaka Prahari Karyalaya Post	91+090	Sunbal 1 Somnath	3	3	1	2	2	4	2062	2	R	21
19	399	Traffic Police Post Sunbal	92+410	Sunbal 1	1	3	1	8.5	4	34	2065	2	R	22
20	465	Sadak ko bich ma raheko Prabesh Gate	110+475	Butwal 9 Ramnagar	7	14				0		2		6
21	467	Sadak Dastur Sankalan Kendra Office+Quarter	110+785	Butwal 9 Ramnagar	7	3	1	10	3	30	2071	2	R	21.5
22	473	Check Post	112+300	Butwal 12 Ramnagar	7	3	1	2	2	4	2070	2	R	15
23	488	Sadak ko bich ma raheko Prabesh Gate	113+345	Butwal 10 Sukkhanagar	7	14				0		2	L	6
24	490	Nepal Electricity Pale Ghar	113+400	Butwal 13 Chauraha	7	16		2.2	1.1	2.31	2050	2	R	24

Types of structure: 1- Residential, 2-Commercial, 3- Community , 4- Shed, 5- toilet, 6- wall, 7- Empty House/ hut, 8- Kitchen, 9-Community res, 10- Temple, 11- Waiting shed ,12- Public tap,13- Well/ tubewall,14- Gate, 16- Different status& Park, 1&2 - Res+ Commercial, 4& 6- Wall& gate etc

Roof Type : 1- Slate 2- Zink sheet, 3-RRC Dhalan, 4- Straw, 6- Tripal

Wall Type: 1-Stone & mud mortar plaster by Mud, 2- Stone & mud mortar plaster by Cement, 3-Stone and cement mortar by cement plaster, 4- Bricks & cement mortar by cement plaster, 5- Bamboo& wood, 6- Zink sheet, 7-stone , mud, wood and Zink sheet , 8- Zink sheet & wood, 9- Block , 10-Stone cement, and metal pipe mix

Use: 1-Self settlement, 2 -Commercial, 3- Res+ Commercial, 4- Rented , 5- under construction, 6-Empty house, 7- common uses, 8- etc

Affected Situation: 2 Fully, 1- Partially

APPENDIX 6: LAND AND STRUCTURE VALUATION METHODOLOGY

Comparative Cost Analysis for affected land of Narayanghat- Butwal Sub- Project Public consultation and government rate of the affected areas

SN	Place of consultation	Land rate received from Consultation (NRs.) Sqm	Government Rate (NRs) Sqm
1	Chournara /old name Tamshariya	15,812	5,315.53
2	Kawaswati/Sisrawar	16,765	5,463
3	Devchuli/Pargatinagar	18,718	6,496
4	Rajahar	10,859	5,120
Average Cost per Sqm		15,538.5	5,598.6325
Proposed estimated cost per Sq m of land In NRs		15,500.00	

Note: Government rate determined by Land Revenue Office (LRO) of the project road districts 2071/72

Comparative Cost Analysis for affected structures of Narayannghat- Butwal Sub- Project

SN	Place of consultation	Rate received from Consultation (NRs.)	Government Rate (NRs)
1	Gaindakot	2,150	1,800
2	Kawaswati	2,038	
3	Devdaha	2,500	
4	Daunne	1,800	
5	Devchuli / Rajahar	2,250	
Average Cost per Sqft		2147.6	
Proposed estimated cost per Sqft.			2,120

APPENDIX 7: TERMS OF REFERENCE FOR SOCIAL SAFEGUARD CONSULTANT

A. Social Safeguard (4 national experts, 68 person-months)

1. The Consultant will assist the Project Executing Agencies (PEAs) in implementing resettlement plans (RPs) and other social mitigation plans of transport projects in Nepal. The Consultant will:

- (i) Assist the PEAs and Chief District Officer for land acquisition.
- (ii) Develop resettlement and rehabilitation (R&R) information campaigns and community participation.
- (iii) Assist the Project Affected Persons (APs), especially from indigenous people, vulnerable groups, in resettlement and rehabilitation, including redressing grievances, and coordination with local authorities and other relevant institutions.
- (iv) Calculate detailed costs of all land acquisition, income restoration and resettlement components.
- (v) Update the database of APs and their entitlements for implementation and monitoring purposes.
- (vi) Monitor and evaluate progress and achievement of resettlement objectives.
- (vii) Conduct a needs assessment of livelihood training options among vulnerable households and implement the livelihood training program.

