

**Asian Development Bank (ADB) Assisted
Delhi Water Supply Improvement Investment Program**

**BIDDING DOCUMENT
For
Procurement
of**

**DWSIIP / 04: Transmission System Improvement and Construction of Clear Water
Reservoirs & Pumping Stations for Wazirabad WTP Command area including
SCADA & Instrumentation**

Under International Competitive Bidding

(Following ADB's single stage two envelope bidding procedure)

Technical Bid - VOLUME 1

SECTION 1- 9



Executing Agency:

**Delhi Jal Board,
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Jhandewalan
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**Technical Bid –Volume 1
(Part I – Bidding Procedures, Part II – Employer's Requirements
and Part III - Conditions of Contract and Contract Forms)**

Issued on: 29-11-2019

Invitation for Bids No.: NIT No. 01 (2019-20)

ICB No.: DWSIIP/04

Employer: Delhi Jal Board

Country: India

Preface

This Bidding Document for the Procurement of Works has been prepared by Delhi Jal Board (DJB) and is based on the Standard Bidding Document for the Procurement of Works (SBD Works) issued by the Asian Development Bank dated December 2016. The Bidding Document has been modified to include GCC template from FIDIC Gold Book.

ADB's SBD Works has the structure and the provisions of the Master Procurement Document entitled "Bidding Documents for the Procurement of Works", prepared by multilateral development banks and other public international financial institutions, except where ADB-specific considerations have required a change.

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This Section contains the general clauses that govern the Contract. These General Conditions shall be the Conditions of Contract for Design, Built and Operate Contracts prepared by the Fédération Internationale des Ingénieurs-Conseil or FIDIC (FIDIC 2008) FIDIC Gold Book. These Conditions are subject to the variations and additions set out in Section 8 (Particular Conditions of Contract).

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

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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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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

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.

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 audited by auditors appointed by ADB.

3.2 Furthermore, Bidders shall be aware of the provision stated in clause 15.6 of the Particular 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, incorporated, or registered, 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 ITB 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,

5.1 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries as

Equipment and Services

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 recognize 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 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 not 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
Declaration**

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 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 not 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

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| 26. Confidentiality | <p>26.1 Information relating to the examination, evaluation, comparison, and post qualification 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.</p> <p>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.</p> <p>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.</p> |
| 27. Clarification of Bids | <p>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.</p> <p>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.</p> |
| 28. Deviations, Reservations, and Omissions | <p>28.1 During the evaluation of Bids, the following definitions apply:</p> <ul style="list-style-type: none"> (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 | <p>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.</p> <p>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</p> |

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 omission.

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.

Section 2 - Bid Data Sheet

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

A. General

ITB 1.1	The number of the Invitation for Bids (IFB) is: NIT No. 01 (2019-20)
ITB 1.1	<p>The Employer is:</p> <p>Delhi Jal Board (DJB)</p> <p>The authorized representative of the Employer is:</p> <p>Project Manager, DWSIIP Executive Engineer (EAP) -III Delhi Jal Board, Overhead Tank, Ashok Vihar, Delhi-110052, India</p>
ITB 1.1	<p>The name of the international competitive bidding (ICB) is:</p> <p>Transmission System Improvement and Construction of Clear Water Reservoirs & Pumping Stations for Wazirabad WTP Command area including SCADA & Instrumentation</p> <p>The identification number of the ICB is: DWSIIP/04</p> <p>The number and identification of lots comprising this ICB is: One</p>
ITB 1.2	<p>Remove para a and replace with the following:</p> <p>(a) the term “in writing” means communicated in written form (e.g. by mail, email, fax, distributed or received through electronic procurement system used by the Employer) and delivered against receipt.</p>
ITB 1.3	<p>Insert ITB 1.3 after ITB 1.2:</p> <p>The Employer shall use the below website: https://www.delhijalboard.nic.in to manage the following aspects of this bidding process</p> <ol style="list-style-type: none"> i. Clarification(s) to the Bidding Documents, in accordance with ITB 7.1 ii. Transmission of the Minutes of the pre-Bid Meeting, in accordance with ITB 7.6 iii. Issuance of Addendum or addenda, in accordance with ITB 8.2

ITB 2.1	The name of the Project is Delhi Water Supply Improvement Investment Program (DWSIIP)
ITB 2.1	The Borrower is: India
ITB 6.1	<p>Add following at end of ITB 6.1:</p> <p>The Bidding Document is in Two Parts.</p> <p>Part 1 is for Technical bid. Part 1 is in 5 Volumes. Volume 1 includes Section 1 to 6 and Section 7, 8 & 9. Volume 2 includes Standard Specifications; Volume 3 includes Particular Specifications; volume 4 includes Drawings, Volume 5 includes Quality assurance & Quality control manual and Safety manual;.</p> <p>Part 2 is for Volume 6 Price Bid which includes Price Bid form, Preamble to Bill of Quantities and Bill of Quantities. .</p>

B. Contents of Bidding Documents

ITB 7.1	<p>For <u>clarification purposes</u> only, the Employer's address is:</p> <p>Attention:</p> <p>Project Manager, DWSIIP, Executive Engineer (EAP) -III Street Address: Delhi Jal Board, Overhead Tank, City: Ashok Vihar , Delhi ZIP code: 110052 Country: India Telephone: +91 011 27301179 E-mail: djbeap3@gmail.com</p> <p>The Employer shall publish its response at the Employer's website indicated in ITB 1.3 of the BDS</p>
ITB 7.4	<p>A Pre-Bid meeting shall take place.</p> <p>Date: 20-12-2019</p> <p>Time: 11:00 Hrs</p> <p>Place: Conference Hall , Varunalaya Phase –II Karol Bagh, Delhi-110005, India</p> <p>A site visit conducted by the Employer shall be organized. Date: 20-12-2019</p> <p>Time: 14:30 Hrs (Meeting point – to be decided during pre-bid meeting)</p>

ITB 7.6	<p>Add the following at end of ITB 7.6 :</p> <p>The Employer shall publish the Minutes of the Meeting at the Employer's website indicated in ITB 1.3 of the BDS</p>
ITB 8.2	<p>Add the following at end of ITB 8.2:</p> <p>The Employer shall publish the Addendum or addenda at the Employer's website indicated in ITB 1.3 of the BDS.</p> <p>The Employer should not be faulted for bidder's failure to download the addendum or addenda.</p>

C. Preparation of Bids

ITB 10.1	The language of the Bid is: English
ITB 11.2 (g)	<p>The Bidder shall submit with its Technical Bid the following additional documents:</p> <ul style="list-style-type: none"> • Power of Attorney in original duly attested by Notary. In case of partnership firm / limited company / group of companies, a power of attorney for the person authorized to sign shall be issued by all the partners. • Cost of Bid document (Tender Fee) – Demand Draft • Indian Firms- GST Number as issued by GST department. However International bidder will submit GST registration after award of work.
ITB 11.3 (d)	<p>The Bidder shall submit with its Price Bid the following additional documents:</p> <p>Form TECH -1: Guaranteed Electrical Power Consumption</p> <p>Schedule of Payment Currencies</p> <p>Tables of Adjustment Data</p>
ITB 12.1	The units and rates in figures entered into the Bill of Quantities and Daywork Schedule should be type written or if written by hand, must be in print form. Bill of Quantities and Daywork Schedule not presented accordingly may be considered 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: None
ITB 14.2	Unit rates and prices for all items of the Works described in the Bill of Quantities shall be expressed in positive values. If unit rates and prices are expressed in negative values, the bid will be rejected
ITB 14.5	<p>The prices quoted by the Bidder shall be adjustable.</p> <p>The formula for adjusting the prices and explanatory details are specified in GCC Clause 13.8. Bidder shall fill out the Tables of Adjustment in Section 4 (Bidding Forms)</p>
ITB 15.1	The unit rates and the prices shall be quoted by the Bidder in Indian Rupees (INR) plus upto three foreign currencies.
ITB 15.4	The rates of exchange shall be the selling rates 28 days prior to the deadline for submission of bids published by: Reserve bank of India (www.rbi.org.in) or agency authorized by Reserve bank of India.
ITB 18.1	The bid validity period shall be 180 days.
ITB 19.1	The Bidder shall furnish a bid security in the amount INR 27.04 Millions only.
ITB 19.2	Not Applicable
ITB 19.3	<p>Replace ITB 19.3 with the following:</p> <p>The Bid Security shall be in the form of:</p> <p>Unconditional Bank Guarantee in the name of Project Manager, DWSIIP, all from a reputable source from an eligible country.</p> <p>The bid security shall remain valid for 4 weeks beyond the original validity period for the bid, and beyond any period of extension subsequently requested.</p> <p>In the case of a bank guarantee, the bid security shall be submitted using the Bid Security Form included in Section 4 (Bidding Forms).</p> <p>The bank guarantee shall be issued by a reputable bank, which may</p>

	include scheduled banks or nationalized banks of Employers country or a foreign bank through a correspondent bank located in India to make it enforceable.
ITB 19.4	<p>Replace ITB 19.4 with the following:</p> <p>Subject to the succeeding sentences, any bid not accompanied by an irrevocable and callable bid security shall be rejected by the Employer as nonresponsive. If a Bidder submits a bid security that (i) deviates in form, amount, and/or period of validity, or (ii) does not provide sufficient identification of the Bidder (including, without limitation, failure to indicate the name of the Joint Venture or, where the Joint Venture has not yet been constituted, the names of all future Joint Venture Partners), the Employer shall request the Bidder to submit a compliant bid security within 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.</p>
ITB 20.1	<p>In addition to the original Bid, the number of copies are :</p> <p style="text-align: center;">Technical Bid – 2 Nos. hard copies and one soft copy in CD Price Bid – None</p> <p>Bidder shall print/provide continuous page numbers to the documents submitted in each envelope. Bidder shall also submit the Bid Document, Corrigendum & Addendum as issued duly signed and stamped along with their technical bid</p>
ITB 20.2	<p>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.</p>
ITB 20.2	<p>The Bidder shall submit an acceptable authorization within Forteen (14) days.</p>

D. Submission and Opening of Bids

ITB 21.1	Bidders shall not have the option of submitting bids electronically
ITB 21.1 (b)	Not applicable.
ITB 22.1	<p>The Bid submission should be at the address below:</p> <p>Office of the Project Manager - DWSIIP, Executive Engineer (EAP) -III, Delhi Jal Board, Over Head Tank, Ashok Vihar, Delhi- 110052, India. Telephone: +91 011 27301179.</p> <p>The deadline for bid submission is:</p> <p>Date: 10-02-2020</p> <p>Time: 15:00 Hrs</p>
ITB 25.1	<p>The opening of the Technical Bid shall take place at:</p> <p>Office of the Project Manager - DWSIIP, Executive Engineer (EAP) -III, Delhi Jal Board, Over Head Tank, Ashok Vihar, Delhi- 110052, India. Telephone: +91 011 27301179.</p> <p>Date: 10-02-2020</p> <p>Time: 15:15 hours</p>
ITB 25.5	The Letter of Technical Bid shall be initialed by three representatives of the Employer attending Bid opening.
ITB 25.6	<p>Add the following at end of ITB 25.6 :</p> <p>The Employer shall publish the record of the opening of the Technical Bids at the Employer's website indicated in ITB 1.3 of the BDS</p>
ITB 25.10	The Letter of Price Bid and Bill of Quantities shall be initialed by minimum three representatives of the Employer attending Bid opening.

E. Evaluation and Comparison of Bids

ITB 32.2	<p>Add the following at end of ITB 32.2:</p> <p>The qualifications of the other firms such as Bidder's subsidiaries, parent entities, affiliates, subcontractors shall be permitted. The bidder shall fill out the Affiliate Company Guarantee Form included in Section 4 (Bidding Forms) for each subsidiary, parent entity, affiliate etc. that the bidder submits for consideration of the Employer in determining its qualifications."</p>
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

	<p>single currency is: Indian Rupees (INR)</p> <p>The source of selling exchange rate shall be: Reserve Bank of India or agency authorized by Reserve Bank of India</p> <p>The date for the selling exchange rate shall be: 28 days prior to the deadline of Bid Submission.</p>
ITB 35.1	A margin of preference shall not apply.

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,

An alternative completion time will not be permitted..

1.3 Technical Alternatives

Technical alternatives, if permitted under ITB 13.4,
Technical alternatives will not be permitted.

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

Domestic Preference – Not Applicable.

1.6 Multiple Contracts

Not applicable

1.7 Operating & Maintenance Costs

In addition following Evaluation criteria shall apply:

The following evaluation methods for bid evaluated the “Lowest Evaluated Substantially Responsive Bid” shall be followed:

Since the full-operation and maintenance costs (i.e., once all the facility construction is complete and the entire project is brought under operation) of the facilities being procured form a major part of the life cycle cost of the facilities, these costs will be evaluated for 15 years and based on the performance characteristics of the pump and equipment proposed to be furnished by the Bidder as well as on past experience of the Employer or other employers similarly placed. Such costs shall be added to the bid price for evaluation.

Factors which will be used in calculating include:

- i. Cost of Operation & Maintenance of facilities during 10 Years of Operation & Maintenance following completion of commissioning and the trial operation period;
- ii. The estimated total cost of the electricity required at and consumed by the Pumps and equipment during the 10 Years of Operation & Maintenance including:
 - a. The power consumed by the Pumps and equipment supplied as a part of the facilities, based on calculations of the operating efficiencies and power consumption of all electrically-operated equipment under working condition.
 - b. The guaranteed Power Consumption.

- iii. The Evaluation shall further be considered as:

Based on the pumps & equipment selected, the bidder shall provide guaranteed power consumption (Total power requirement) during operation and maintenance period as per format of Tech-1 given under section 4. This guaranteed power consumption shall be multiplied by the current rate of electricity charges of Rs. 7.20 per KWh and shall be added to Present Value (PV) of (O&M) for each year and for the total duration of O&M period.

- iv. The rate at ten (10) percent per annum will be used to discount the O&M cost for each year for the life cycle period of 15 years.
- v. The life cycle cost as quoted by the Bidder for the 10 Years of O&M Period will be used to calculate the cost for Year 11 onwards till Year 15 (as O&M period is minimum taken as 15 years to take full benefit of LLC Concept and accommodating normal life on E&M Equipment's). For calculating Operational Cost for Year 11 onwards till Year 15, an average escalation factor of 8%, shall be used.

The O&M NPV cost plus power cost calculated as per the procedure stipulated above will be added to the Bid Price (Design Build costs) to obtain the Evaluated Bid Price upon which the decision for award of contract will be based.

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. However, bidder may avail Construction experience of parent company/subsidiary/affiliates and An undertaking from parent company/subsidiary/affiliates need to be submitted along with the bid to effect that A Parent Company guarantee in the sample form set out in the tender documents or in another form approved by the Employer shall be provided within 28 days after receiving the letter of acceptance".

Parent company:- A Parent company is a company that owns more than 50%of the outstanding voting stock in another/second company and controls management and

operation of second company by influencing or electing its board of director, the second company being deemed a subsidiary of the parent company.

Affiliates: - Two companies are affiliated when both companies are subsidiaries of a third corporation.

2.1 Eligibility

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

2.1.1 Nationality

Nationality in accordance with ITB Sub clause 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 Sub clause 4.3.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
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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
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2.1.4 Government-Owned Entity

Bidder required to meet conditions of ITB Sub clause 4.5.	must meet requirement	must meet requirement	must meet requirement	not applicable	Forms ELI - 1; ELI - 2 with attachments
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2.1.5 United Nations Eligibility

Not having been excluded by an act of compliance with a United Nations Security Council resolution in accordance with ITB sub clause 4.7.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Technical Bid
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2.2 Pending Litigation and Arbitration

Pending litigation and arbitration criteria shall apply.

2.2.1 History of Non-Performing Contracts

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
Non-performance of a contract did not occur as a result of contractor default since 1st January 2015.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON - 1

2.2.2 Pending Litigation and Arbitration

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
All pending litigation and arbitration, if any, shall be treated as resolved against the Bidder and so shall in total not represent more than 50 (fifty) percent of the Bidder's net worth calculated as the difference between total assets and total liabilities.	must meet requirement by itself or as partner to past or existing Joint Venture	not applicable	must meet requirement by itself or as partner to past or existing Joint Venture	not applicable	Form LIT - 1

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 5 (FY2012/13-FY2017/18) years to demonstrate the current soundness of the Bidder's financial position. As a minimum, the Bidder's net worth for the last year calculated as the difference between total assets and total 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 INR 1285 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 may be asked to resubmit their current contract commitments and latest information on financial resources supported by latest audited accounts or 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 will be reassessed on this basis.

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
<p>For Single Entities:</p> <p>The Bidder must demonstrate that its financial resources defined in FIN - 3, less its financial obligations for its current contract commitments defined in FIN - 4, meet or exceed the total requirement for the Subject Contract of INR 214 Million or its equivalent</p>	must meet requirement	not applicable	not applicable	not applicable	Form FIN – 3 and Form FIN – 4
<p>For Joint Ventures:</p> <p>(1) One partner must demonstrate that its financial resources defined in FIN - 3, less its financial obligations for its own current contract commitments defined in FIN - 4, meet or exceed its required share of INR 86 Million or its equivalent from the total requirement for the Subject Contract. (40%)</p>	not applicable	not applicable	not applicable	must meet requirement	Form FIN – 3 and Form FIN – 4

AND					
(2) Each partner must demonstrate that its financial resources defined in FIN - 3, less its financial obligations for its own current contract commitments defined in FIN - 4, meet or exceed its required share of INR 54 Million or its equivalent from the total requirement for the Subject Contract. (25%) AND	not applicable	not applicable	must meet requirement	not applicable	Form FIN – 3 and Form FIN – 4
(3) The joint venture must demonstrate that the combined financial resources of all partners defined in FIN - 3, less all the partners' total financial obligations for the current contract commitments defined in FIN - 4, meet or exceed the total requirement for the Subject Contract of INR 214 Million or its equivalent	not applicable	must meet requirement	not applicable	not applicable	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 contract similar to the proposed works that has been successfully or substantially* completed within the last 10 years from the date of issue of tender notice. <i>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).</i>					
One Contract of the value of the Bidder's participation exceeds INR 1350 Million or its equivalent	must meet requirement	not applicable	not applicable	must meet requirement	Form EXP – 1 And Work Completion Certificate clearly indicating the works/quantities/ amounts performed that are related to the requirement.

- * A Project is deemed to be **Substantially** Completed when its facility and Components are atleast 95% Completed and ready to operate for the intended purpose.