2. The administrative responsibilities of the Consultant will include:

- (i) Working in co-ordination with the dedicated Resettlement Officer (RO) and Executive Engineers in the respective Divisional level Implementation Cells.
- (ii) The Consultant shall help to promote good working relationships between the APs and the PEAS, particularly the RO. This will be achieved through regular meetings with both the RO and the APs. Meetings with the RO will be held at least fortnightly, and meetings with the APs will be held monthly, during the entire duration of the assignment. All meetings and decisions taken shall be documented by the consultant.
- (iii) Preparing monthly action plans with targets in consultation with the RO.
- (iv) Assisting the RO in carrying out the implementation of the RPs.
- (v) Updating the database of APs and their entitlements.
- (vi) In consultation with the APs, preparing micro-level plans indicating the categories of entitlement, alternative livelihood options, and relevant institutions for obtaining additional training and support. Women's perceptions are important to be incorporated in the development of these plans.
- (vii) Reporting to the RO on a monthly and quarterly basis. The report should include physical and financial progress, both in quantitative and qualitative terms. The report should prominently feature the problems and issues addressed and tackled with the APs and the solutions found. The report should have a separate chapter on women's issues, their problems and what has been done (within the framework of the RP) to ensure their participation in decision-making as well as the options made available to them to access economic opportunities, marketing and credit. The report should clearly indicate the number of field visits made by the Consultant staff and the outcome of consultations with people.

3. Identification of APs and verification of database from RPs:
 - (i) The Consultant shall establish rapport with PAPs, consult with and provide information to them about the respective entitlements as proposed under the RPs, and distribute identity cards to the eligible APs. The identity card should include a photograph of the PAP, the extent of loss suffered due to the Project, and the choice of the PAP with regard to the mode of compensation and assistance.
 - (ii) During the identification and verification of the eligible APs from RPs, the Consultant shall ensure that each of the APs are contacted and consulted either in groups or individually. The Consultant shall ensure consultation with women from the PAP families especially from women headed households.
 - (iii) Participatory methods should be adopted in assessing the needs of the APs, especially with regard to the vulnerable groups of APs. The methods of contact may include village level meetings, gender participation through group's interactions, and individual meetings and interactions.
 - (iv) The Consultant shall verify the information already contained in the RPs and make suitable changes if required. Verification shall include actual measurement of the extent of total property loss/damage, and valuation of the loss/damage/affect along with the RO. The Consultant shall display the list of eligible APs in prominent public places like villages, local administrative offices, schools, and the District Headquarters.
4. Counseling the entitled persons:
 - (i) The Consultant shall explain to the APs the provisions of the policy and the entitlements under the RP. This shall include communication to the roadside squatters and encroachers about the need for their removal, the timeframe for their removal and their entitlements.
 - (ii) The Consultant shall disseminate information to the APs on the possible consequences of the Project on the communities' livelihood systems and the alternatives available to them.
5. For disbursing the Resettlement Assistance:
 - (i) The Consultant shall assist the PEAS in ensuring a smooth transition (during the part or full relocation of the APs), helping the APs to take salvaged materials and shift. In close consultation with the APs, the Consultant shall inform the RO about the shifting dates agreed with the APs in writing and the arrangements desired by the APs with respect to their entitlements.
 - (ii) The Consultant shall assist the APs in opening bank accounts explaining the implications, the rules and the obligations of a joint account and how s/he can access the resources s/he is entitled to.
 - (iii) The Consultant shall ensure proper utilization of the R&R budget available for the package.
 - (iv) The Consultant shall ensure that economic investment options be available to APs to restore their losses of land and other productive assets. The Consultant shall advise the RO to disburse the entitlements to the eligible persons/families in a manner that is transparent, and shall report to the PEAS on the level of transparency achieved in the project.
6. Accompanying and Representing the APs at the Grievance Committee Meetings

- (i) The Consultant shall nominate a suitable staff member to be a member of the Grievance Redress Committees (GRCs) for the respective contract packages.
- (ii) The Consultant shall help the APs in filling the grievance application and in clearing their doubts about the required procedures.
- (iii) The Consultant shall record the grievance and bring it to the notice of the GRCs within seven days of receipt of the grievance from the APs. It shall submit a draft resolution with respect to the particular grievance of the PAP, suggesting multiple solutions, if possible, and deliberate on the same in the GRC meeting through the Consultant representative in the GRC.
- (iv) The Consultant shall accompany the APs to the GRC meeting on the decided date, help the AP to express his/her grievance in a formal manner if requested by the GRC and again inform the APs of the decisions taken by the GRC within 3 days of receiving a decision from the GRC. (The time frame for the GRC to take a decision is 15 days).