2.4.2 Construction Experience in Key Activities

May be complied with by specialist subcontractors. The employer shall require evidence of the 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 requirement	must meet requirement ^a	not applicable	not applicable	Form EXP – 2 and Work Completion Certificate clearly indicating the works/quantities/ amounts performed that are related to the requirement
(i) Supply, delivery, laying, jointing, testing and commissioning of 1000 mm dia pressure pipe of DI / MS etc. in a minimum length of 2800 meters in a single contract in last 10 years	must meet requirement	must meet requirement	not applicable	not applicable	Form EXP – 2 and Work Completion Certificate clearly indicating the works/quantities/ amounts performed that are related to the requirement
(ii) Design, supply, installation, Testing and Commissioning of pumping systems, with a cumulative capacity of 500 KW and at least one of 150 KW for water supply projects in a single Contract in last 10 years.	must meet requirement	must meet requirement	not applicable	not applicable	Form EXP – 2 and Work Completion Certificate clearly indicating the works/quantities/ amounts performed that are related to the requirement

(iii) Experience in construction and commissioning of trenchless technology works of 1.0 kms or above in a single or multiple Contract and at least 1 (one) work of minimum 1000 mm diameter of the carrier pipe in Single stretch of 60 m minimum in a Contract in last 10 years.	must meet requirement	must meet requirement	not applicable	not applicable	Form EXP – 2 and Work Completion Certificate clearly indicating the works/quantities/ amounts performed that are related to the requirement
(iv) Participation in at least one contract that have been successfully completed within the last 10 years prior to the bid submission date, where in scope of works under the contract includes Design, Construction and Commissioning of Underground Reservoir for minimum capacity of 10 million liters”.	must meet requirement	must meet requirement	not applicable	not applicable	Form EXP – 2 and Work Completion Certificate clearly indicating the works/quantities/ amounts performed that are related to the requirement

- ^a In the case of a joint venture bidder, at least one of the partners must have the experience in the key activity if the bidder itself (not its subcontractor) will carry out the relevant activity.

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: *[insert complete name of the Employer]*

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, either individually or as partner in a Joint Venture, 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, Joint Venture partners, associates, parent company, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, are not subject to, or not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the Asian Development Bank or a debarment imposed by the Asian Development Bank in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the Asian Development Bank and other development banks.¹
- (h) Our firm, Joint Venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the Contract, are not, or have never been, temporarily suspended, debarred, declared ineligible, or blacklisted by the Employer's country, any international organization, and other donor agency.

¹ These institutions include African Development Bank, European Bank for Reconstruction and Development (EBRD), Inter-American Development Bank (IADB), and the World Bank Group. According to paragraph 9 of the Agreement, other international financial institutions may join upon the consent of all Participating Institutions and signature of a Letter of Adherence by the international financial institution substantially in the form provided (Annex B to the Agreement). Upon adherence, such international financial institution shall become a Participating Institution for purposes of the Agreement. Bidders are advised to check www.adb.org/integrity for updates.

If so debarred, declared ineligible, temporarily suspended, or blacklisted, please state details (as applicable to each Joint Venture partner, associate, parent company, affiliate, subsidiaries, Subcontractors, and/or Suppliers):

(i) Name of Institution: _____

(ii) Period of debarment, ineligibility, or blacklisting [*start and end date*]:

(iii) Reason for the debarment, ineligibility, or blacklisting:

- (i) Our firm's, Joint Venture partners, associates, parent company's affiliates or subsidiaries, including any Subcontractors or Suppliers key officers and directors have not been [*charged or convicted*] of any criminal offense (including felonies and misdemeanors) or infractions/violations of ordinance which carry the penalty of imprisonment.

If so charged or convicted, please state details:

(i) Nature of the offense/violation: _____

(ii) Court and/or area of jurisdiction: _____

(iii) Resolution [*i.e. dismissed; settled; convicted/duration of penalty*]:

(iv) Other relevant details [*please specify*]:

- (j) We understand that it is our obligation to notify ADB should our firm, Joint Venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers, be temporarily suspended, debarred or become ineligible to work with ADB or any other MDBs, the Employer's country, international organizations, and other donor agencies, or any of our key officers and directors be charged or convicted of any criminal offense or infractions/violations of ordinance which carry the penalty of imprisonment.
- (k) Our firm, Joint Venture partners, associates, parent company, affiliates or subsidiaries, including any Subcontractors or Suppliers, are not from a country which is prohibited to export goods to or receive any payments from the Employer's country 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.
- (l) [We are not a government-owned enterprise] / [We are a government-owned enterprise but meet the requirements of ITB 4.5].¹
- (m) We have not been suspended nor declared ineligible by the Employer based on execution of a Bid-Securing Declaration in accordance with ITB 4.6.
- (n) 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.

¹ Use one of the two options as appropriate.

- (o) 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.
- (p) We understand that any misrepresentation that knowingly or recklessly misleads, or attempts to mislead may lead to the automatic rejection of the Bid or cancellation of the contract, if awarded; and may result in remedial actions, in accordance with ADB's Anticorruption Policy (1998, as amended to date) and Integrity Principles and Guidelines (2015, as amended from time to time).

Name

In the capacity of

Signed

Duly authorized to sign the Bid for and on behalf of

Date

.....

(To be submitted with price Bid)

Letter of Price Bid

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

Date:

ICB No.:

Invitation for Bid No.:

To: [. . .insert complete name of the employer . . .]

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:

[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 may result in the rejection of the bid.

- (d) The discounts offered and the methodology for their application are: [. . .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 the 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 words* (. *amount in figures*) 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 Letters of Technical and Price 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

..... *Authorized signature(s) and bank's seal (where appropriate)*

-- 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.

Bid-Securing Declaration

NOT APPLICABLE

AFFILIATE COMPANY GUARANTEE

Name of Contract/Contract No.: _____

Name and address of Employer: _____

[together with successors and assigns].

We have been informed that [name of Contractor] (hereinafter called the "Contractor") is submitting an offer for the above-referenced Contract in response to your invitation, and that the conditions of your invitation require its offer to be supported by an affiliate company guarantee.

In consideration of you, the Employer, awarding the Contract to the Contractor, we [name of affiliated company] irrevocably and unconditionally guarantee to you, as a primary obligation, that (i) throughout the duration of the Contract, we will make available to the Contractor our financial, technical capacity, expertise and resources required for the Contractor's satisfactory performance of the Contract; and (ii) we are fully committed, along with the Contractor, to ensuring a satisfactory performance of the Contract.

If the Contractor fails to so perform its obligations and liabilities and comply with the Contract, we will indemnify the Employer against and from all damages, losses and expenses (including legal fees and expenses) which arise from any such failure for which the Contractor is liable to the Employer under the Contract.

This guarantee shall come into full force and effect when the Contract comes into full force and effect. If the Contract does not come into full force and effect within a year of the date of this guarantee, or if you demonstrate that you do not intend to enter into the Contract with the Contractor, this guarantee shall be void and ineffective. This guarantee shall continue in full force and effect until all the Contractor's obligations and liabilities under the Contract have been discharged, when this guarantee shall expire and shall be returned to us, and our liability hereunder shall be discharged absolutely.

This guarantee shall apply and be supplemental to the Contract as amended or varied by the Employer and the Contractor from time to time. We hereby authorize them to agree on any such amendment or variation, the due performance of which and compliance with which by the Contractor are likewise guaranteed hereunder. Our obligations and liabilities under this guarantee shall not be discharged by any allowance of time or other indulgence whatsoever by the Employer to the Contractor, or by any variation or suspension of the works to be executed under the Contract, or by any amendments to the Contract or to the constitution of the Contractor or the Employer, or by any other matters, whether with or without our knowledge or consent.

This guarantee shall be governed by the law of the same country (or other jurisdiction) that governs the Contract and any dispute under this guarantee shall be finally settled under the [Rules or Arbitration provided in the Contract]. We confirm that the benefit of this guarantee may be assigned subject only to the provisions for assignment of the Contract.

Signed by:
[signature]

Signed by:
[signature]

.....
[name]

.....
[name]

[name]

.....
[position in parent/subsidiary company]

.....
[position in parent/subsidiary company]

Date:.....

-- Note --

If permitted in accordance with ITB 32.2 of the BDS, the Bidder shall fill out the Affiliate Company Guarantee Form for each subsidiary, parent entity, affiliate etc. that the Bidder submits for consideration of the Employer in determining its qualifications.

Technical Proposal

Personnel

Equipment

Site Organization

Method Statement

Mobilization Schedule

Construction Schedule

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:

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

-- Note --

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

Form PER – 2: Résumé of Proposed Personnel

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

Position		
Personnel information	Name	Date of birth
	Professional qualifications	
Present employment	Name of employer	
	Address of employer	
	Telephone	Contact (manager / personnel officer)
	Fax	E-mail
	Job title	Years with present employer

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

From	To	Company/Project/Position/Relevant Technical and Management Experience

Equipment

Form EQU: Equipment

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 <input type="checkbox"/> Owned <input type="checkbox"/> Rented <input type="checkbox"/> Leased <input type="checkbox"/> 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

The Bidder shall submit along with his bid a site organization chart depicting roles and structure of the site organization. The proposed site organization shall also describe the roles, relationships and division of responsibilities between the site management and the representative head/branch office that shall be responsible for the Project. In particular, the Bidder shall provide details of the technical and financial responsibility and authority of the Project Manager who will be responsible for the day-to-day operations at the Site. The details shall be furnished separately for the Design-Build Period and for the Operation Service Period of the contract.

Method Statement

1. In existing condition, the Wazirabad WTP having 131 MGD treatment capacity supplies water to UGRs in North, North West & South Districts and New Delhi.
The DWSIIP include improvement of distribution network, water treatment and transmission systems in the proposed Wazirabad WTP command area. As per redistribution of the zones in Wazirabad Command Area, Improvement of Transmission system supplying water to 11 UGR's are proposed. The subproject under DWSIIP/04 is for improvement of water supply transmission network in the service area including laying of large diameter pipes up to diameter 1500 mm..
The Employer's indicative guidelines on Methodology for this are given in the Employer's Requirements.
2. The Bidder is required to submit an Approach and Method Statement for improvement of water supply transmission network in the service area along with the Technical Bid.
Approach and Method Statement shall include sequencing of activities, Challenges and methodology for handling, stacking, transportation, laying & jointing of large diameter pipes, Environmental and social impact assessments and prevention, mitigation and monitoring of impacts during construction.

The Bidder's Approach and Method Statement shall be in line with the overall principle of the Employer. The Service Improvement Plan (SIP) shall be compatible with these concepts.

The main objectives of subproject under DWSIIP/04 are:

1. Condition Assessment of Existing Transmission Main
2. Feasibility of using existing transmission mains and laying of proposed transmission mains.
3. Energy Optimization
4. Alternatives of transmission system w.r.t. water distribution from Clear Water Pumping Stations, pipe alignments, Capital and Operation and Maintenance Cost.
5. Removing direct tapings
6. Transition of transmission system from existing/current water supply zones to proposed water supply zones.
7. Linking between Wazirabad WTP command Area and adjacent WTP command Area.

The Bidder should include in their proposed methodology the proposed instrumentation. The instrumentation shall be capable of transferring real time data to the SCADA system, which shall include the parameters for performance evaluation of the Contractor during the operation, maintenance and service delivery. The Bidder's Approach and Method Statement shall also spell out how the real losses in transmission system will be measured which starts from Pumping stations at WTP and ends at Under Ground Reservoirs (UGRs).

3. The activities to be included in the Approach and Method Statement shall also include the following:
- i. Surveys or confirmatory surveys (as applicable) including topographic, geotechnical, underground utility surveys etc.
 - ii. Property and consumer surveys and GIS mapping of all properties showing water consumers
 - iii. Review, verifications and updation of designs;
 - iv. Handling, stacking, transportation, laying & jointing of large diameter pipes
 - v. Preparation of SIP, including phasing of works, cost effective value Engineering and drawings
 - vi. Approval of SIP (may be in phases)
 - vii. Implementation schedule along with methodology as per scope of works;
 - viii. Operation Services;
 - ix. Safeguard activities;

Mobilization Schedule

The Bidder shall submit along with the bid the proposed mobilization schedule for Machinery, equipment and human power etc; in the form of a bar chart. The bar chart will clearly depict the proposed date of mobilization, duration of services, and date of demobilization.

(Note: Bidders should provide the above schedule on a separate sheet showing all months from start Month to end Month inclusive for the Design-Build Period, and a similar, but suitably modified, format for the Operations Service Period.)

Construction Schedule

The Bidder shall submit proposed Construction Schedule in detail so as to demonstrate: the order in which he proposes to carry out the Works. It shall include all stages such as design, procurement, manufacture, pre-delivery inspection and testing, delivery to Site, construction, erection, testing and commissioning.

The Bidder shall ensure that the proposed schedule covers all major events and activities for the design reviews any other submissions, approvals and consents and also the sequence of all tests specified in the Employer's Requirements.

Similarly, the Bidder shall give attention to the requirements set out in Section 6, Employer's Requirements, and the Bidder is required to demonstrate how he proposes to meet the Milestone Targets that have been established to ensure that pro-rata progress is maintained on all sub-components of the Works throughout the execution period.

The programme details shall be separate for the Design-Build Period, and for the Operations Service Period.

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.

Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of a 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 number(s), fax number(s), e-mail address)	
<p>Attached are copies of the following documents.</p> <p><input type="checkbox"/> 1. In case of a single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2.</p> <p><input type="checkbox"/> 2. Authorization to represent the firm or Joint Venture named above, in accordance with ITB 20.2.</p> <p><input type="checkbox"/> 3. In case of a Joint Venture, a letter of intent to form a Joint Venture or Joint Venture agreement, in accordance with ITB 4.1.</p> <p><input type="checkbox"/> 4. In case of a government-owned enterprise, any additional documents not covered under 1 above required to comply with ITB 4.5.</p>	

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 number(s), fax number(s), e-mail address)	
Attached are copies of the following documents. <input type="checkbox"/> 1. Articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and ITB 4.2. <input type="checkbox"/> 2. Authorization to represent the firm named above, in accordance with ITB 20.2. <input type="checkbox"/> 3. In the case of a government-owned enterprise, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.	

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

Form CON - 1: Historical Contract Non-Performance

Each Bidder must fill out this form in accordance under Criterion 2.2.1 and 2.2.3 of Section 3 (Evaluation and Qualification Criteria) to describe any history of non-performing contracts and pending litigation or arbitration formally commenced against it.

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

Joint Venture Partner: _____

Table 1: History of Non-Performing Contracts			
Choose one of the following: <input type="checkbox"/> No non-performing contracts. <input type="checkbox"/> Below is a description of non-performing contracts involving the Bidder (or each Joint Venture member if Bidder is a Joint Venture).			
Year	Description	Amount of non-performed portion of contract (INR equivalent)	Total Contract Amount (INR equivalent)
[insert year]	Contract Identification: [indicate complete contract name/ number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Reason(s) for nonperformance: [indicate main reason(s)]	[insert amount]	[insert amount]

Form LIT - 1: Pending Litigation and Arbitration

Each Bidder must fill out this form if so required under Criterion 2.2 of Section 3 (Evaluation and Qualification Criteria) to describe any pending litigation or arbitration formally commenced against it.

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

Joint Venture Partner: _____

Pending Litigation and Arbitration			
Choose one of the following: <input type="checkbox"/> No pending litigation and Arbitration. <input type="checkbox"/> Below is a description of all pending litigation and Arbitration involving the Bidder (or each Joint Venture member if Bidder is a Joint Venture).			
Year	Matter in Dispute	Value of Pending Claim in INR Equivalent	Value of Pending Claim as a Percentage of Net Worth

- Note -

This form shall only be included if Criterion 2.2 of Section 3 (Evaluation and Qualification Criteria) is applicable.

Form FIN - 1: Historical Financial Performance

Each Bidder must fill out this form.

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

Joint Venture Partner: _____

Financial Data for Previous Years [INR Equivalent]				
Year 1:	Year 2:	Year 3:	Year 4 :	Year 5:

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					

<input type="checkbox"/>	<input type="checkbox"/>	<p><input type="checkbox"/> Attached are copies of financial statements (balance sheets including all related notes and income statements) for the last <u>5</u> years, as indicated above, complying with the following conditions:</p> <ul style="list-style-type: none">• Unless otherwise required by Section 3 of the Bidding Document, all such documents reflect the financial situation of the 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).
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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, converted to US dollars at the rate of exchange at the end of the period reported.

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

Joint Venture Partner: _____

Annual Turnover Data for the Last Years (Construction only)			
Year	Amount Currency	Exchange Rate	INR Equivalent

Average Annual Construction Turnover

Form FIN – 3: Availability of Financial Resources

Bidders 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 a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Financial Resources		
No.	Source of financing	Amount (INR equivalent)
1	Working Capital (to be taken from FIN - 1)	
2	Credit Line ^a	
3	Other Financial Resources	
Total Available Financial Resources		

^a To be substantiated by a letter from the bank / banks issuing the available line of credit. Only unutilized fund-based limits shall be considered

Form FIN- 4: Financial Requirements for Current Contract Commitments

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 a Joint Venture, each Joint Venture Partner must fill out this form separately and provide the Joint Venture Partner's name below:

Joint Venture Partner: _____

Current Contract Commitments						
	Name of Contract	Employer's Contact (Address, Tel, Fax)	Contract Completion Date	Outstanding Contract Value (X) ^a	Remaining Contract Period in months (Y) ^b	Monthly Financial Resources Requirement (X / Y)
1						
2						
3						
4						
Total Monthly Financial Requirement for Current Contract Commitments						INR

^aRemaining outstanding contract values to be calculated from 28 days prior to the bid submission deadline (INR equivalent based on the foreign exchange rate as of the same date).

^bRemaining contract period to be calculated from 28 days prior to bid submission deadline.

**Form FIN - 5: Self-Assessment Tool for Bidder's Compliance to 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	$\sum D$ = Sum of available financial resources net of current contract commitments for all partners		$\sum D =$ _____	

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
Total Contract Amount	INR	
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 Similarity in Accordance with Criterion 2.4.1 of Section 3 (Evaluation and Qualification Criteria)		
Participation in at least contract similar to the proposed works that has been successfully or substantially completed within the last 10 years from the date of issue of tender notice.		
One Contract of the value of the Bidder's participation exceeds INR 1350 Million or its equivalent		

Form EXP - 2: Construction Experience in Key Activities

Fill out one (1) form per contract.

Contract with Similar Key Activities		
Contract No of	Contract Identification	
Award Date		Completion Date
Total Contract Amount	INR	
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 (Evaluation and Qualification Criteria)		
i. Supply, delivery, laying, jointing, testing and commissioning of 1000 mm dia pressure pipe of DI / MS etc. in a minimum length of 2800 meters in a single contract in last 10 years		
ii. Design, supply, installation, Testing and Commissioning of pumping systems, with a cumulative capacity of 500 KW and at least one of 150 KW for water supply projects in a single Contract in last 10 years.		