7. Assisting eligible APs to take advantage of the existing Government Housing and Employment Schemes, if available.

- (i) Establish linkages with the district administration to ensure that the APs are benefited from the schemes available and those they are entitled to. The focus for this component of the Consultant work shall be the vulnerable APs for their income restoration. The Consultant shall maintain a detailed record of such facilitation.
- (ii) Identify, design and conduct training programmes on alternative methods of livelihood restoration using local skills and resources.

8. Inter-Agency Linkages for Income Restoration and other R&R Services

- (i) The Consultant shall be responsible for establishing linkages with financial institutions to assist the APs to access credit, if possible.
- (ii) Training institutes to impart skills and management training for enterprise creation and development.
- (iii) Coordinate with the PEAS field level officers to facilitate consultation on rehabilitation of borrow areas.

9. Recommending Improvement of R&R Services

- (i) Recommend and suggest techniques and methods for improvement of services extended by the concerned government departments and other agencies and committees in disbursement/extension of R&R services in the Project.
- (ii) Discuss, with the PEAS on contingency management and other improvement of R&R services, within the Project period.

APPENDIX 8: TERMS OF REFERENCE FOR THE EXTERNAL MONITOR

1. The external monitor will conduct a bi-annual assessment of the resettlement plan process, performance, outputs and outcomes and its compliance with ADB's SPS. The key tasks to be conducted for this purpose are the following:

A. Key tasks

a. Data verification:

- Verification of the internal monitoring data from the implementation Supervision Consultant (SC)'s resettlement team and DOR project implementation unit (PIU)
- Verification of the baseline monitoring data
- Verification of the data/official documentation from the Deputy Commissioners offices (CDO) and land revenue offices.
- Verification of Compensation Determination Committee (CDC) pricing methods
- Direct verification with affected persons – of compensations and/or resettlement assistance received

b. Assessment of RP process:

- Assessment of performance of internal monitoring system
- Assessment of the performance of the RP implementation team
- Assessment of performance of Grievance Redress Mechanism (GRM) or other complaint resolution system set up by the project
- Assessment of information disclosure and consultation process
- Assessment of implementation of Income and Livelihood Training Program
- Assessment of RP implementation compliance with ADB's Safeguards Policy Statement
- Provide recommendations and corrective actions if necessary

c. Assessment of RP performance

- Setting up parallel, sample baseline and monitoring system for post-project RP impact verification
- Conduct satisfaction survey of the resettlement process
- Assess whether RP and livelihood training objectives have been met; especially whether livelihoods and living standards have been restored or enhanced;
- Evaluation of change in living standards pre/after resettlement process: assess whether the resettlement entitlements were appropriate in meeting the objectives, and whether the objectives were suited to AP conditions.
- Provide recommendations and corrective actions if necessary
- Compiling of lessons-learned and best practices of RP design and implementation for future resettlement plans

B. Methodology

2. The external monitor will identify and select a set of appropriate process, output and outcome indicators and gather information on them to substantiate its assessment. This exercise will require formal and informal surveys, field level verification and consultation with affected persons. A combination of the following quantitative and qualitative methods should be used:

- **Sample Affected Household Survey:** a sample baseline of affected household survey (at least 20%) and representative (of different categories such as titled and non-titled, vulnerable, etc...) will be gathered to obtain information on the key indicators of entitlement delivery, efficiency, effectiveness, impact and sustainability;
- **Focus Group Discussion (FGD):** Consultation with a range of stakeholder groups (local Government, resettlement field staff, community leaders and APs including women and vulnerable groups);
- **Key Informant Interviews:** Consultation with individuals like local leaders, village workers or persons with special knowledge or experience about resettlement activities and implementation;
- **Public Consultation Meetings:** Public consultation meetings at resettlement sites to elicit information about performance of various resettlement activities;
- **Structured Direct Observations:** Field observations on status of resettlement implementation, plus individual or group interviews for crosschecking purposes;
- **Informal Surveys/Interviews:** Informal surveys of APs, host village, workers, resettlement staff, and implementing agency personnel using non-sampled methods; and
- In the case of special issues, in-depth case studies of APs and host populations from various social classes will be undertaken to assess impact of resettlement.

C. Outputs

- **2 independent review reports per year:** to be developed for each year of the RP implementation. The reports should include (i) assessment of the RP implementation process (process and output/outcome indicators); (ii) compliance status with ADB's SPS; (iii) Corrective action plans and recommendations. These reports will be submitted to the project director (DoR project implementation unit) and ADB simultaneously.
- **Post-Completion RP Evaluation Report:** to be conducted within 6 months of the completion of the RP implementation process. This should include: (i) overall assessment of RP implementation process; (ii) assessment of RP outcomes; (iii) implementation of corrective action plans; (iv) lessons-learned and best practices. This report will be submitted to the project director (DOR project implementation unit) and ADB simultaneously.

D. Institutional Arrangements

3. The external monitor will be recruited by DoR. DoR's project implementation unit and in particular its project director, will facilitate access to the internal monitoring system, the SC resettlement team and affected persons and will serve as liaison for data to be checked with the Deputy Commissioners' offices in the districts concerned by the project.

E. Qualifications, Experience and Inputs of Experts and Staff (National)

4. The external monitor agency should have at least master degree in sociology, anthropology or other social development studies, and at least 5 years experience in resettlement activities in Nepal. They should have experience in resettlement activities for project financed by multi-lateral development banks, such as the Asian Development Bank (ADB) or the World Bank (WB). He or she should be proficient in English and have good writing skills.

Appendix 4 – Gender Equity and Social Inclusion Plan

FOR REFERENCE ONLY

Annex 2: Gender Equity and Social Inclusion Plan for Narayanghat - Butwal Road (Section – 2) from Km 65+000 to Km 113+535

Activities	Indicators and Targets ^a	Responsibility	Time Frame
Output 1. Roads upgraded to all weather standard with strong local community participation			
1. Engage women and those from disadvantaged groups in compensatory tree plantation for afforestation along the KTRW buffer zone in coordination with community groups and local NGO.	40% of participant beneficiaries are from BPL (below poverty line) and/or ethnic/caste-based disadvantaged groups ^b . At least 50% are women (subject to availability of voluntary women). This may be inclusive of the BPL and disadvantaged groups.	DOR, NGO, CSC	Y1 – onwards
2. Conduct skill development trainings to become eco-guardians and partners in the protection of KTRW.	200 persons trained to become eco-guardians, at least 40% of which are women (subject to availability of voluntary women).	DOR, NGO, CSC	Y1 – onwards
3. Enjoin contractors to employ local labor, including women, in road upgrading works ^c .	At least 10% local unskilled workers are women ^d (subject to availability of voluntary women). All women workers hired shall receive the same wages as their male counterparts, for the same work done.	DOR, CSC, Contractors	Y1 – onwards
4. Ensure participation of women and those from excluded groups in slope protection works through bioengineering especially for the hill roads.	At least 50% participation of women and those from poor and excluded groups in the training, awareness building and bioengineering related activities (subject to availability of voluntary women). At least 30% of those who will benefit with increased income through selling the plants are women and those from excluded groups.	DOR, NGO, CSC	Y1 – onwards
5. Ensure that contract documents prohibit the hiring of child labor.	Explicit provision prohibiting child labor is evident in project contracts.	DOR, CSC, Contractors	
6. Ensure that negative impact on vulnerable female-headed households due to road construction is mitigated.	Entitlement matrix contains additional mitigation measures as special provisions for indigenous groups and female headed households. All affected FHH directly benefit from appropriate provisions and mitigation measures provided in the combined IPP and RP.	DOR	Y1 – onwards

Annex 2: Gender Equity and Social Inclusion Plan for Narayanghat - Butwal Road (Section – 2) from Km 65+000 to Km 113+535