<p>iii. Experience in construction and commissioning of trenchless technology works of 1.0 kms or above in a single or multiple Contract and at least 1 (one) work of minimum 1000 mm diameter of the carrier pipe in Single stretch of 60 m minimum in a Contract in last 10 years.</p>	
<p>iv. Participation in at least One contract that has been successfully completed within the last 10 years prior to the bid submission date, where in scope of works under the contract includes Design, Construction and Commissioning of Underground Reservoir for minimum capacity of 10 million liters”.</p>	

(To be submitted with price Bid)

FORM TECH-1 Guaranteed Electrical Power Consumption

Year	Kwhr / ML of water supplied (1)	ML of water supplied during year (2)	Total kWhr Consumed in Year (3) = (1) x (2)	Cost of Power consumed in INR @ INR 7.3 per Kwh (4) = (3) X7
OM-1		199,301		
OM-2		201,110		
OM-3		202,902		
OM-4		204,711		
OM-5		206,519		
OM-6		208,328		
OM-7		210,137		
OM-8		211,929		
OM-9		213,737		
OM-10		215,546		
			Total Cost of Power from OM- 1 to OM-10	

(To be submitted with price Bid)
Schedules

Schedule of Payment Currencies

For*insert name of Section of the Works*

Separate tables may be required if the various sections of the Works (or of the Bill of Quantities) will have substantially different foreign and local currency requirements. In such a case, the Employer should prepare separate tables for each Section 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		1.00		
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.

(To be submitted with price Bid)

Tables of Adjustment Data

To be entered by the bidder

Table A - Local Currency

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Local Currency Amount	Bidder's Proposed Weighting
	Nonadjustable	—	—	—	A: <u>0.15</u> B: _____ C: _____ D: _____ E: _____
Total					1.00

Table B - Foreign Currency**Name of Currency:**

Insert name of currency. If the bidder wishes to quote in more than one foreign currency, but in no case more than three, this table should be repeated for each foreign currency.

To be entered by the bidder

Index Code	Index Description	Source of Index	Base Value and Date	Bidder's Currency in Type/Amount	Equivalent in FC1	Bidder's Proposed Weighting
	Nonadjustable	—	—	—		A: <u>0.15</u> B: _____ C: _____ D: _____ E: _____
Total						1.00

- Note -

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

Tables of Adjustment Data shall only be included if prices are to be quoted as adjustable prices in accordance with ITB 14.5.

Bill of Quantities

(Provided in Part 2)

Section 5 - Eligible Countries

This Section contains the list of eligible countries.

1.	AFG	Afghanistan	35.	FSM	Micronesia, Federated States of
2.	ARM	Armenia	36.	MON	Mongolia
3.	AUS	Australia	37.	MYA	Myanmar
4.	AUT	Austria	38.	NAU	Nauru
5.	AZE	Azerbaijan	39.	NEP	Nepal
6.	BAN	Bangladesh	40.	NET	The Netherlands
7.	BEL	Belgium	41.	NZL	New Zealand
8.	BHU	Bhutan	42.	NIU	Niue
9.	BRU	Brunei Darussalam	43.	NOR	Norway
10.	CAM	Cambodia	44.	PAK	Pakistan
11.	CAN	Canada	45.	PAL	Palau
12.	PRC	China, People's Republic of	46.	PNG	Papua New Guinea
13.	COO	Cook Islands	47.	PHI	Philippines
14.	DEN	Denmark	48.	POR	Portugal
15.	FIJ	Fiji	49.	SAM	Samoa
16.	FIN	Finland	50.	SIN	Singapore
17.	FRA	France	51.	SOL	Solomon Islands
18.	GEO	Georgia	52.	SPA	Spain
19.	GER	Germany	53.	SRI	Sri Lanka
20.	HKG	Hong Kong, China	54.	SWE	Sweden
21.	IND	India	55.	SWI	Switzerland
22.	INO	Indonesia	56.	TAJ	Tajikistan
23.	IRE	Ireland	57.	TAP	Taipei, China
24.	ITA	Italy	58.	THA	Thailand
25.	JPN	Japan	59.	TIM	Timor-Leste,
26.	KAZ	Kazakhstan	60.	TON	Tonga
27.	KIR	Kiribati	61.	TUR	Turkey
28.	KOR	Korea, Republic of	62.	TKM	Turkmenistan
29.	KGZ	Kyrgyz Republic	63.	TUV	Tuvalu
30.	LAO	Lao PDR	64.	UKG	United Kingdom
31.	LUX	Luxembourg	65.	USA	United States
32.	MAL	Malaysia	66.	UZB	Uzbekistan
33.	MLD	Maldives	67.	VAN	Vanuatu
34.	RMI	Marshall Islands	68.	VIE	Viet Nam

Section 6 – Employer's Requirements

This Section contains the Scope of Services, Specifications, Drawings, Supplementary Information regarding Works to be Procured, Personnel Requirements and Equipment Requirements.

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6.1 Scope of Services

6.2 Specifications & Quality Control

6.2.1 Standard Specifications

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6.2.5 Environmental Safeguards

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6.5 Personnel Requirements

6.6 Equipment Requirements

Annex A: Terms of Reference for Community Mobilization and the Resettlement Consultant (CRMC)

Annex B: Extracts from Terms of Reference for Project Management Consultant

Annex C: Draft Initial Environmental Examination

Annex D: Geotechnical Investigation Report

Annex E: Resettlement Due diligence Report

6.1 Scope of Services

6.1.1 Definitions

The words, terms and expressions beginning with capital letters and defined under this Section 6.1 including those in Section 7 - General Conditions of Contract and those in Section 8 – Particular Conditions of Contract shall, unless the context otherwise requires, have the meanings as described thereto / herein:

1. “Boundary Limits” shall mean the boundary within which the Contractor has the responsibility of providing services in accordance to the terms and conditions under this Contract. Under the present Contract the Boundary Limit starts from Inlets of UGR’s inside Wazirabad WTP area and extends up to command area under 11 nos. UGR.
2. Command areas” shall mean service area in which treated water of Wazirabad WTP is supplied from 11 nos. UGR’s.
3. “Service Area” shall mean the distribution network spread across the command area of UGRs and Contractor has the responsibility of providing services in accordance to the terms and condition of this Contract.
4. “Contractor's Personnel” means personnel hired and deployed by the Contractor under provision of Works and Services but excluding the DJB Personnel;
5. “CPHEEO” means the Central Public Health and Environmental Engineering Organization under the Ministry of Urban Development, Government of India;
6. “Contract Date” means the date on which the contract is signed;
7. “Contract Period or Total Contract Period” means the period of Contract counted from Commencement Date upto Contract Completion Date;
8. “Contract commencement date” means the stipulated date of commencement of contract indicated in Letter of Acceptance (LOA). The Commencement Date should be within 28 days after the Contractor receives the LOA.;
9. “Contract completion” means the date on which the Operation Service has been completed
10. “Design Built Period” means the period commencing from contract commencement date to the date indicated in the Commissioning Certificate as the date of completion of design and construction of the permanent works.
11. Development Period has the same meaning as Design Built Period.
12. “DPR” means the Detailed Project Report;
13. “Electricity Department” means the local service provider supplying electricity for facilitating Operation of the facilities;
14. “Existing Assets” means infrastructure components, plant, machinery, equipment and any other units existing at the site as on the Commencement Date;
15. “Final Take Over Date’ means the date on which the Contractor/operator takes over the entire facilities within the service area post completion of the Design Build Period of the Contract. Final Take Over Date” is synonymous to “the date stated in the Commissioning Certificate”
16. “Government Agencies” means all those agencies comprising of local, state and central government authorities directly or indirectly connected to provision of water services to the consumers in DJB;

17. "Initial Take Over Date" means the date on which the Contractor/operator takes over the operations of entire facilities within the service area on as is condition. This period is 120 days from the contract commencement date.
18. "Major Maintenance" means large capital maintenance works requiring replacement of existing infrastructure / assets like pumps, motors, pipes, transformers, instrumentation, civil structures other than procured and installed by the contractor and include, those which are procured and installed by contractor and whose operational life is exceeded than those specified in CPHEEO manual during the currency of operation period; This constitutes the Asset Replacement Schedule as indicated in the later part of this section.
19. "Mandatory Works" means, works which are listed in the Bill of Quantities and are required to be constructed, installed or erected and commissioned in line with the provisions of this Contract unless such works require change of scope or design as agreed.
20. "Minimum Service Levels" means the levels of service to be maintained in the operations, maintenance and management and service delivery, described in Clause of Performance Standards in this Section;
21. "Minor Maintenance" means routine preventive or corrective maintenance works such as minor repair, reconditioning, or replacement of spare parts to ensure serviceability of existing and new infrastructure assets procured and installed by the Contractor including, pipes, electrical equipment, flow meters, pressure monitoring equipment, and consumer meters, starter panel, electromechanical equipment etc;
22. "Mobilization period" means the period in which activities defined in section 6.1.20 would be completed. It is the period commencing from the date of commencement of contract and extends up to 30 days;
23. "New Assets" means infrastructure components, plant, machinery, equipment and any other units procured, supplied, installed, erected and commissioned by the Contractor during the Implementation period other than those existing on the site as on the Commencement Date;
24. "NRW" or Non-Revenue Water means that quantity of water, which does not earn any revenue. This is difference of quantity, between the volume of system input water and the billed volume of water within a defined boundary limit and time line. This is computed as the difference between the total water produced and the total water billed expressed as a percentage of the total water produced. NRW mainly comprises:
 - Apparent (Commercial) losses such as illegal water connections, unbilled water, water theft and metering inaccuracies; and
 - Real (Physical) losses which are leakages in the transmission and distribution networks from pipe joints, or valves or service connections or service reservoirs, etc.
25. "Payment for Operation Services" means the eligible payments towards operation, maintenance, repairs and service delivery after meeting the stipulated performance indicators;
26. "Operator" means the agency to operate the system after taking over. Contractor means the agency to design build the works. Here operator is synonymous to the Contractor.
27. "Performance Standards" mean the Minimum Service Levels to be achieved and maintained by the Operator during Contract period set forth in Clause of Performance Standards as per Schedule 5 of Section 8;
28. "DJB" means the Delhi Jal Board, Govt. of NCT Delhi;

29. "Physical losses" is the difference between the NRW and the combined volume of unbilled authorized consumption, unauthorized consumption and meter inaccuracies within a defined boundary limit and defined time line.
30. "Planned Maintenance" means activities required to undertake preventive maintenance of all assets existing or proposed to be installed under the Contract;
31. "Potable Water Specification" means the water quality requirements of potable water to be supplied to the Consumers as stipulated in IS 10500 Guidelines for Physical and Chemical Parameters and Table 2.3 Bacteriological Quality of Drinking Water, in the Manual on Water Supply and Treatment, CPHEEO, Government of India, Ministry of Urban Development, New Delhi;
32. "Preparatory Period or Service Improvement Plan Preparation period" is the period commencing from the contract commencement date during which time the Contractor will prepare the Service Improvement Plan (SIP);
33. "Project Information Memorandum or PIM" shall mean the report prepared by the Employer detailing the Project as provided in Section 6.4 Supplementary Information regarding Works to be Procured;
34. "Project Management Consultant" means the agency appointed by the Employer to provide project management services under a separate Contract;
35. "Release Event" shall mean an event such as no availability of water at the source, no availability of electricity etc., or an event of force majeure;
36. "Schedules or Schedule" means the schedules forming part of this contract, or any one of them, as the context requires;
37. "Scope of Services" shall mean all those services to be provided by the Contractor in accordance to the obligations, activities, responsibilities and tasks in implementing the contract;
38. "Scheduled Design Built Completion Date" or "SDBCD" shall mean the date by which the construction of all the Works as per the agreed Service Improvement Plan are to be completed, commissioned, tested and certified by the Employer or Employer's Representative;
39. "Services" means all those activities, interventions, actions and tasks required as part of the implementation of design built works including all planning, design, detailed engineering, procurement, construction, rehabilitation and operations, maintenance, and management in providing continuous pressurized water supply services to the consumers in DJB
40. Sub-Project area is synonymous to the Service area.
41. "SIP" mean Service Improvement Plan proposed by the contractor and approved by Employer
42. "UGR" means Underground Service Reservoir.
43. "PS/PH": means Pumping Station or Pump House

6.1.2 Project Background

The Government of India is negotiating a loan with the Asian Development Bank (ADB) for financing the Delhi Water Supply Improvement Investment Program (DWSIIP), which comprises improvement of the water supply system in command area of Wazirabad Water Treatment Plant (WTP).

The DWSIIP has been defined based on the Master Plan for Delhi's water supply system. The Master Plan was prepared in the year 2011 for Delhi Jal Board (DJB), with financial assistance of Japanese International Cooperation Agency (JICA).

The DWSIIP will complement past and ongoing efforts of the Government of National Capital Territory of Delhi (NCTD) to improve water supply services to the residents of NCTD.¹ The DWSIIP will improve the infrastructure, management, and performance of the water supply services for 2.41 million people in the Wazirabad Water Treatment Plant (WTP) command area located in North Delhi.² The DWSIIP will help achieve the National Capital Territory of Delhi (NCTD) Water Supply Master Plan objectives of reduced non-revenue water (NRW) and equitable access to water supply services.³ The DWSIIP will include improvement of distribution network, water treatment and transmission systems in the Wazirabad WTP command area, and strengthening of institutional capacity and program management.

The physical works in DWSIIP are to be implemented in two tranches and six packages (three packages in each Tranche as shown in Table below).

Table 6.1 Tranche-wise List of Works Packages

Package No.	Tranche	Details of Package
DWSIIP/01	1	Distribution Network Improvement in UGR Command Areas C-02 and C-03 Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.
DWSIIP/02	1	Distribution Network Improvement in UGR Command Areas G-02, H-06 and H-08 Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.
DWSIIP/04	1	Improvement of Transmission System to various UGRs and Construction of UGRs & Clear Water Pumping Stations within Wazirabad Water Treatment Plant and Providing SCADA & Instrumentation System including Operation and Maintenance for 10 Years.
DWSIIP/03	2	Design, Construction, Installation, Testing, Commissioning and Automation along with 15 Years O & M of 120 MGD (545 MLD) Output Capacity Wazirabad Water Treatment Plant
DWSIIP/05	2	Distribution Network Improvement in UGR Command Areas G-01, H-05 and H-07 Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.
DWSIIP/06	2	Distribution Network Improvement in UGR Command Areas C-01, P-09 and P-10 Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.

The objective and impact of the DWSIIP will be improved water supply services in the Wazirabad WTP Command Area. The outcome will be improved access to reliable, continuous and equitable/sustainable water supply services in the Wazirabad WTP command area.

¹ The design and monitoring framework.

² The Asian Development Bank (ADB) provided project preparatory technical assistance: ADB. 2013. *Technical Assistance to India for Preparing the Delhi Water Supply Improvement Investment Program*. Manila (TA 8415-IND).

³ Japan International Cooperation Agency. 2011. *Study on Improvement of Water Supply System in Delhi in the Republic of India*. New Delhi.

6.1.3 Introduction to the Project Area

6.1.3.1 Project City -Delhi

Delhi, India's capital territory, is a massive metropolitan area in the country's north. The National Capital Territory (NCT) of Delhi covers an area of 1,486 km² and is divided into 9 census districts and 27 sub-divisions. Of this, the urban area, including the new settlements in rural habitations, accounts for about 525 km². Delhi encompasses three governing bodies: the Municipal Corporation of Delhi (MCD), the New Delhi Municipal Council (NDMC) and Delhi Cantonment Board (DCB). The MCD is one of the largest municipal bodies in the world according to population size. Of the total NCT area, MCD occupies 94.2 %, whereas NDMC and DCB occupy 2.9% and 2.9% respectively.

6.1.3.2 Delhi Jal Board (DJB)

For effective management of the water supply and sewerage in the NCT of Delhi, the Delhi Government reconstituted the Delhi Water Supply and Sewage Disposal Undertaking into the Delhi Jal Board (DJB), with the Water Minister of NCT as Chairman of the Board. The DJB is responsible for water resources management, monitoring the pollution of water and the treatment and supply of potable water.

Wastewater collection, conveyance, treatment and disposal facilities are also the responsibility of DJB. It is responsible for all the above services in the MCD area. DJB also supplies treated water in bulk to the NDMC and to the DCB both of which are responsible for the distribution of this water within their own territories.

6.1.3.3 Project Area

The proposed Wazirabad command area covers an area of 12,956 Hectares, a population of 2.42 million in 2011 with an ultimate population of 2.64 million by 2051 (Design horizon).

The Wazirabad command area covers 18 UGR's. However, the scope of the ADB financed DWSIIP project covers service area under 11 UGR's. under this project Transmission System up to only 11 UGRs will be considered and Transmission Pipe line for rest of 7 UGRs will be extended by DJB at a later stage. The list of revised 11 UGRs and their location is given in the table 6.2 and figure 6.1 below: Burari B do not form the part of this command area, However, the transmission is extended to cover the same for meeting partial demand but the Burari B line is not included under scope of this package.

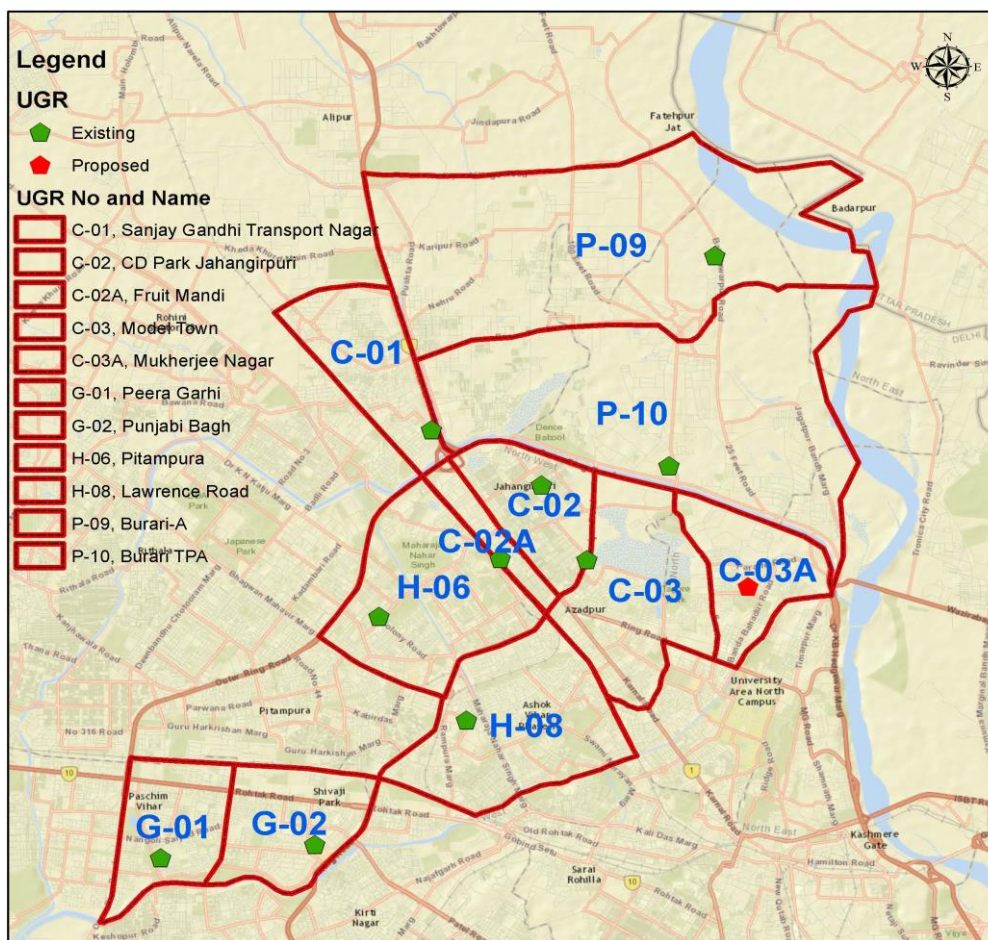


Figure 6.1 : Location Map of the proposed Wazirabad Command Area

Table 6.2: UGRs with Flow Meter at Tappings

S. No.	UGR Code	Name of UGR	Flow Meter at Tapping's	Type of Flowmeter	Remarks
1	C-01	Sanjay Gandhi Transport Nagar	800/DI	-	Line-2
2	C-02	CD Park Jahangir puri	700/DI	Electromagnetic	Line-2
3	C-03	Model Town	600/DI	Electromagnetic	Line-3
4	C-03A	Mukharjee Nagar (New)	500/DI	Electromagnetic	Line-2
5	G-01	Peeragarhi	700/DI	-	Line-3
6	G-02	Punjabi Bagh	600/DI	Electromagnetic	Line-3
7	C-02A	Fruit Mandi	400/DI	Electromagnetic	Line-2
8	H-06	Pitampura	800/DI	Electromagnetic	Line-3
9	H-08	Lawrence Road	900/DI	Electromagnetic	Line-3
10	P-09	Burari A	900/DI	Electromagnetic	Line-1
11	P-10	Burari TPA	900/DI	Electromagnetic	Line-1
12	P-08	Burari B	250/DI	-	Line-1

As stated above, the project shall be implemented through six contract packages and contract Package DWSIIP/04 covers UGR' & Clear Water Pumping Station within WTP area, and Clear Water Transmission Main from WTP to 11 nos UGR's. The project area coming under Package DWSIIP/04 is referred to in this document as command area or service area.

6.1.4 Existing System – Phase I, II & III and Phase IV Recycle Plant

In existing condition, the Wazirabad WTP having 131 MGD treatment capacity supplies water to UGRs in North, North West & South Districts and New Delhi. Wazirabad WTP was developed in four phases and details of the same are provided in Table below:

Table 6.3: Water Treatment Plant Capacity

WTP Name	Treatment Capacity in MGD	Source	Year of Construction
Wazirabad Phase I	40	River Yamuna	1965
Wazirabad Phase II	40	River Yamuna	1972
Wazirabad Phase III	40	River Yamuna	1990
Recycle Water Treatment Plant Phase IV	11	Backwash water and sludge from clarifiers from treatment plant Phase I,II,III	2010
Total (MGD)	131		

From each phase, two transmission main are emerging, Hence a total six pumping mains are leaving the Wazirabad WTP, Kilokri and Duplicate mains from Phase-I, Triplicate and IAR mains from Phase-II and West Delhi (civil lines) and West Delhi 1500 mm mains from Phase-III.

Phase –I

There are 2 number 900mm diameter rising mains emanating from this pump house. 1 no.- 900mm dia Kilokari Main supplies water to NDMC & 1 no.- 900mm diameter Duplicate Main supplies water to Kashmiri Gate, Shubhash Park area and finally both the line is terminated at Kailash Colony UGR.

Phase -II

1 no.- 900mm dia Triplicate Main supplies water to Shubhash park, Ramlila Ground UGR & 1 no.- 750mm dia IAR Main supplies water to Bharat Nagar, Ashok Vihar, Gulabi Bagh, Shatri Nagar UGR.

Phase -III

1 no.- 1500mm dia rising main supply water to Model Town, Lawrence Road, Punjabi Bagh UGR & 1 no.- 1100mm dia rising main supply water to Mahendru Park, Burari, Adarsh Nagar, Mukherjee Nagar area.

Phase- IV (Recycle Plant)

Delivery line of all pumps is connected to 1no. - 700mm diameter rising main which supplies water to Burari Area.

The details of the existing pumps at clear water pumping stations at each location are as given below:

Table 6.4: Details of existing pumps at Clear Water Pumping Stations

Stage	Design Capacity (MGD)	Nos. of Pump (Working + Standby)	Year of Installation	Capacity of each Pump (MGD)	Head (m)
Phase-I	40	2W + 1S	1965	15	54
		1W + 2S		10	54
Phase-II	40	3W + 3S	1972	13	43
Phase-III	40	4W + 2S	1990	11	28
11 MGD Recycle Plant	11	4W + 2S	2010	2.85	25

Table 6.5: Details of existing electricals at Clear Water Pumping Stations

S.NO	ITEM DESCRIPTION	EXISTING SYSTEM			
		PHASE-I	PHASE-II	PHASE-III	PHASE-IV
A.	11 KV HT PANEL				
1	Type	Indoor			
2	Feeders	2 I/C+1B/C+4O/Gs			
3	Breaker Type	OCB			
B.	HT TRANSFORMER				
1	Type	Outdoor	Indoor	Indoor	Indoor
2	Qty	2	2	2	2
3	Rating	2500 kVA	2500 kVA	2000 kVA	1000 kVA
4	Voltage Ratio	11kV/3.3 kV	11kV/3.3 kV	11kV/433V	11kV/433V
5	Cooling	ONAN			
6	Vector Group	DYN-11			
7	Make	Kirloskar	GEC	CGL	Kirloskar
C.	3.3 KV HT PANEL				
1	Type	Indoor	Indoor		
2	Feeders	I/C+1B/C+6O/Gs	I/C+1B/C+4O/Gs	NA	NA
3	Breaker Type	OCB	OCB	NA	NA
D.	LT TRANSFORMER				
1	Type	Outdoor	Indoor	Indoor	Indoor
2	Qty	2	2	2	2
3	Rating	250 kVA	250 kVA	NA	NA
4	Voltage Ratio	3.3 kV/433V	3.3 kV/433V	NA	NA
5	Cooling	ONAN	ONAN	NA	NA
6	Vector Group	DYN-11	DYN-11	NA	NA
E.	LT PANEL				
1	Type	Indoor	Indoor	Indoor	Indoor
2	Feeders	2I/C+1B/C+O/Gs Power and Starter feeders.	2I/C+1B/C+O/Gs Power and Starter feeders	2I/C+1B/C+O/Gs Power and Starter feeders	2I/C+1B/C+O/Gs Power and Starter feeders
F.	STARTERS				
1	Type	LRS	LRS	LRS	S/D
2	Qty.	6	6	6	6
3	Ratings	3x525 kW+ 3x375 kW (3.3kV)	6x375 kW (3.3 kV)	6x210 kW (LT)	6x55 kW (LT)
4	Motors	3x525 kW+ 3x375 kW (3.3kV)	6x375 kW (3.3 kV)	6x210 kW (LT)	6x55 kW (LT)
G.	APFC PANEL				
1	Qty.	2	4	2	2
2	Voltage	3.3	3.3	415	415
3	Rating	2x125 kVAR(LT)	2x178 kVAR(3.3 kV)+2x170kVAR(LT)	300 kVAR (LT)	----

S.NO	ITEM	EXISTING SYSTEM			
H.	BUS DUCT				
1	Type	NA	NA	NA	NSPBD
2	Rating	NA	NA	NA	1600A
3	Qty	NA	NA	NA	2
4	Conductor	NA	NA	NA	Al.
I.	D G SET				
1	Rating	NA	NA	NA	1010 kVA
2	Qty	NA	NA	NA	1

6.1.5 Details of Proposed Works

6.1.5.1 New CWR/UGR and single PS for WTP

The following are the salient features of proposed works under this package:

- A single CWR /UGR and single Pumping station are proposed as replacement of existing UGR’s and existing Pumping stations. New UGR and new pump house will be independent of existing phase 1, phase 2 and phase 3 UGR’s and corresponding pump stations.
- For commissioning of new UGR, existing filter houses water channel of existing WTPs are to be connected to new UGRs. The new UGR is to be connected with outlet of Existing Filters considering hydraulics so that clear water from Filter can flow by gravity to new UGR.
- Constructions of new WTP & Filters are envisaged under Package-DWSIIP-03 in near future. After construction of new filters, New UGR is to be connected with new filters in coordination with contractor of Package-03.
- The levels in new UGRs are to be worked out considering levels of filtered water channel so that water can flow by gravity.
- For commissioning of new PS, the new pumping main from new pump house will be connected to existing pumping main of respective PS, in line with proposed transmission system.
- The operation of existing CWR’s (UGR’s) and PS’s of WTP Phase I, II and III would be continued till new UGR and PS for WTP is constructed.

Presently existing Under Ground Reservoirs (UGR’s) and Pumping stations for WTP Phase I and II are in operation. The pump house for WTP Phase III is also in operation.

As the new WTP of 120 MGD is proposed, Single UGR with single pump house is proposed.

The location of proposed single UGR & Single Pumping Station in Wazirabad WTP Complex is shown in the fig 6.2 below:

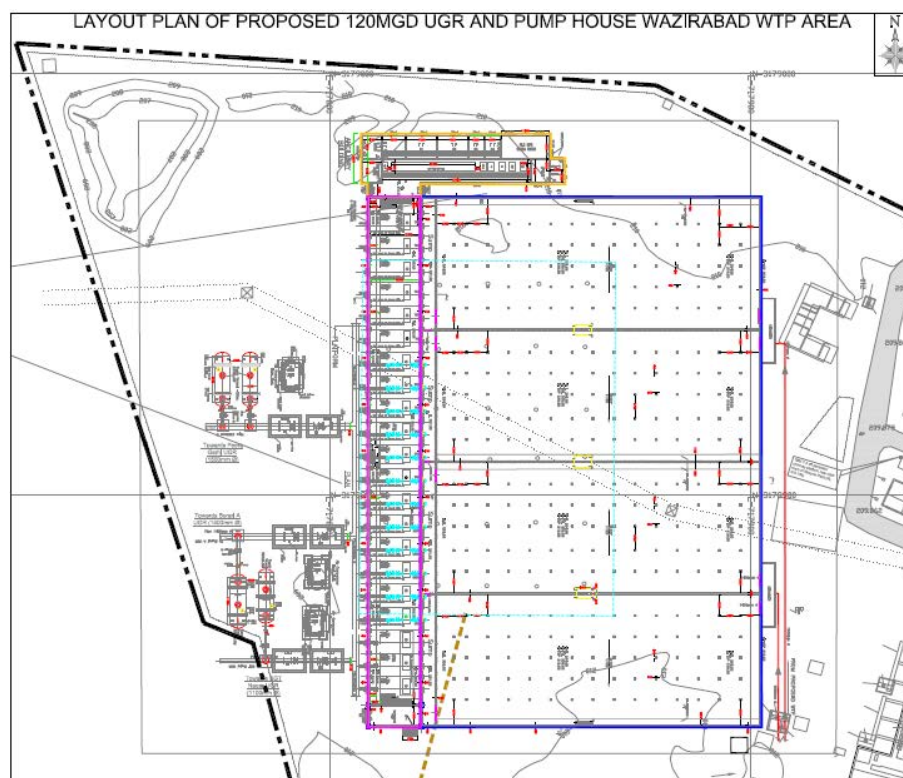


Fig 6.2 Location of new single UGR and single Pumping Station in Wazirabad WTP Complex

New UGR along with new pump house and ancillary structures like Battery room, Transformer room, HTP, PLC/SCADA and Office will be provided nearby all proposed pump house. The utility building like store room, Workshop etc will be suitably provided under package 03, based on finalized WTP layout. Recycle (Phase 04) pump houses will be retained as it. However, interconnection from existing Line 04 UGR will be done to proposed Line-3 rising main. The sizing and hydraulic levels of proposed UGR are provided in Table 6.5.

Table 6.6 Proposed Size and levels of UGR at WTP

UGR Description	Water depth considered (m)	Proposed Plan Size (m x m)	Bottom of UGR: (IL of UGR) m	TWL of UGR (m)	Approx. GL of the area (m)	Remarks
Single UGR/CWR	5	125X80	204	209	210.0	1. 2 hours retention time considered 2. 2 Difference between GL and TWL will act as free board for CWRs

6.1.5.2 Proposed Mechanical Works at Clear Water Pumping Station's:

For design of pumping system for Package 04, it needs to be ensured that proposed TWL and invert level of all UGRs at distribution points are properly checked and verified in totality as integrated system. The interface between Rising main system, i.e. Package 04 and distribution Packages like Package 1, 2, 5 & 6 needs to be hydraulically stimulated and consistent. The tentative proposed levels for UGRs at WTP and proposed levels of

distribution UGRs are mentioned in the below table.

Table 6.7: Tentative Proposed levels for UGRs at WTP and UGRs

S.No	UGR Name	Approximate Ground Level (m)	UGR Top Level (m)	TWL (m) considered (Tentative)	UGR Invert (m) considered (Tentative)
1	Single UGR CWR combined	209	As per structure design	210	204
2	Lawrence Road	215.350	As per structure design	215.02	210.8
3	Punjabi Bagh	213.030	As per structure design	212.65	208.94
4	Pitampura	216.150	219.000	218.500	210 (Existing)
5	SGT Nagar	209.740	211.270	210.270	204.82 (Existing)
6	Burari TPA	207.800	209.045	208.045	203.87 (Existing)
7	Burari A	210.850	212.320	211.320	204.72 (Existing)
8	Burari B	212.000	As per structure design	215 (TWL for Hydraulic design)	
9	Peeragarhi	211.880	212.850	211.850	208.03
10	CD Park (Jahangirpuri)	207.630	209.450	208.450	204.25
11	Model Town	208.050	209.952	208.952	202.945
12	Mukherjee Nagar	207.500	As per structure design	208.500	203.5
13	Fruit Market	211.27	As per structure design	211.27	To be verified at site
Note 1: Freeboard considered as 1m in existing UGRs from top of the slab.					
Note 2: Successful Bidder has to reconfirm the ground level, TWL provided has to be ascertained after confirmation of topo and soil survey work and hydraulic design during detailed engineering stage.					

The levels indicated in the table are tentative and for guideline purpose only. It needs to be finalized based on site survey and detailed hydraulic design.

6.1.5.3 Transmission System details:

Pipe Line1, 2 and 3 will supply water of 91 MGD.

Line-4 will supply water to Rohini area on availability of 131 MGD water in future and not covered under scope of this package.

Table 6.8 Phase wise and line wise distribution of water

Rohini UGR Main	Pipe Line-4 (Future)	Rohini Sector 19, Rohini Sector 15,16, 17, Rohini Sector 11, Rohini Sector 7, Avantika, Shakur Basti
Peeragarhi UGR main	Pipe Line-3	Model Town, Pitampura, Lawrence Road, Punjabi Bagh, Peeragarhi
SGT nagar Main	Pipe Line-2	CD Park, Fruit Market, Mukherjee Nagar, SGT Nagar
Burari Main	Pipe Line-1	Burari A, Burari TPA, Siraspur, Holambi Kalan B and Burari B

Technical information and details to be considered under scope of work of this package are given in Table below.

Table 6.9: Technical information and details

	Line 1	Line 2	Line 3	Line 4 (Future)
From	New UGR at WTP***			
To	Burari A, Burari TPA, Siraspur, Holambi Kalan B and Burari B	CD Park, Fruit Market, Mukherjee Nagar, SGT Nagar	Model Town, Pitampura, Lawrence Road, Punjabi Bagh, Peeragarhi	Rohini Sector 19, Rohini Sector 15,16, 17, Rohini Sector 11, Rohini Sector 7, Avantika, Shakur Basti
Suction level (m)	204.96	203.03	202.45	203.59
Maximum Discharge level	215.0m at Burari B	211.27 m at Fruit Market	218.0 m at Pitampura and at Lawrence Road	215.0 m at Rohini Sector 15, 16 & 17
Flow (MGD)	50.46	23.27	48.04	42.87
Starting Dia (mm)	1400	1100	1500	1500
Pipe Summary				
Diameter (mm)	Length (m)			
250	5289*	0	0	0
300	0	0	0	0
400	0	468	0	593
450	0	0	0	0
500	0	482	0	1264
600	0	0	791	1730
700	0	1340	3428	3383
800	4157*	1816	2513	4089
900	2854	2004	6595	1840
1000	0	0	0	1391
1100	0	8850 (Existing)	272 (Existing)	0
1200	2090	0	0	2882
1400	3940	0	2132	0
1500	0	0	8110 (New), 1860 (existing)	9429
Maximum Length to Tail end	18.33 km	14.96 km	24.42 Km	26.59 Km
New proposed- 37.278 Km , Existing retained- 10.98 Km , Total Network- 48.26 km				
Pump (2051)**	50.46 MGD @ 32.00 M	23.27 MGD @ 27 M	48.04 MGD @ 34 M	42.87 MGD @ 32 M
Pump (2036)**	41.10 MGD @ 24 M	21.02 MGD @ 24 M	44.88 MGD @ 32.5 M	40.64 MGD @ 30 M

Notes:

*Lengths of i) Pipe line tapping to Burari B UGR of 250mm diameter (5289m) ,ii) Pipe line tapping to Sisaspur UGR of diameter 800mm (3317m), iii) Pipe line tapping to Shalimar palace and iv) Pipe line tapping to Siraspur of 800mm diameter (840m) are not covered under scope of this package but need to be considered in Hydraulic design.

** These Pumps are not covered under scope of this package but need to be considered in Hydraulic design. However provision of space & connections for installation of these pumps in future is covered under scope of this package.

*** For commissioning of new UGR, existing filter houses water channel of existing WTPs are to be connected to new UGRs . Constructions of new WTP & Filters are envisaged under Package-DWSIIP-03 in near future. After construction of new filters, New UGR are to be connected with new filters in coordination with contractor of Package-03.

6.1.5.4 Proposed Mechanical Works under Clear Water Pumping Station:

The arrangements proposed inside new pump house are as given below:-

	Line 1	Line 2	Line 3	Line 4 (Future)
From	UGR at WTP			
To	Burari A, Burari TPA, Siraspur, Holambi Kalan B and Burari B-Line size – 1400mm dia.	CD Park, Fruit Market, Mukherjee Nagar, SGT Nagar, Line size – 1100mm dia.	Model Town, Pitampura, Lawrence Road, Punjabi Bagh, Peeragarhi – Line size – 1500mm dia	Rohini Sector 19, Rohini Sector 15,16, 17, Rohini Sector 11, Rohini Sector 7, Avantika, Shakur Basti, Line size – 1500mm dia,
Pumps Proposed	6 Nos. (4W+2S) pumps are covered under scope of this package However provision of space & connections, puddle flanges etc for installation of 3 nos pumps after year 2036 in future is covered under scope of this package		6 Nos. (4W+2S) pumps are covered under scope of this package.	No any pumps are covered under scope of this package. However provision of space & connections, puddle flanges etc for installation of 6 nos pump in future is covered under scope of this package

For Line – 4 – Only space is considered inside pump house for installation of 6 nos. (4W+2S) pumps, as presently 91 MGD water supply is considered.

Existing Phase – 1, Clear water pumping station, will continued supplying 40 MGD clear water towards South Delhi, Greater Kailash UGR. Replacement of any E&M equipment for Phase-1 pumping station is not considered in this package.

The **proposed pump configuration** is described below :

Peeragarh (Line-3), Rohini main(Line-4)

- Capacity of each pump is selected based on demand discharge as per hydraulic analysis and also considering 10 % hydraulic overloading of demand discharge. Numbers of pump & combination - 6nos.(4W + 2S) is selected, considering 50% stand by pumps.
- Suction condition of present pumping station is negative suction, the proposed pumping station will have positive suction and size of puddle pipe is selected to cater the flow for ultimate design demand.

Burari main (Line-1) Sanjay Gandhi Transport nagar Main (Line-2)

Capacity of each pump is selected based on demand discharge as per hydraulic analysis and also considering capacity of Recycle plant (Phase-IV – 11 MGD) **Burari main (Line-1)**. To meet the design demand as per hydraulic analysis the treated water from phase –IV will be connected to the pump house suction sump and from there water shall be pumped through 1400mm dia rising main towards Burari and through 1100mm dia rising main towards SGT Nagar. As head require for both the rising main is same, delivery line for all pumps shall be connected to a common header line and from there shall be further connected to the 1400mm dia **Burari main (Line-1)** & 1100mm dia **Sanjay Gandhi Transport nagar Main (Line-2)** rising main.

- The existing pumps at phase –IV will be remain in operation during construction stage, however these pumps shall be abandoned once new pumping station is in operation as pump head require for new pump is not matching with the existing installed pumps at phase-IV.
- Numbers of pump & combination - 6nos.(4W + 2S) is selected, considering 50% stand by pumps.
- Suction condition of present pumping station is varying from positive to negative suction, the proposed pumping station will have positive suction and size of puddle pipe is selected to cater the flow for ultimate design demand.
- Since pump head require for ultimate design period is different for rising main 1400mm dia **Burari main (Line-1)** & 1100mm dia **Sanjay Gandhi Transport nagar Main (Line-2)** feeding from this pump house, separate pump set is require for both the rising main. We have kept space in pumping station for installation of 3 nos additional pump in future which will be connected to 1100mm dia rising main in future and 6 nos pumps to be installed presently will be feeding to 1400mm dia rising main.

Proposal for Mechanical Works from Clear Water Pumping Station are given in table below.

Table 6.10: Technical details of proposed Mechanical pumps

Item description	Total Actual Peak Demand for 2036 (MGD)	Peak Demand considering 22 Hrs. of operation (MGD)	Nos. of Pump (W + S)	Capacity of each pump Selected based on Treatment Plant Capacity (MGD)	Head (m)	Motor Rating of each pump (KW)
Rohini UGR Main (Line-4)	37.25	40.64	6 nos. (4W + 2S)	Only Space & provision for connection in future considered. Pumps are not covered under scope of this package.		
Peeragarhi UGR main (Line-3)	41.30	45.05	6 nos. (4W + 2S)	11	34.5	280
Burari A and Sanjay Gandhi Transport Nagar UGR Main (Line - 1 & 2)	56.97	62.14	6 nos. (4W + 2S)	13.75	26	250

Since it is proposed to be constructed new single clear water pump house, All E&M equipment in the pump set in the pump house will be new. New pump house will be constructed & commissioned.

Pumps at Phase-IV (Recycle Plant) pumping station will be remain in operation during construction period, however these will not be in operation once new phase-III pump house is operation as head requirement for proposed pumps is not matching with the existing pumps.

6.1.5.5 Proposed Electrical Works under Clear Water Pumping Station:

The proposed water Transmission System targets to meet water demand up to year 2051, whereas the Electro-Mechanical components are designed to meet the demand up to the intermediate year 2036.

Table 6.11: Details of Proposed Electrical Components

S. No.	Item/Equipment Description	Pump House Details			
		COMMON CWPS			Recycle
1	11 KV HT Panel				
	Type	Indoor Floor Mounted			
	Feeders	2-I/C+1B/C+2-O/G			
	Breaker Type	Vaccum Circuit Breaker			
2	3.3 KV HT Panel				
	Type	Indoor Floor Mounted			
	Feeders	2-I/C+1B/C+27O/G			
	Breaker Type	Vaccum Circuit Breaker			
3	HT Transformer				
	Type	Out Door/Indoor			
	Quantity	2 nos			Existing Transformers will be used.
	Rating (KVA)	6300			
	Primary/Secondary Voltage	11/3.3 KV			
	Cooling	ONAN			
	Vector Group	Dy			
4	LT Transformer				
	Type	Indoor			
	Quantity	2 nos			
	Rating (KVA)	125			
	Primary/Secondary Voltage	3.3KV/0.433 kV			
	Cooling	AN			
	Vector Group	Dyn-11			
5	LV Switchboard				
	Type	Indoor Floor Mounted			
	Feeders	2-I/C+1B/C+ required nos & rating of outgoing starter feeders			
	Breaker Type	Moulde Case Circuit Breaker			
6	Motors				Existing Pumps and motors will be used.
	Quantity(W+S)	6(4+2)	6(4+2)	6(4+2)	
	Ratings (KW)	250	275	250	
	Voltage (Voltage)	3.3			
	Duty	Continuous			
	Type	TEFC			

6.1.5.6 Proposed Instrumentation& Automation for the Water Pumping Station:

The proposed water Transmission System targets to meet water demand up to 2051, whereas the Electro-Mechanical components are designed to meet the demand up to the intermediate year of 2036. The detail of proposed instrumentation for the different options shall be as under:

Table 6.12: Details of Proposed Instrumentation & Automation system

S. NO.	ITEM/EQUIPMENT DESCRIPTION	DETAILS
1	Pressure Gauge	
a	Type	Burdon type/Diaphragm Seal Type
b	Dial Size	150mm
c	Accuracy	+/- 1%
d	Zero Adjustment	Required
e	Case material	SS 316
2	Pressure Transmitter	
a	Type	Electronic
b	Accuracy	+/- 0.25% of span or better
c	Indicator	LCD with Led backlighting
d	Out put	4-20mA
e	Mounting	Pipe, Wall or Bracket mounted
f	Power supply	230V
g	Communication Protocol	Open Protocol like MODBUS
3	Level Transmitter	
a	Type	Ultrasonic
b	Transmitter/Controller Type	Microprocessor Based
c	Input Supply	230V AC or 110 V DC
d	Out put	4-20 mA
e	Communication Proto col	Open Protocol like MODBUS
4	Flowmeter	
a	Type	Full Bore Electromagnetic
b	Lining	Hard Rubber
c	Transmitter/Controller Type	Microprocessor Based
d	Input Power Supply	230V AC
e	Output	4-20 mA or 0-10 VDC
f	Flange Material	Carbon Steel, Epoxy Coated
g	Communication Port	Open Protocol like MODBUS
5	Residual Chlorine Analyzer	
a	Type	Flow Through
b	Transmitter/Controller Type	Microprocessor Based
c	Input Power Supply	230V AC
d	Output	4-20 mA or 0-10 VDC (HART)
e	Measuring Range	0-5ppm free chlorine
f	Membrane	PTFE
g	Ingress Protection	IP68
h	Material	Field Housing: ABS/Polycarbonate
i	Communication Port	Open Protocol like MODBUS

Data Measurement

Following instruments shall be provided as a minimum for the relevant processes as listed below:

- i. Running and trip indication for clear water pumps;
- ii. Level indication for clear water reservoirs
- iii. Low-level switches to shut down pumps.
- iv. These shall be hard wired to the motor starters
- v. Pressure, flow rate and total flow.

Extent of Automation

The control system shall be manual or automatic or a combination thereof. Regardless, the system shall be designed to promote energy efficiency, conserve water, and reduce waste while meeting the water quality standards and demands under all anticipated conditions

In case of a manual system, all equipment is started and stopped by an operator, and other process operations are controlled by the operator. This requires that the pump houses be manned continuously while in operation with number of operators as per requirements.

In case of an automatic system, all equipment is started and stopped by the control system, with pump rates adjusted automatically to maintain the system levels, discharge pressures, etc. This may allow unattended plant operation or operation with a minimum number of operators. But it requires a more complex and expensive control system with associated regular maintenance with the provision of manual over ride.

Automation for Recycle Pump House

Existing Recycle Pumps House has been equipped with required field instruments suitable for automation system. PLC/SCADA system has also been installed in this pump house but it is not in operation due to some internal faults.

New PLC/SCADA system has been proposed for this pump house to make the entire system in auto operation and to supervise the data acquisition system.

An automatic system is proposed under this project as per the following philosophy.

a. Control Equipment (Automatic Systems)

Automatic system shall use programmable Logic Controller (PLC). The operator interface may be in the form of traditional control, instrument panel and computers.

Digital communication between components of the control system shall be reliable and self- monitoring. The communication protocol shall meet the following requirements

1. It shall include error checking and reporting, to ensure that data is correctly transferred from one component to another;
2. The components of the system must detect the failure of the communication system (either between individual components of the system or between the system and the operator.
3. It shall be compatible with different manufacturer's instrument & equipment in order to allow expansion of the system in future.

The operator interface shall consist of a local hard wired control panel or mimic, character based input/output panel, personal computer or work station, control system functions and operator interface manufacturer. Personal computers or work stations shall be used with the hardware based on reliability, software compatibility, vendor support and suitability for continuous operation in the plant environment. The operator interface software i.e SCADA shall provide the operator with interactive control and monitoring of the plant, handle and annunciate alarms, log and trend events and process variables and generate the required reports. Process control and logic shall be performed by the PLC and not the operator interface computer or work station.

a. Level Instruments

Access to the top of the reservoir is inconvenient, ultrasonic level transmitter shall be used. In this package ultrasonic level transmitter are proposed at all CWRs.

b. Flow Instruments

On line, flow meters shall generally be Electromagnetic

c. Pressure Instruments

Pressure may be simply indicated on a gauge or transmitted (and optionally indicated as well) by a transmitter.

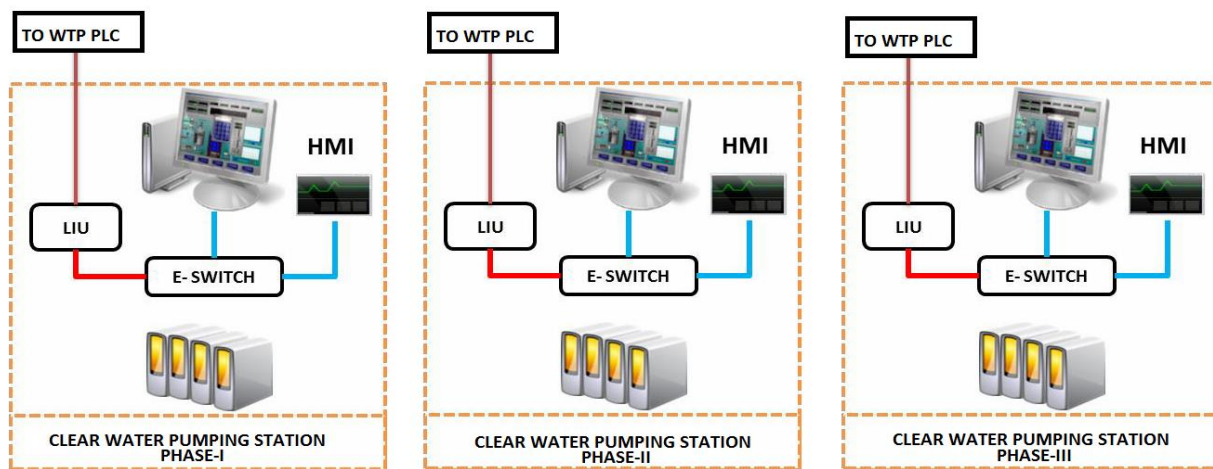
d. Electrical System Parameters

The status of power supply, On-Off status of breakers, variables associated with transformer etc. need to be continuously monitored. Any failure will be urgently reported by generating alarm. In addition to these parameters KW, KWh, Voltage, Current etc. shall also be monitored.

e. Control & Monitoring of Scheme

A Programmable Logic Controller (PLC) based control system and local SCADA shall be provided for automatic/semi-automatic operation of all the 4 Clear Water Pump Houses. The control system will be designed to recover fully to a normal operational state on restoration of power following a power failure without any manual intervention. Manual override facility shall also be provided to run the plant in the event the PLC/SCADA failure or at the discretion of the plant operator. The PLC shall be provided with necessary communication ports and software for interfacing with third party integration i.e. with other systems. The Instrument Control Panel (ICP) cum PLC Panel shall be housed in each Clear Water Pump house. Information received from field digital as well as analogue regarding status of operation of pumps, flow, level, operation of valves, pressure, residual chlorine analyzer shall be displayed on HMI via Ethernet switch. These data shall be interfaced to WTP PLC through Fiber optics cable. Monitoring and control shall be achieved through HMI. A suitably rated UPS shall also be installed at each Pump House.

PROPOSED SYSTEM ARCHITECTURE FOR PLC & SCADA SYSTEM



6.1.5.7 Proposed Transmission Pipe lines:

The details of Proposed Transmission Pipe lines are given under this section.

Replacement of West Delhi Main 1500 mm diameter pipeline- Route of the proposed alignment is as follows:

- The pipeline crosses the Najafgarh drain and then outer Ring Road and then follows Outer Ring Road towards the powerhouse. This Alignment is same as the old alignment. Based on information collected the pipeline upto Gopalpur is recently laid and can be retained.
- Then the pipeline moves in western direction and is routed along north side of a tributary of Najafgarh drain for a distance of around 1800 m.
- Then the line is proposed to cross the same drain to and is proposed to be laid southwards along Om Mandir Marg for a distance of 1200 m. The existing 1100 mm Civil Lines Main is also laid along this road. The proposed 1500 mm diameter transmission main will be provided on opposite (right edge of the road) side of existing 1100 mm diameter transmission main pipeline.
- Then this pipeline is proposed to follow West Bhai Parmanand Colony, Tagore Park and Malikpur Chavni to Shahid Ramparsad Bismil Marg. The length along this alignment is around 1000m.
- The pipeline follows southwards along Shahid Ramparsad Bismil Marg for around 300 m length.
- Then it turns right westwards and follows Municipal Corporation of Delhi (MCD) colony roads/ Karnal Road/Grand Trunk Road upto Azadpur Chowk along the old 1500 mm alignment – Length –2,175m
- Existing pipeline crossing foot bridge at Azadpur on GT road underpass passes through narrow passage. Therefore, the new proposed 1500 mm pipe line considered to continue along with old alignment through narrow lanes of Nani Wala Bagh cloth market after Municipal Corporation of Delhi (MCD) colony which connects the recently laid loop pipe line to cross GT road. Recently laid existing pipeline at Shalimar Bagh metro station, is considered to be connected to proposed 1400 mm mild steel pipe which then follows ring road.

- After Model Town tapping the pipe continues as 1500mm diameter which connects existing loopline before crossing the GT Road. After crossing the GT Road, proposed 1400mm pipeline connects to the 1500mm existing loop line at Adarsh Nagar Police Station. At Adarsh Nagar Police Station, instead of following old alignment, It is then passes through near by bridge underpass to cross ring road and to avoid bends in colony area of AC block Shalimar bagh.
- Recently laid 1100mm existing pipeline at Shalimar Bagh metro station, is connected to proposed 1400mm mild pipe which then follows ring road till proposed tapping points for Pitampura and Lawrence Road.
- After these tapplings the pipeline then reduces to 900 mm diameter till (Gufa Shiv Mandir) Britania chowk flyover. Here pipeline proposed cross ring road with trenchless to avoid Lawrence road B block juggi and follows the pipeline on other side of ring road to follow the metro railway track towards the Rohtak Road. Then it reach Punjabi Bagh UGR for a length of around 5000 m.
- After Punjabi Bagh size of this line reduces to 700 mm and moves westwards along Ch. Balbir Singh Marg for a distance of 1600 m and then southwards along Rd Number 29 for a length of 700 m.
- The the pipeline turns westwards and moves along northside of a Drain for a distance of 900 m.
- Then the pipeline moves northwards along Rao Devas Marg for a length of around 1200 m.

Proposed Tappings:

- a. 600mm diameter –Model Town UGR
- b. 800mm diameter –Pitampura UGR
- c. 900mm diameter –Lawrence Road UGR
- d. 600mm diameter –Punjabi Bagh UGR
- e. 700mm diameter –Peeragarhi UGR

Critical sections of alignment for pumping main:

Major Road Crossing:

- a. Outer Ring Road
- b. Arihant Marg road near Azadpur Underpass
- c. G. T road near underpass at H.P petrol pump (NH 44)
- d. Maharaja Nahar Singh Marg
- e. Britania Road
- f. Mahatma Gandhi Road (near Punjabi Bagh roundabout)
- g. Rohtak Road

Railway Crossing

- a. Near Azadpur Area on Amritsar – Delhi Railway line
- b. Near Shakurpur Basti next to Seven Seas Banquet & Lawns

Drain Crossing

- a. Crossing the main drain connecting to Najafgarh drain along Outer ring road in between WTP and Outer ring road
- b. Drain between Ring Road and Mukherjee nagar
- c. Crossing near Punjab Kesari Office.

Proposed Burari Main :

Proposed 1400 mm diameter main is to replace the existing 700 mm line supplying water to Burari TPA and Burari A UGR .

- Start of 1400 mm diameter pipe from Recycle WTP and Phase III WTP pumping Station, then through WTP area to Jharoda – Burari Marg parallel to Ring Road and then along the southern Right of Way line of Jharoda Burari Marg north of Drain upto Sant Nagar Road/ Burari Chowk– Length – Around 3600 m.
- Then 1400 mm diameter pipe moves in north direction pipe line upto Burari TPA UGR along Sant Nagar Road– Length –394m.
- Then 1200 mm diameter pipe line going northwards along Sant Nagar Road upto Burari Crossing Bus Stop – Length –2,135m. This line from here bifurcates into two pipe line. One 800 mm line continues northwards along same road to supply Siraspur and Burari B UGR and other pipeline of 900 mm diameter moves eastwards to supply to Burari A UGR through Baba Colony.
- Burari A pipeline – This 900 mm diameter pipe line moves eastward upto Pushta Road – Length – 744m.
- Then 900 mm diameter pipe line moving northwards along Pushta Road upto Burari A UGR – Length – 2,038m.
- Siraspur Pipeline – This 800 mm pipeline continues along Sant Nagar Road in north Direction for a length of around 2000 m and then this line bifurcates into two. One 800 mm pipeline turns westwards and follows Burari – Swaroop Nagar Road for a length of around 3200 m to supply water to Siraspur UGR. Tapping is left for future expansion for laying of 800mm dia pipe after water allocation of 131 MGD.
- The Second line of 250 mm diameter for Burari B UGR continues in northwest direction along Nathupur Road for a distance of 2800 m to the proposed location of Burari B UGR.

Number of tappings and connections

- a. 900 mm diameter - Burari TPA UGR
- b. 900 mm diameter - Burari A UGR

Major Road Crossing

- a. Jharoda Gaon Road
- b. Jagatpuri Road
- c. Pump House Road

Drain Crossing

- a. Drain crossing along Sant Nagar Road.
- b. Drain crossing along Burari – Swaroop Nagar Marg.

Critical Section:

1. Existing pipeline between the Wazirabad Water Treatment Plant gate to nalla road shall be retained which then shall be connected to proposed 1400 mm Mild steel pipeline

6.1.5.8 Proposed Components of Transmission Pipe lines:**Table 6.13: Detail of Line - 3**

Detail of Line - 3 Proposed 1500, 1400, 900, 700 and 600 mm Dia Transmission Pipe From Retained-1500mm TM Wazirabad WTP to Peeragarhi UGR Via Punjabi Bagh UGR						
S. No.	From	To	Diameter (mm)	Material	Proposed Length (m)	Retained Pipe Length (m)
1	* Wazirabad WTP	Existing 1500mm Gopalpur Drain Bridge	R-1500	MS	---	1290
2	Existing 1500mm Gopalpur Drain Bridge	Tapping Point Model Town (SDM Office near Azadpur Flyover)	1500	MS	6650	---
3	Tapping Point Model Town (SDM Office near Azadpur Flyover)	Joint Point of Proposed 1500mm to Retained 1500mm TM Near Metro Pillor No. 67 (Azadpur Chowk)	P-1500+R-1500	MS	175	---
4	* Joint Point of Proposed 1500mm to Retained 1500mm TM Near Metro Pillor No. 67 (Azadpur Chowk)	Joint Point of Retained 1500mm to Proposed 1500mm TM Near Adarsh Nagar Police station (Azadpur Chowk)	R-1500+P-1500	MS	---	570
5	Joint Point of Retained 1500mm to Proposed 1500mm TM Near Adarsh Nagar Police station (Azadpur Chowk)	Joint Point Retained 1100mm TM KC Goel Marg (Shalimar Bagh Metro Station in front of Metro Pillor No.16)	1400	MS	1285	---
6	*Joint Point Proposed 1400mm to Retained 1100mm TM KC Goel Marg (Shalimar Bagh Metro Station in front of Metro Pillor No.16)	Joint Point of Retained 1100mm and Proposed 1400mmTM (Shalimar Bagh Metro Station in front of Metro Pillor No.9, Wazirpur Industrial Area Block A)	P-1400/R-1100	MS		272
7	Joint Point of Retained 1100mm and Proposed 1400mmTM (Shalimar Bagh Metro Station in front of Metro Pillor No.9, Wazirpur Industrial Area Block A)	Tapping Point Pitampura (Prem Badi Bridge)	1400	MS	777	---
8	Tapping Point Pitampura (Prem Badi Bridge)	Tapping Point Lawrence Road (Prem Badi Bridge)	1400	MS	70	---
9	Tapping Point Lawrence Road (Prem Badi Bridge)	Tapping Point Panjabi Bagh (Chaudhary Balbir Singh Marg)	900	DI	5233	---
10	Tapping Point Panjabi Bagh (Chaudhary Balbir Singh Marg)	Punjabi Bagh UGR	600	DI	138	---

Detail of Line - 3 Proposed 1500, 1400, 900, 700 and 600 mm Dia Transmission Pipe From Retained-1500mm TM Wazirabad WTP to Peeragarhi UGR Via Punjabi Bagh UGR						
S. No.	From	To	Diameter (mm)	Material	Proposed Length (m)	Retained Pipe Length (m)
11	Tapping Point Panjabi Bagh (Chaudhary Balbir Singh Marg)	Peera Garhi UGR	700	DI	3428	---
12	Tapping Point Model Town (SDM Office near Azadpur Flyover)	Model Town UGR	700	DI	653	---
13	Tapping Point Lawrence Road (Prem Badi Bridge)	Pitampura UGR	800	DI	2513	---
14	Tapping Point Pitampura (Prem Badi Bridge)	Lawrence Road UGR	900	DI	1362	---
Sub Total					22284	2132

Table 6.14: Detail of Line -2

Detail of Line - 2 Proposed 400, 500,700, 800 and 900 mm Dia Transmission Pipe From Retained 1100mm Dia to MN, MT, CD Park & SGT N UGR						
S. No.	From	To	Diameter (mm)	Material	Proposed Length (m)	Retained Pipe Length (m)
1	Wazirabad WTP	Azadpur Underpass Turning Point, Near Metro Pillor No. 75, (Infront of HP Petrol Pump)	R-1100	MS	---	8540
2	Azadpur Underpass Turning Point, Near Metro Pillor No. 75, (Infront of HP Petrol Pump)	1100mm TM End Cap (Adarsh Nagar Police Station)	R-1100	MS	---	310
3	Tapping Point Mukherjee Nagar (Retained 1100mm Dia TM at Avatar Marg)	Mukherjee Nagar UGR	500	DI	482	---
4	Tapping Point Fruit Mandi (Retained 900mm near Metro Pillor No. 106, GT Karnal Road)	Fruit Market UGR Taping	400	DI	468	---
5	Tapping Point CD Park (Retained 900mm Jahangir Puri Metro Station Pillor No. 130, GT Karnal Road)	CD Park UGR	700	DI	1340	---
6	Joint Point Azadpur Underpass (Retained	Jahangir Puri Metro Station Pillor No. 130 at	900	DI	2004	---

Detail of Line - 2 Proposed 400, 500, 700, 800 and 900 mm Dia Transmission Pipe From Retained 1100mm Dia to MN, MT, CD Park & SGT N UGR						
S. No.	From	To	Diameter (mm)	Material	Proposed Length (m)	Retained Pipe Length (m)
	1100mm TM Line)	GT Karnal Road)				
7	Tapping Point CD Park (Retained 900mm Jahangir Puri Metro Station Pillor No. 130, GT Karnal Road)	Sanjay Gandhi Transport Nagar UGR	800	DI	1816	---
Sub Total					6110	8850

Table 6.15: Detail of Line -1

Detail of Line - 1 Proposed 1400, 1200, 900, 800, 700 and 250 mm Dia Transmission Pipe From Wazirabad WTP to Burari TPA, Burari A, Burari B & Siraspur UGR						
S. No	From	To	Diameter (mm)	Material	Proposed Length (m)	Retained Pipe Length (m)
1	Wazirabad WTP	Tapping Point Burari TPA	1400	MS	3940	---
2	Tapping Point Burari TPA	Taping Burari A, Baba Colony Gate	1200	MS	2090	---
3	Taping Burari A, Baba Colony Gate	Burai A UGR	900	DI	2804	---
4	Tapping Point Burari TPA	Burari TPA UGR	900	DI	50	---
Sub Total					8884	0
Grand Total Length of Line 1,2 &3					37278	10982
Note	* Retained Transmission Main lengths are not included in Total Proposed length. Proposed length for 11 UGR Wazirabad Command Area					

NOTE: Length of branch to Siraspur UGR (3317m), Branch to Burari B UGR (5289m) and tapping point to Siraspur near Shalimar Place (840m) is not included in the above table.

Table 6.16: Summary of Proposed Transmission Network

Pipe Material	Diameter in mm (NB/OD)	Length			Existing DI/CI/MS Distribution Pipe Retained	
		Proposed DI Pipe (in m)	Proposed MS Pipe (in m)	Trenchless Proposed MS Pipe (in m)	Existing DI/CI pipe (in m)	Existing MS pipe (in m)
	400	468		0		
	500	411		71		
	600	721		70		
	700	4588		180		
	800	3996		333		

Pipe Material	Diameter in mm (NB/OD)	Length			Existing DI/CI/MS Distribution Pipe Retained	
		Proposed DI Pipe (in m)	Proposed MS Pipe (in m)	Trenchless Proposed MS Pipe (in m)	Existing DI/CI pipe (in m)	Existing MS pipe (in m)
	900	10900		553		
	1100			0		9122
	1200		2090	0		
	1400		5781	291		
	1500		6721	104		1860
Total:		21084	14592	1602		10982

Note: i) Taping to Siraspur UGR of length 3317m is not included in above table.

ii) Taping to Burari B UGR of length 5289m is not included in above table.

iii) Taping point Siraspur near Shalimar Place of length 840m is not included in above table.

6.1.5.9 Proposed Surge Protection:

Details of Proposed surge vessel covered under scope of this package are given under below table.

Table 6.17: Details of Proposed surge vessel

Sr. No.	Description	Capacity (cum)	Numbers
1	Line-1 Surge Vessel	80	1
2	Line-2 Surge Vessel	90	1
3	Line-3 Surge Vessel	63	2

6.1.6 Suggested implementation Schedule

Project comprises of construction of transmission pipe lines, new Clear Water Reservoir (CWR) and Clear Water Pumping Stations (CWPS) including PLC and integrated SCADA.

Burari TPA, Burari A, Burari B, Siraspur (demand inclusive of Holambikalan) designated as Line-1 will be supplied through 1400mm transmission line; Mukherhee Nagar, Fruit Mandi, CD Park, SGT Nagar represented as Line-2 will be supplied water through 1100mm dia transmission line. Line 1-Burari and Line-2 -SGT Nagar both lines will take water from new UGR. Pitampura, Model Town, Lawrance Road, Peeragari, Punjabi Bagh UGR designated as Line 3 will be supplied water from new UGR at WTP through 1500mm dia transmission line from Wazirabad WTP.

About 10.98 Km length has been retained out of 34.60 Km existing length of above three lines (Line-1: 2.95 Km; Line-2: 13.56 Km; Line-3: 18.09 Km) The length of newly proposed transmission line is approximately 37.28 Km (Line-1: 8.88 Km of 1400/1200/900 dia.: Line-2: 6.11Km of 500/400/700/900/800 mm dia.); Line-3: 22.28 Km of 1500/1400/900/800/700/600) including trenchless of 1.6 Km and tentatively 10.98 km existing line (Line-2: 8.85 Km of 1100 mm dia. & Line-3:2.13 Km of 1500mm dia.) has been proposed to be retained Therefore, overall length of transmission system becomes 48.26 Km for 91 MGD transmission system. .

Three new UGR/CWR along with single Pump house and ancillary buildings are proposed under this package. Phase 4 UGR and Pump house of 11 MGD Recycle Plant will be integrated with the proposed scheme and will be suitably connected to proposed transmission main system.

It is proposed that new clear water pump house will be constructed, therefore, all E&M equipment's has been considered are new. All existing E&M equipment at Phase -1, 2, 3 plant is proposed to be abandoned as required once new pump house is constructed & commissioned. As per the requirement abandoned Phase 3 UGR will be demolished and in place of that proposed single CWR/UGR along with Pump House will be constructed in that place for proposed 120MGD WTP.

The proposed water Transmission System targets to meet water demand up to year 2051, whereas the Electro-Mechanical components are designed to meet the demand up to the intermediate year 2036. Instrumentation system for monitoring of flow, water quality, level and pressure of water supply has been proposed with integrated PLC/SCADA system at each CWR/CWPS.

6.1.7 Broad Scope of Services:

The broad Scope of Services is detailed in Table below:

Table 6.18: Major works proposed

S. No.	Components	Indicative Quantities
1	Clearance of site, providing guard fencing, signals board etc, complete.	LS
2	Design, investigation, survey and providing, laying, testing and commissioning of Transmission Pipe main pipe (MS/ DI, K9 with K12 special) including allied works such as valve chamber, crossings, thrust block, valve chamber etc. for Burari, Civil Lines and West Delhi	Approx. 37.278 Km is new and 10.98Km existing to be retained (after carrying out hydraulic testing, after checking whether lines are lined or not).
3	Design, investigation civil construction of single UGR including electro-mechanical. Instrumentation etc. all complete like interfacing with the proposed pump house	1 No.
4	Design, investigation civil construction of single Pump houses and ancillary building including electro-mechanical. Instrumentation etc. all complete as per specification etc. all complete	1 No.
5	Supply, Installation of Pumps, motors, and associated E&M works, Instrumentation, SCADA all complete (including all allied works)	12 numbers of pump sets of specified capacity.
6	Survey and connection with existing Filter house and proposed single UGR combined for phase 1, phase 2 and phase 3	1
7	Connection between phase 04 UGR to Phase 3 Pump house sump	As per actual site condition
8	Design, investigation civil construction of Surge Vessel and related compressor house for phase 1, phase 2 and Phase 3 pump houses	3 numbers of specified capacity
9	Demolition of existing UGR and Pump house, related ancillary building after construction of the new proposed units	3+3

S. No.	Components	Indicative Quantities
10	Utility shifting of both underground and over ground facilities like existing pipes lines, transmission tower etc.	LS
11	Design Supply Commission of Electromagnetic flow meter	3 Nos at UGR
12	Design Supply Commission of Electromagnetic flow meter at tapings to UGR	3 Nos at UGR
13	Construction of RCC chambers for installation of inline valve, flow meters within command area of UGR.	4 Nos
14	Providing and Laying of MS Transmission pipes using trenchless technology in the service area	1.60 Km
15	Supply and installation of necessary SCADA enabled instrumentation equipment and system	LS
16	Supply and installation of SCADA hardware, software and communication equipment at each proposed Pump House and establish communication with WTP-PLC through FOC cable.	LS
17	Providing and Maintaining water quality monitoring points including collection of samples and get the water quality monitored on regular basis as per applicable standards and requirements at UGR.	3 UGR outlets
18	Design, Install, Commission vacuum chlorinators of liquid Chlorine at UGR in WTP etc.	3 Nos. of specified capacity
18	Design, installation, Commission Surge Protection system at proposed clear Water Pump House including all allied works, etc. Complete etc.,	4 nos.
19	Execution of project keeping in mind safety, social safeguard, environment and suitability in strict compliance with ADB’s Safeguards policies and documents, as well as those of the Government of India.	LS

The Scope of Services shall include all technical, managerial, administrative, commercial, environmental, and social interventions as required in accordance with acceptable, prudent water utility construction and management practices, ensuring safe and sustainable drinking water supply services to the consumers in the service area. The scope of services mentioned in the above table is indicative only and the Contractor is required to undertake his own detailed investigation of the project facilities to determine the complete scope of services for achieving the minimum service levels.

With regards to trenchless construction, the Contractor shall propose locations for the use of this method construction in the Service Improvement Plan (SIP), based on the use of this method at major road crossings and to minimize social and environmental impacts.

6.1.8 Methodology and Approach to the Services

6.1.8.1 Site Acquaintance

In order to get acquainted with the project, the Contractor is required to:

- 1) Establish contact with all relevant stakeholders Consumers, DJB, PMC, PWD, NHAI, Electricity Distribution Company, Gas distribution authority, Telecommunication companies, ASI (for work near heritage and monumental sites, DPCC, DMC, and the

local traffic police and other government agencies, as well as the Project Management Consultant (PMC) and other Consultants engaged by DJB.

- 2) Become familiar with the organization set up, DJB's O&M practice, existing water supply system, and the applicable standards and guidelines for water supply design, and with existing assets and current on-going works in the Service Area.
- 3) Study the works being done by DJB (including the JICA financed 'Delhi Water Supply Improvement Investment Programme in Chandrawal WTP Command Area' which is adjacent to the Wazirabad Command Area), works being carried out in other existing and proposed Command Areas and other departments being undertaken during the contract period in the service area.
- 4) Satisfy himself with the nature and scope of work and the prevailing site conditions.
- 5) Be familiar with governing laws and regulations in order to undertake studies and construction activities under the Contract such as:
 - i) Environmental and social impact assessments and prevention, mitigation and monitoring of impacts during construction;
 - ii) Compensation for damages to property or services;
 - iii) Occupational health and safety including workers compensation;
 - iv) Signage for construction works and;
 - v) The permissions/permits and co-ordination required from the different agencies.
- 6) The Contractor shall review and validate the Detailed Project Report of the project which will enable him to prepare the SIP:
 - i) in line with the Detailed Project Report (DPR) approved for funding,
 - ii) in compliance with the Draft Master Plan for DJB, in full cognisance with the proposed and ongoing changes in Command Areas,
 - iii) in compliance to the terms and conditions of the Project and Loan Agreements among ADB, Government of India and Government of Delhi,
 - iv) in coordination with the on-going and programmed activities of DJB and GNCTD, as required,
 - v) Any deviations to the document, data provided by DJB and consultant shall be highlighted and got approved as part of the SIP.
- 7) In case of any interventions proposed in the SIP, which are not part of the DPR or those interventions which are part of the DPR but require improvement from conventional design practices, the Contractor shall provide sufficient explanation and justification as to how implementing such interventions would influence the achievement of the Performance Standards stipulated in the document at a better cost (capital, operation and maintenance, life cycle, as appropriate and in accordance with the requirements of the Employer).
- 8) In a situation where the Employer does not agree to the interventions proposed in SIP, there may be mutually agreed revision of the Performance Standards.

6.1.8.2 Work in Roads and Road Restoration

Work in roads and road restoration is a critical activity which requires special attention of the Contractor. The following guidelines shall be followed:

- a) Work shall be carried out in strict compliance with the requirements of the Municipal Corporation of Delhi (MCD) and road owning agencies.

- b) The Contractor shall erect notice boards at his own cost showing type of work, inconvenience expected & timeline for various construction activities going to take place in a particular street or a particular stretch of road as per direction of the Employer.
- c) The Contractor shall have to do the sequencing of activities as per direction of the Employer to synchronize pipe line work to minimize the road excavation and restoration in the street which will have pipe lines.
- d) The Contractor shall comply with the requirements of ADB’s safeguards documents.

6.1.8.3 Provisions of Road Restoration

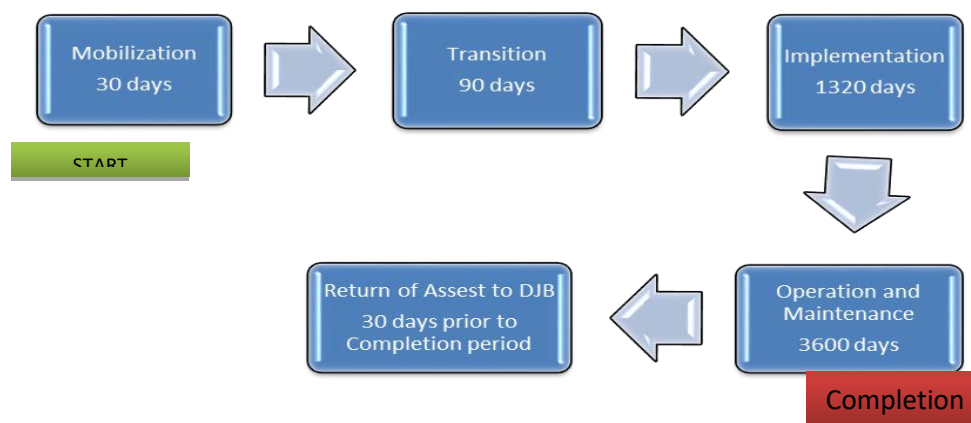
Permanent road restoration shall be carried out by the MCD. The Employer shall be responsible for road restoration charges to MCD.

Temporary road restoration shall be carried out by the Contractor, such that all roads are motorable and maintained in such condition until permanent road restoration is carried out by the MCD.

6.1.9 Operation and Maintenance

It is envisaged that the Contractor will operate and maintain all the assets within or outside the service area which are associated and necessary for the effective services delivery. DJB shall hand over all the UGRs and pumping stations (including booster stations), existing distribution network and associated office premises for the purpose of O&M.

Immediately after the Commencement Date the Contractor shall conduct a due diligence of the existing assets and along with DJB prepare a registry of the assets which need to be taken over by the Contractor as a part of its Operation Service obligation. The Contractor shall start taking over the assets from DJB after 30 days from the Commencement Date. During the 90 days transition period, the Contractor will take over the entire service area. The Operation Service Period starts at the end of the Transition period, i.e. from day 121, as stated in Section 8 – Particular Conditions of Contract.



The Contractor shall operate and maintain the water supply to the consumers, undertake periodic and breakdown maintenance of E&M equipment, civil structures, office premises, distribution network, valves, bulk flow and consumer meters, service connection, electronic instrumentation associated with SCADA, required consumables including daily cleaning and guarding of all installations, management of consumer complaint centres, etc.

Consumer satisfaction must be paramount in O & M activities. Particularly, queries about billing and notifications of breakdowns or leaks must be quickly addressed. The contractor must make it convenient for consumers to lodge complaint related to services, pay their water bill easily. Contractor shall prepare and timely publish a quarterly report on operations to DJB and consumers for the purposes of accountability and transparency.

Apart from that the Contractor shall submit an Asset Replacement Schedule, which will cater for major replacements of assets, based upon residual useful life of the assets and planned replacement, during the period of the Operation Service. The year wise Asset Replacement Schedule should be agreed with Employer and will be part of the SIP to be submitted by the Contractor. Based upon the Asset Replacement Schedule and Asset Replacement Fund will be determined and the Employer will make required financial arrangement so that sufficient funds are available for the Asset Replacement which in turn will help the Contractor to carry out his Operation Service obligation and maintenance of the performance targets stipulated in the Contract.

The item rate payable to the contractor under asset replacement shall be derived on the basis of contractor’s quoted price of similar item given under Price bid with price variation as per clause 4 of schedule 3 of section 8.

The Contractor shall follow scheduled replacement and /or up-gradation of the equipment as per the schedule given below.

Table 6.19: Asset Replacement Schedule

Item	Scheduled Replacement
Bulk meters	Once in 5 years or as necessary
Motors for pumps	Once in 15 years or as necessary
Computers, printers and networking equipment	Once in 3 years or as necessary
Software	Continuous timely upgrade including regular Up-gradation of anti-virus and protection software
Instrumentation	Once in 3 years or as necessary
Painting of civil and mechanical structures	Once in 3 years or as necessary

The cost of services of all technical, managerial, administrative, commercial, environmental, and social interventions as required in accordance with acceptable, prudent water utility construction and management practices shall be included in the cost of Operation Services. The services of above mentioned manpower shall be treated as part of the Contract and the Contractor shall allow for the cost accordingly.

6.1.10 Public Awareness and Community Participation

It is being increasingly realized that the consumer participation, either as provider or for performance assessment can be critical to the effectiveness and at times efficiency of smaller community level infrastructure. Services, in many of these, the provisions and operations at local level can be better handled by the user or community groups.

Specific arrangements for involving consumers and community groups may be achieved by community participation and this should form a part of decision making process during project implantation stage through workshops and awareness campaign. It will provide them a sense of ownership/partnership.

DJB will appoint a “COMMUNITY MOBILIZATION AND THE RESETTLEMENT CONSULTANT” (CMRC) to support DWSIIP in: (i) community mobilization; (ii) public relations and awareness; (iii) implementation of the resettlement plan, and (iv) ensure

gender equity and social inclusion (GESI) and its monitoring during the Design- Build Period (initial 4 years)

CMRC will work for design and implementation of all community mobilization and participation activities (CMP), implementation of gender equality and social inclusion (GESI) action plan, capacity building of DJB/DWSIIP and other stakeholders.

The contractor should work in coordination with the CMRC and provide prior information to the CMRC about their work schedules. This will enable the CMRC to plan and roll out the relevant community mobilization and communication activities. The Contractor shall be fully responsible for executing the works in accordance with the provisions of the Contract and nothing in the Contract for will relieve the Contractor of his responsibilities, irrespective of the roles and responsibilities of the CRMC, PMC and the Employer with regards to this Clause and related Clauses.

Therefore, the Contractor shall engage a social consultant (or individual consultants) to work/interact with city-level NGOs, civil society organizations, resident welfare associations and other stakeholders for Community Mobilization and Resettlement during project implementation and O&M period beside an independent "COMMUNITY MOBILIZATION AND THE RESETTLEMENT CONSULTANT" (CMRC) to be appointed by DJB.

The social consultant engaged by the Contractor will support DWSIIP in: (i) community mobilization; (ii) public relations and awareness; (iii) implementation of the resettlement plan, and (iv) ensure gender equity and social inclusion (GESI) and its monitoring during the Design- Build Period (initial 4 years). Thereafter, the role of the social consultant will reduce and focus mostly on grievances resolving during the remainder of the Operation Services Period of 10 years.

The social consultant will work for design and implementation of all community mobilization and participation activities (CMP), implementation of gender equality and social inclusion (GESI) action plan, capacity building of DJB/DWSIIP and other stakeholders as detailed below:

1. design and implement Community Awareness and Public Participation activities on DWSIIP works
2. Create awareness on the project and urban management issues like water conservation and water metering, solid waste management, waste water management etc.
3. Motivate and facilitate the end users in accessing connections, metering and to pay the user charges applicable.
4. Coordinate with Elected Representatives, NGOs and community to facilitate project implementation and sustainability.
5. conduct baseline surveys for the service delivery, socio economic status, vulnerability, consumer connections, urban service level
6. conduct special campaign for 100% metering and NRW reduction
7. implement gender equality and social inclusion action plan as per approved GESI; training on GESI activities
8. training programs and community based programs including poverty alleviation plans as required for the target communities
9. conduct Health and Hygiene Education program
10. conduct project awareness program (Pre-construction, construction and post construction)

11. design and implementation of extensive media-based awareness programs as per needs of the project
12. involve the community, ward committees, educational institutes, CBOs and other relevant organizations in awareness campaign;
13. develop “exit strategy” to be taken over and carried on by others
14. conduct awareness and publicity program of DWSIIP works
15. Support the project in preparation and implementation of resettlement plans for affected persons.

A comprehensive IEC program shall be launched by the Contractor during the contract period to educate the consumers and it is a contractor’s responsibility to hire the social consultant to organize and implement the IEC program during the contract period.

The Contractor shall be fully responsible for executing the works in accordance with the provisions of the Contract and nothing in the Contract for will relieve the Contractor of his responsibilities, irrespective of the roles and responsibilities of the CRMC, PMC and the Employer with regards to this Clause and related Clauses.

6.1.11 Important Milestone and Key Time Periods under the Contract

Important milestone and key time periods as per the terms of Contract are given in Table below.

Table 6.20: Milestone and Key Time Periods

Sr. No.	Sectional Milestone	Time from Commencement Date (days)	Event of start	Activities
1	Mobilisation	30	Commencement Date	As per Clause 6.1.20
2	Preparation of Service Improvement Plan (SIP) (Including SIP for 1 no. priority UGR and associated Pumping Station and Transmission Line)	120 Days – SIP Submission 150 Days – SIP Approval	Commencement Date	As per Clause 6.1.21
3	SIP Implementation	1260	approval of SIP in part or full	Design, Construction, testing, commissioning and completion of all works as per milestones
Water supply works:				
4	Construction on 1 No. UGR and Pumping Station	900	Commencement Date	Construction, testing and commissioning of UGR & Pumping station
5	Implementation of one priority transmission Line	900	Commencement Date	Supply, laying, jointing, testing and commissioning of transmission Line
6	Completion of entire works including, preparation of as built drawing etc.,	1260	Commencement Date	UGR & Pump House construction and commissioning, Supply, laying, jointing, testing and commissioning of

Sr. No.	Sectional Milestone	Time from Commencement Date (days)	Event of start	Activities
				transmission Line completion of all other works.
Operation Service delivery				
7	Operation and maintenance of entire system as per scope of work	4830 days	from the date of initial takeover	O&M of system from UGR's to transmission system.
8	Handing over back to Employer	4860 days	30 days before End of Operation Services period	Joint verification of assets, Issuance of Operation Services period completion certificate and Joint signing of Handing Over document

6.1.12 Phasing of Contract

The Contract is divided into two phases (I. Design Build, II. Operation services) spread over the contract period; from the stipulated date of Contract Commencement up to the Contract Completion Date.

- I. Mobilization, preparatory and construction period as per approved service improvement plan and
- II. Operation, Maintenance, Manage, Repairs and Service Delivery Period during the contract period as per the sectional completion of work from initial takeover date (in case of sectional completion), till end of the contract period.

6.1.13 Mobilization Period

Mobilization period shall be a maximum of 30 days from the Commencement Date. During the mobilization period, the Contractor is required to:

- Establish a furnished project office in service area
- Mobilization of staff required for starting the preparatory work
- Mobilise the survey teams
- Provide the computer hardware, software required for, GIS based maps preparation, hydraulic modelling, project management etc. along with connectivity
- Establish furnished Employer’s office
- The contractor shall be responsible for the preparing the transition handover plan, the Comprehensive Assessment of the facilities and familiarise with the operation of the facilities and provision of water supply services by the Board.

6.1.14 Preparatory Period (Preparation of Service Improvement Plan Period)

This Preparatory period will also include simultaneous transition period of 90 days within which the Contractor is required to take over from the Employer all the facilities within the service area for operation and maintenance.

During the mobilisation period of thirty days and initial ninety days of Preparatory period, the DJB shall continue to be responsible to provide water supply services and collect charges in the Service area and operate and maintain and repair the facilities in accordance with applicable laws and performance standards and requirements in force.

The Employer will handover/ensure handover of the facilities in the service area to the Contractor one week before the completion of 90 days of transition period.

The Employer shall ensure that the Transition team of the Contractor is provided with all required access to all the facilities to study the management, operation and maintenance of the water supply system and to carry out the comprehensive assessment of the facilities in order to prepare a draft SIP and Draft Procurement Plan.

During the Preparatory Period, the Contractor is required to:

- Be familiar with the project site condition after required consultation
- Mobilise the Transition Team of the Contractor as per the Transition Handover Plan submitted
- Collect existing data, report, drawings, maps etc
- Conform/ conduct topographic survey to ascertain the levels, road width, existing services etc
- Surveys for all underground utilities and marking on GIS based maps by linking with geo referenced points,
- Conduct survey and prepare data base of the existing properties with service connections details on GIS platform, using 0.5 m resolution or better satellite image of the service area, by linking with geo referenced points
- Conduct Flow measurement surveys in the project area.
- Review the detailed project report in water supply provided by DJB including all designs and provisions from UGR's upto Transmission system and prepare a Improvement Plan.
- Prepare Service Improvement Plan in water supply sector
- Prepare an asset inventory report, baseline water balance and strategy for improving services.
- Registration and compliances of core labour standards as per ADB's Safeguard policy

6.1.15 Service Improvement Plan (SIP) Document

The Contractor during preparation of SIP will be allowed for refinement of overall design for long term efficiency, effectiveness and sustainability. Contractor, in his SIP as a part of "Value Engineering" (Value Engineering shall be in such a way that cost estimates of work does not exceed the corresponding physical quantity of the work), may include proposal which in the Contractor's opinion will reduce the cost of constructing, maintaining or operating the Works, or improve the efficiency or value to the Employer of the completed Works, or otherwise be of benefit to the Employer. Any such proposal may be considered by the Employer with due diligence looking to the bid sanctity.

The SIP comprises of the following two parts:

Part I – Construction Works:

- I. SIP should be prepared based on Employer's requirement including sectional completion requirement and milestones.
- II. Detailed design, drawings and cost estimates of work and improvement as a part of Value Engineering should be proposed to meet the Performance Standards.
- III. Work plan, Methodology and timelines for implementation should be in line with the employers' broad concept /requirement.;
- IV. Detailing of integrated Contract Management Information System by using latest software like Primavera, Microsoft office architecture, data capture, management and reporting structures, protocols including all related hardware, software, installation;
- V. Contractor Personnel deployment plan;
- VI. Construction Plant and equipment deployment plan;
- VII. Cash-flow for both parts;
- VIII. Asset Replacement Schedule with justification;
- IX. Detailed methodology for continuous monitoring of the performance of the Contractor in achieving and maintaining the Performance Standards for release of the eligible Operating Payments;
- X. Compliance matrix of contract and service requirement, O&M requirement and other requirements like social, environmental etc

Part II –Operating and Management Procedures and Policies:

- a) Annual Operating Plan (AOP) covering all operations, maintenance and management requirements in the Service Area;
- b) Annual Asset Replacement Schedule towards mandatory replacement of major E&M equipment during the Operation Services Period
- c) Emergency Response Plan (ERP);
- d) Public Relations Plan;
- e) Standard Operating Procedures (SOPs) for routine operations and emergency responses;
- f) Energy optimization program;
- g) Connections policy for all types of connections including services to the urban poor and treatment of illegal connections;
- h) Network expansion policy;
- i) Detailing of an Integrated Management Information System (MIS) including its architecture, data capture, management and reporting structures, protocols including all related hardware, software, installation, and operation and maintenance requirements; and
- j) Periodic reporting plan including the formats for different performance reports.
- k) The computer hardware and software improvement plan for continued operation of the MIS, instrumentation and SCADA

The Contractor shall submit the draft SIP within time stated in Table 6.17 to allow the Employer to undertake a thorough review of the draft SIP and suggest amendments if any.

6.1.16 SIP- Activity Schedule

Schedule of various activities of the SIP is shown in Table below:

Table 6.21: SIP Activity Schedule

Sr. No.	Activity (2)	Target period for completion from contract commencement date (3)	Amount of penalty to be recovered in case of delayed output (4)
1	Mobilisation on site as per activities under sub clause 6.1.20	30 days	
2	Procurement of Satellite Image, ground verification, footprint dividing into properties, preparing consumer survey ready format and planning for its sequence.	45 days	Rs. 25,000 per day
3	Topographical and consumer survey of the service area	60 days	Rs. 25,000 per day
4	Importing the GIS file for Hydraulic modelling of Water in design software, demand allocation to footprints and Hydraulic Network Modelling	60 days	Rs. 100,000 per day
5	Complete system design and drawings, preparation of abstract of final quantities and cost estimates for the SIP	80 days	Rs. 125,000 per day
6	Preparing PERT chart, manpower, equipment, mobilisation plan, cash flow plan, detailed methodology of continuous monitoring etc.	80 days	
7	Detailed O&M plan, Standard Operating Procedures and policies plan, Performance measurement plan, customer data base separately for water supply.	100 days	
8	Compilation and submission of SIP in complete	120 days	Rs. 150,000 per day
9	Scrutiny of SIP at DJB in complete	135 days	
10	Shortcoming improvement	140 days	
11	Approval of final SIP	150th day	

The Contactor shall submit the outcome of each activity for review of Employer’s representative immediately after completion of the activity. Employer’s representative will review the outcomes on regular basis and will submit their review comments within 15 days of receipt of the document. Contractor will develop separate data base for water supply consumers.

The Contractor shall also submit the activity wise monthly report for monitoring of the employer. Progress of all activities will be reviewed on monthly basis.

In case of delays in meeting timelines of SIP activities, penalty as per the sums indicated in column (4) will be imposed and recovered from due payments. If the delays that occurred in activity milestones are covered by the Contractor within the stipulated or extended period for Compilation and submission of SIP in complete, which is not attributable to Contractor, penalty imposed on account of such delays will be refunded.

6.1.17 Updating Draft Initial Environmental Examination (IEE) Implementation

Upon completion of SIP and all detailed design, the PMC will update the draft IEE and EMP for the Project, contained in Annexure- C, to reflect the changes, submit the updated IEE and EMP to the Employer for review and submission to ADB.

Upon completion of SIP and all detailed design, the PMC/CMRC will update the draft DDR for the Project, contained in Annex E, to reflect the changes, submit to the Employer for review and submission to ADB.

Contractor will implement the IEE and DDR. The Engineer/PMC/CMRC will closely monitor the contractor for compliance with the updated IEE and DDR.

Contractor will ensure prior to implementation, that the updated safeguards documents following detailed design, have been endorsed by DJB/ADB and no commencement of physical works prior to the implementation of DDR in that stretch.

6.1.18 SIP Implementation

The Scope of Services during the implementation period shall essentially comprise of implementing the approved SIP based on the hydraulic model prepared for water distribution based on DMA approach and SIP will be implemented in accordance to international best practice and industry standards and sufficient care shall be taken by the Contractor in minimizing supply interruptions, traffic disruptions, health and safety requirement at workplace / site and ensuring good and timely communications with the Consumers in the Service Area. During work execution, the Contractor shall inform the residents, say, of a particular street, well in advance about the type of work, inconvenience expected, timelines for various works, etc. The Contractor shall have a strong Public Relations and Community Outreach team and will be solely responsible for such work; notwithstanding this support will be provided as stated in Clause 6.1.16.

All the Works and interventions proposed as part of the SIP shall be in conformity with the Specifications set out in the Employer's Requirements. Implementation of the water supply distribution network in a given street / road shall be taken up simultaneously so that the people living in the area are not affected multiple times.

6.1.19 Management Information System

Contractor shall develop, establish, operate and manage during the entire contract period a comprehensive Integrated Management Information System (MIS) in respect of all matters including but not limited to:

- i. Design Build activities
- ii. All the Operation and maintenance activities
- iii. Meter Reading System;
- iv. Consumer services, including data bases relating to complaints and questions, response times and resolution;
- v. Financial management, including accounting systems;
- vi. Performance information systems; and
- vii. Others as identified during SIP preparation and implementation.

6.1.20 Scope of Operation Services:

From the Final Taking Over Dates, the Contractor shall supply potable water to 11 nos. UGR's on as-is condition and through the constructed and commissioned system respectively. Contractor shall be responsible for operation, maintenance and management of water supply services in service area as detailed below

From Final Takeover date to expiry of Operation Period:

- Operating pumping station at the CWR/UGR's within Wazirabad WTP to send required quantity of water to 11 nos. Zonal UGR's
- Managing the Transmission network on as-is condition with an overall objective and progressive development efficiently, equitably and minimizing Physical losses.
- Detecting and monitoring unauthorised tapping in transmission main and non-Revenue consumption
- Provide continuous on-the-job trainings and other capacity building programs
- Submission of monthly Operating Performance Report (OPR) which should include separate section on achievement of Performance Targets as per Schedule 3 & Schedule 5 of Section 8, Volume 1
- Provide continuous on-the-job trainings and other capacity building programs
- Submission of monthly Operating Performance Report (OPR) which should include separate section on achievement of Performance Targets as per Schedule 3 & Schedule 5 of Section 8, Volume 1
- Conduct mandatory replacement of equipment as per the approved Asset Replacement Schedule

If the Contractor fails to achieve the services defined in performance targets, then the Contractor shall be levied with Non-Performance Adjustment as specified in Schedule 3 of section 8 of PCC. The Contractor shall not be liable for Non-Performance Adjustment to the extent such failure is attributable to a Release Event in which event the Contractor shall take necessary steps to mitigate the effects of the event and operate the potable water system in accordance with the standards of a reasonable and prudent way.

Replacement of equipment, assets or infrastructure which is not part of the Contractor's work or agreed in the SIP for replacement shall be paid separately. All these need to be part of the Asset Replacement Schedule which is indicated in previous portion of this section. The Contractor will include costs for repairs of bulk flow meters, valves, panels, motor pumps and all other equipment and its spares including battery, and other equipment in his quoted price.

6.1.21 Training

Contractor will provide on the job training during operation services to the staff of Employer. Contractor shall organize detailed training to the identified staff in technical, commercial and financial aspects of water services provision to enable the Employer to build sufficient capacity and skills to manage the water services after the Contract Completion Date. Commencing from 90 days before the Contract Completion Date, the staff either from Employer or from a future Contractor will overlap and co-manage the operations to ensure continuity in service delivery.

6.1.22 Electricity Consumption

The Contractor, during the preparation of the SIP shall assess the capacity of pumps and motors existing (provided by the Employer), the arrangements for maintaining the power factor before taking over the same etc. During operation and maintenance period, the Contractor shall be responsible to maintain power factor; any equipment required to maintain power factor will be installed by the contractor under provisional sum and will be paid separately. The Contractor will be responsible for maintaining power factors 0.98 at the pumping equipment installed by him.

6.1.23 Maintaining Performance Standards

The performance standards for the Design Build works during the SIP implementation shall consist of i) quality of work as per specifications and ii) The time line for completion as per the milestones defined in "Table 6.17- Key time periods and milestones". The liquidated damages will be levied for non-achievement of these milestones in time, as per the provisions in Section 8: Particular Conditions of Contract.

The measurement of the quality of work will be as per the tests laid down in the specifications of various items while the measurement of the achievement of milestones is based on the defined works and defined dates given in "Table 6.17 - Key time periods and milestones"

Payment of operation services will be in accordance to the procedures in Schedule 3 – Contractor Payments attached to Section 8: Particular Conditions of Contract. Operation service contract will be governed by Performance Standards provided in Schedule 5 – Performance Targets and Measurement attached to Section 8: Particular Conditions of Contract.

6.1.24 Periodic Reports

The Contractor shall prepare and submit periodic reports on different plans, progress of Works, performance standards etc., including exceptional reports on emergencies if any. The reporting requirements are provided in Table 6.19. The Contractor shall as part of the SIP develop the required formats for the periodic reports and also identify any critical reporting requirements in order to enable timely decision making by the Employer.

Table 6.22: Summary of Periodic Reporting Requirements

Deliverable	First Report	Follow-up Tasks
Transition Handover Plan	Submit within 30 days from the Contract commencement date	Not applicable
Service Improvement Plan (SIP)	Submit SIP not later than 150/180 days from the Contract Commencement Date	Not applicable
Annual Operating Plan (AOP)	Submit Annual Operating Plan (AOP) not later than 150 days from the Commencement Date (as part of SIP)	Submit AOP for subsequent years not later than 90 days prior to end of previous year plan

Deliverable	First Report	Follow-up Tasks
Standard Operating Procedures (SOPs) for operation and management	Submit report not later than 360 days after Commencement Date	Complete implementation and training 30 days before commissioning of first zone and subsequently whenever new employees join for O&M.
Management Information Systems (MIS)	Submit report not later than 150 days after Commencement Date	Generate monthly reports from MIS
Monthly Progress Reports (MPR) during the Design Build Phase of Contract	Submit MPR every month before the 7 th day of the subsequent month commencing from the Commencement Date till the Final Taking Over Date	To be submitted every month during the Design Build period.
Operating Performance Report (OPR); the OPR shall include: a detailed progress report on the implementation of the SIP; monthly water account with details of bulk water supplied by the Employer and received at UGR, distribution and billed; revenue collection based on information provided by the Employer; Performance Standards achieved or maintained during the month; staff details engaged at various centres; exceptional reports on emergencies; financial information on project cash flows, consumer grievance redressal etc.	Submit OPR for any and every month before the 10 th day of subsequent month commencing from the Initial Takeover Date	To be submitted every month
Quarterly Performance Report (QPR); the QPR shall include a brief summary of the relevant issues detailed in the Monthly Performance Reports including a summary analysis of unpaid bills based on information provided by the Employer	Submit Quarterly Performance Report for any and every quarter before 20 th day of subsequent quarter commencing from the Commencement Date	Repeat for every quarter including summary analysis of unpaid bills
Annual Performance Report (APR); the APR shall include the annual accounts, cash flow, and financial performance including summary analysis of unpaid bills based on information provided by the Employer	Submit Annual Performance Report for any and every year before 20 th day of subsequent year	Repeat for every year
Asset and Facilities Register	Submit Asset and Facilities Register within 150 days from the Commencement Date	Submit updated Asset and Facilities Register before 30 th day from the completion of an operating year

6.2 Specifications

The Contractor shall carry out the Works based on the Specifications included in this section. The section comprises the following two parts:

6.2.1 Standard Specifications;

6.2.2 Particular Specifications;

6.2.1 Standard Specifications

- The “Standard Specifications are included in **Volume 2** of the Bidding Document, set out the specifications that shall be followed for construction of general civil works. Specifications for additional specialized items of civil works, and for pipes, mechanical instrumentation and electrical works, shall be as set out in Particular Specifications, of this Section.
- In the event of any discrepancy between the provisions of the Standard Specifications and the Particular Specifications, then the provisions of the **Particular Specifications will prevail**.
- In the event of conflict between this Specification and the Codes for equipment, provisions of this Specification shall govern. Certain specifications issued by National or other widely recognized bodies are referred to in this Specification.

6.2.2 Particular Specifications

- The Particular Specifications contains specification for additional specialized items of Civil Works; Pipeline; Mechanical, Electrical and Instrumentation works; Pumping Station etc., including the requirements for Testing and Commissioning and

Operating Services. In the event of any discrepancy between the provisions of the Standard Specifications and the Particular Specifications, **provisions of the Particular Specifications will prevail**. The Particular Specifications are included in **Volume 3** of the Bidding Document.

- All the Materials incorporated in the Works shall be the most suitable for the duty concerned and shall be new and of first class commercial quality, free from imperfections and selected for long life and minimum maintenance. These may be tested according to relevant Indian Standards (IS) or International Standards Organization (ISO) standards in qualified labs and certificates produced to the satisfaction of the Employer's Representative.
- The objectives of the specifications given are to specify the details pertaining to the designs, drawings, and selection of equipment or product. The equipment or product supplied shall be of high standard of quality and best engineering practices and shall comply with all currently applicable standards, regulations and codes.
- Except as otherwise specified in these technical specifications, the Indian/International Standards and codes of practice in their latest version shall be adhered to for the design, manufacturing, inspection, calibration, installation, field testing, packing, handling and transportation of products. Should any product be offered conforming to other standards, the equipment or products shall be equal to or superior to those specified and the documentary confirmation shall be submitted for the prior approval of the Employer.

In addition, the following Clauses are part of the Employer's Requirements.

Employer's Site Office

- The Contractor shall provide, furnish, equip and maintain, for the design, build period, 2 site offices for the sole use of the Employer's site staff. The offices shall be located near the Contractor's site offices. Basic construction details and dimensions shall generally conform to local building standard or as approved by the Employer.

- One site office shall have an internal area of at least 50m², and shall have at least, 2 officer rooms, a conference room, pantry and a toilet. The layout of the site office and the sizes of the individual rooms, shall be agreed upon between the Employer and the Contractor. The Contractor shall establish Employer's site office within 14 days of the issue of the Notice to Proceed. Another site office shall have an internal area of at least 40 sqm, and shall have an office room, pantry and toilet facilities. The layout of the site offices and the sizes of the individual rooms, shall be agreed upon between the Employer and the Contractor. The Contractor shall establish the site office within 120 days of the issue of the Notice to Proceed. Each office room in these offices shall be provided with air conditioning facilities, sufficient lighting and well ventilated and shall be so insulated as to provide comfortable working conditions.
- Each site office shall have required furniture/appliances, desktops, printer, required stationary and printing material, at telephone connected to the public system and broadband internet. Each site office and equipment shall become the property of the Employer upon completion of the Contract.
- The Contractor shall be responsible for the proper maintenance of the offices during the design build period. He shall keep the offices and toilets clean and shall provide adequate cleaning staff for this purpose throughout the Contract period. All electricity, water and telephone charges, relating to the Employer's offices, including connection and disconnection fees and rental charges shall be paid by the Contractor. If the Employer feels that office arranged by the contractor is not being maintained properly, Employer has right to deduct a reasonable amount from that payment.

Safety Equipment for the Employer

- The Contractor shall provide the Employer with the safety equipment at each site office. The Contractor shall replace each item after it wears out and becomes unsuitable for use.

Contractor's Offices, Stores and Services

- The Contractor shall provide, erect, construct, maintain and subsequently remove proper offices, stores, workshops, laboratories, storage and parking areas for his own use. Such facilities shall be sufficiently sized and equipped to enable him to manage his operations and those of his Subcontractors in a professional manner and to enable him to carry out all his obligations under the Contract. Sheds for storage of materials that may deteriorate or corrode if exposed to the weather shall be weatherproof, adequately ventilated and provided with raised floors. No material shall be placed directly on the ground. Within his offices a meeting room shall be available for site meetings with the Employer and the Employer.

First Aid at Office and Work Site

- The Contractor shall make his own arrangements for treatment of casualties on the Site in such first-aid units as may be thought necessary. The Contractor shall be responsible for the construction of such first-aid units and their management and operation and the removal by ambulance of injured or sick employees to nearby hospitals. The first-aid service shall cover the Contractor's own personnel as well as that of the Employer, the Employer and all Subcontractors.

Environmental safe guards

The Contractor shall be responsible for ensuring following environmental safe guards measures:

Bidding stage:

- Understand the EMP requirements and allocate necessary resources (budget, staff, etc.,)
- Understand the regulatory compliance requirements related to labour welfare, safety, environment etc.,
- Construction stage:
- Ensure that all regulatory clearances (both project related and contractor related) are in place before start of the construction work.
- Mobilize EHS supervisor prior to start of work
- Confirm with PIU availability of rights of way at all project sites prior to start of work.
- Update EMP and prepare SEP
- Prepare Method Statement and get it approved prior to start of work
- Prepare the following duly incorporating EMP measures, and submit to the PIU :
 - Construction waste management (CWM) plan
 - Traffic management (TM) plan
 - Occupational Health & Safety (OHS) Plan
- Implement the mitigation measures as per the EMP including CWM & TM Plans
- Finalize sections for use of trenchless technology considering technical, environmental and social safeguard aspects with the coordination of PIU and PMC
- Follow the EMP measures/guidelines for establishment of temporary construction camps, construction waste disposal sites, and material borrow areas, etc.,
- Implement EMP and ensure compliance with all the mitigation and enhancement measures
- Conduct environmental monitoring (air, noise, water etc.,) as per the EMP
- Undertake immediate action as suggested by PIU / PMU / PMC to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation
- Submit monthly Environmental Monitoring Reports on EMP implementation
- Act promptly on public complaints and grievances related to construction work and redress in a timely manner in coordination with PIU
- Comply with applicable government rules and regulations
- Site clean-up and restoration including clean up and disinfection of pipelines prior to supply

Testing Facilities, Laboratory

- Within 14 days of issue of Notice to Proceed, the Contractor shall establish, in the campus of site office, an on-site fully furnished and adequately equipped field laboratory staffed by qualified personnel suitable for construction material testing except cement and steel etc. He will make the facility to test other material in the approved independent material testing laboratory. The name and qualifications of independent testing laboratories shall be submitted to Employer for approval no less than thirty calendar days prior to the date the laboratories are to be used. Once approved, dismissal and replacement of the approved independent testing laboratory shall require written authorization by the Employer. The site laboratory shall be functional till the design build work is completed. Laboratory and equipment shall become the property of the Contractor upon completion of the Contract
- If Project Manager found that Laboratory arranged by the Contractor is not being maintained properly then Project Manager has right to deduct a reasonable amount from payment. The calibration of the laboratory equipment and instruments shall at the initial stage to be certified by agencies approved by the Employer. Laboratory equipment shall be properly maintained and calibrated throughout the period of the Contract by the Contractor at his own expense. The Contractor shall notify the Employer in sufficient advance prior to conducting any tests for the materials and work. The Employer will also inspect the laboratory and the contractor shall provide adequate facilities to the Employer for his independent verification of the accuracy and adequacy of the facilities.
- The Contractor shall be responsible for the sampling, curing, and transport to the laboratories of all materials for testing, and all testing costs including laboratory fees, and/or all costs in running the on-site laboratory, i.e., chemicals, reagents, and other test consumables, staff, and utilities.

Protection of Overhead and Underground Services

- The Contractor will be held responsible for any damage to known services (i.e. overhead services that are visible within the Site and underground services shown on the drawings) and he shall take all necessary measures to protect them. All work or protective measures shall be subject to approval of the Employer. In the event of a service being damaged he shall inform the Employer and the authority concerned, the Contractor shall not repair any such service unless instructed to do so.
- Contractor will map the underground utilities. Where no underground services are shown on the drawings or scheduled but the possibility of their presence can reasonably be inferred, the Contractor shall, in collaboration with the Employer, ascertain whether any such services exist within the relevant section of the Site. The Contractor shall complete such an investigation well in advance of the start of construction work in the said section and he shall submit a report in good time to enable the Employer to make whatever arrangements are necessary for the protection, removal or diversion of the services before any construction activities commences.
- In main roads and junctions, irrespective of utility services indicated in the drawing, the Contractor need to take proper care prior to commencement of Construction activities so as to ensure minimum disruption to the services. This may require even making a cross sectional trail pit to determine the exact alignments of different utilities.
- Taking care of other utility services infrastructure during the execution of the works is the responsibility of the Contractor. Nothing in the Contract should relieve the Contractor from his responsibility towards safety of other utility services infrastructure

during project execution. The Contractor's Construction program should include such activities into consideration and no extra claim towards time of completion and cost in this regard shall be entertained.

- As soon as any underground service not shown on the drawings is discovered, it shall be deemed to be a known service and the Contractor will be held responsible for any subsequent damage to it. If such a service is damaged during the course of its discovery, the cost of making good such damage will be met by the Employer unless he establishes that the Contractor did not exercise reasonable diligence and that the damage was avoidable.
- Where the authority concerned elects to carry out on its own account any alterations or protective measures, the Contractor shall co-operate with and allow such authority reasonable access and sufficient space and time to carry out the required work.

Signboards

- Signboards shall be placed at each of the project offices, at important locations and in each UGR area, in English, information about the project and Employer, and the names of the Employer and Contractor in a form and size to be agreed by the Employer. They shall be of durable construction capable of withstanding the effects of the climate until the end of the design build Period.
- The Contractor shall keep the signboards in good condition for the duration of the contract and shall remove them on completion of the Contract.
- Besides these signboards the Contractor shall not, except with the written authority of the Employer, exhibit or permit to be exhibited on the Site any other form of advertisement. The signboards will essentially have the description of Grievance system, EHS supervisor name, fire, emergency, women help line and other details like project scope cost, period of construction etc. As suggested by the employer.

Site Drainage

- The Contractor shall keep each Section of the Works well drained until the Employer certifies that it is substantially complete and shall ensure that, so far as is practicable, all work is carried out in the dry. Site areas shall be kept well drained and free from standing water except where this is impracticable having regard to methods of Temporary Works properly adopted by the Contractor.
- The Contractor shall provide, operate and maintain in sufficient quantity such pumping equipment, well points, pipes and other equipment as may be necessary to minimize damage, inconvenience and interference and shall construct, operate and maintain all temporary coffer-dams, sumps, ditches, drains and other temporary works as may be necessary to remove water from the Site while construction is in progress. Such Temporary Works and construction equipment shall not be removed without the approval of the Employer.
- Notwithstanding any approval by the Employer of the Contractor's arrangements for the removal of water, the Contractor shall be responsible for the sufficiency thereof and for keeping the Works safe at all times and for making good at his own expense any damage to the Works.
- The Contractor shall be responsible to keep the Site clear of water at whatever pump rate is found necessary.
- The Contractor's site drainage facilities shall not cause pollution in any local watercourses, he shall be responsible for any legal action resulting from pollution events.

Detours and Traffic Control

- The Contractor shall program his work in such a way that, wherever the temporary closure of street sections to public thoroughfare cannot be avoided, the duration of traffic diversion can be kept as short as possible. No streets shall be closed and no detours shall be introduced and no traffic diverted until the Contractor's proposals have been approved by the Employer and the appropriate Government authorities, such as the Public Works Department.
- Where work is to be carried out in public roads, the Contractor shall give notice to the Employer sufficiently in advance of the date on which he wishes to commence such work.
- The Contractor shall be responsible for obtaining the permission of the Employer, Road Department and the Police for activities he intends to carry out in public roads. Two copies of the Contractor's proposals to the relevant authorities shall be submitted to the Employer. One copy of all obtained approvals shall be submitted to the Employer.
- The Contractor's attention is drawn to the fact that processing of the documentation required by the local authorities prior to the cutting of existing public roads takes approximately 30 days. During the