Activities	Indicators and Targets ^a	Responsibility	Time Frame
7. Conduct HIV/AIDS, STI and Human Trafficking awareness-raising campaigns for project communities and contractor's field personnel.	At least 50% of participants from local communities are women All contractors' field personnel participate in the awareness-raising campaigns	DOR, CSC, NGO	Y1 – onwards
8. Ensure women's participation in community orientation and road safety awareness programs.	At least 40% of the 2,000 targeted participants of 20 awareness-raising seminars will be women.	DOR, CSC	Y1
Output 2: Improved capacity of DOR, DTM, and RBN in road maintenance management.			
1. Appoint a full time social and GESI consultant at DOR.	Effective social and gender GESI focal officer engaged at the DOR throughout project period.	DOR	Y1 – onwards
2. Finalize the GESI guidelines for the road sector	Finalized and adopted GESI guidelines for strategic roads development	DOR, International Consultant	Y1 – onwards
3. Train staff of DOR, Regional Directorate, Divisions, contractors and other relevant organizations and NGOs, on gender and social inclusion using MPIT GESI guidelines developed with ADB's assistance and project-specific GESI elements.	At least 6 training sessions will be carried out in five regions and centre which will include gender focal points and women staff.	DOR, CSC, GESI consultants	Y1 – onwards

AIDS = acquired immune deficiency syndrome, CSC = construction supervision consultant, DOR = Department of Road, FHH = female-headed household, GESI = gender equality and social inclusion, HIV = human immunodeficiency virus, IPP = indigenous peoples plan, KTWR = Koshi Tappu Wildlife Reserve, MPIT = Ministry of Physical Infrastructure and Transport, NGO = nongovernment organization, RP = resettlement plan, STI = sexually transmitted infections, Y = year.

^a Targets are based on the approximately 32,000 households in the project influence area, 36% or 11,520 of which are indigenous households, and 27% or 8,640 of which are below-poverty-line (BPL) households.

^b Vulnerable and disadvantaged groups include ethnic and caste-based disadvantaged groups, indigenous groups, people living below the poverty line, and women headed households.

^c Approximately 70,000 person-days of employment will be generated for local disadvantaged groups, and women, employed in road construction, maintenance and bioengineering slope protection activities.

^d Approximately 2,000 skilled and unskilled workers will be employed for road works. The exact number of unskilled workers that will be hired will be determined when contractors submit their proposals.

FOR REFERENCE ONLY

Section 9 - Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

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FOR REFERENCE ONLY

Letter of Acceptance

[on letterhead paper of the employer]

..... date.

To: *name and address of the contractor*

Subject: *Notification of Award Contract No.*

This is to notify you that your Bid dated *date* for execution of the *name of the contract and identification number, as given in the Bid Data Sheet* for the Accepted Contract Amount of the equivalent of *amount in figures and words and name of currency*, as corrected and modified in accordance with the Instructions to Bidders is hereby accepted by our Agency.

You are requested to furnish the Performance Security within 28 days in accordance with the Conditions of Contract, using for that purpose the Performance Security Form included in Section 9 (Contract Forms) of the Bidding Document.

Authorized Signature:

Name and Title of Signatory:

Name of Agency:

Attachment: Contract Agreement

Contract Agreement

THIS AGREEMENT made the day of, between *name of the employer*. (hereinafter "the Employer"), of the one part, and *name of the contractor*. (hereinafter "the Contractor"), of the other part:

WHEREAS the Employer desires that the Works known as *name of the contract*. should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects therein.

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
 - (a) the Contract Agreement,
 - (b) the Letter of Acceptance,
 - (c) the Letter of Technical Bid,
 - (d) the Letter of Price Bid,
 - (e) the Variation Nos *insert variation numbers if any*.
 - (f) the Particular Conditions of Contract – Part A,
 - (g) the Particular Conditions of Contract – Part B,
 - (h) the List of Eligible Countries that was specified in Section 5 of the Bidding Document
 - (i) the General Conditions of Contract,
 - (j) the Specifications,
 - (k) the Drawings,
 - (l) the completed Schedules including Bill of Quantities, and
 - (m) Tables of Adjustment Data
3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of *name of the borrowing country*. on the day, month and year indicated above.

Signed by

Signed by.....

for and on behalf of the Employer
in the presence of

for and on behalf the Contractor
in the presence of

Witness, Name, Signature, Address, Date

Witness, Name, Signature, Address, Date

FOR REFERENCE ONLY

Supplementary Appendix to the Contract Agreement

CONTRACT NO. _____

SIGNED BETWEEN *[Name of the Executing Agency]* and *[Name of the Agency/ Contractor]* for the *[Name of the Contract]* on _____ *[Date]* _____.

CONFIRMATION OF MOBILIZATION OF KEY STAFF AND EQUIPMENT

Pursuant to the above referred contract signed between the two parties, it is reconfirmed by *[Name of the Agency/ Contractor]*, that the key staff and equipment indicated in the **Section 6 Employer's Requirement** will be deployed in the field duration of the contract including any mutually agreed extended date of completion of the contract. This **Supplementary Appendix** shall be read in conjunction with the main contract.

It is further confirmed by *[Name of the Agency/ Contractor]* that the key staff and equipment will not be demobilized from the project site without the specific approval of the Engineer. Any demobilization will only be due to reasons beyond the control of *[Name of the Agency/ Contractor]* and approval of the Engineer.

In case, some staff is allowed to proceed on leave, *[Name of the Agency/ Contractor]* will provide alternate field staff acceptable to the Engineer during the absence of the original mobilized staff. Such leave may be planned with the status of physical progress and construction schedule.

Similarly, in case of any or some of the equipment are not in working condition or are being subject to repairs or routine maintenance, *[Name of the Agency/ Contractor]*, will mobilize alternate at the earliest and without affecting the progress of the contract.

The Engineer or his authorized representative will review every fortnight the status of mobilization of key staff and equipment. In case non-compliance is observed consistently over a period of 30 days, the Engineer will take remedial action as per the provisions of the Contract.

Authorized Representative of the Executing Agency

Authorized of the Agency/ Contractor

FOR REFERENCE

Performance Security

..... Bank's name, and address of issuing branch or office¹

Beneficiary: Name and address of employer

Date:

Performance Guarantee No.:

We have been informed that name of the contractor. (hereinafter called "the Contractor") has entered into Contract No. reference number of the contract. dated with you, for the execution of name of contract and brief description of works. (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we name of the bank. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of name of the currency and amount in figures² (..... amount in words.) such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the Day of,³, and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458 (or ICC Publication No. 758 as applicable), except that subparagraph (ii) of Sub-article 20(a) is hereby excluded.⁴

.....
Seal of Bank and Signature(s)

Note to Bidder

If the institution issuing the performance security is located outside the country of the employer, it shall have a correspondent financial institution located in the country of the employer to make it enforceable.

¹ All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

² The guarantor shall insert an amount representing the percentage of the contract price specified in the contract and denominated either in the currency(ies) of the contract or a freely convertible currency acceptable to the employer.

³ Insert the date 28 days after the expected completion date. The employer should note that in the event of an extension of the time for completion of the contract, the employer would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [6 months][1 year], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."

⁴ Or the same or similar to this clause specified in the Uniform Rules for Demand Guarantees, ICC Publication No. 758 where applicable.

Advance Payment Security

.....*Bank's name, and address of issuing branch or office*¹

Beneficiary:*Name and address of employer*

Date:

Advance Payment Guarantee No.:

We have been informed that *name of the contractor* (hereinafter called "the Contractor") has entered into Contract No. *reference number of the contract* dated with you, for the execution of *name of contract and brief description of works* (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum *name of the currency and amount in figures*² (..... *amount in words*) is to be made against an advance payment guarantee.

At the request of the Contractor, we *name of the bank* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *name of the currency and amount in figures*³ (..... *amount in words*) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number *Contractor's account number* at *name and address of the bank*

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that ninety percent (90%) of the Contract Price has been certified for payment, or on the ... day of,⁴, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458 (or ICC Publication No. 758 as applicable).

.....
Seal of Bank and Signature(s)

Note to Bidder

If the institution issuing the advance payment security is located outside the country of the employer, it shall have a correspondent financial institution located in the country of the employer to make it enforceable.

¹ All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

² The guarantor shall insert an amount representing the amount of the advance payment denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the employer.

³ Footnote 2.

⁴ Insert the expected expiration date of the time for completion. The employer should note that in the event of an extension of the time for completion of the contract, the employer would need to request an extension of this guarantee from the guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the employer might consider adding the following text to the form, at the end of the penultimate paragraph: "The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [6 months][1 year], in response to the Employer's written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee."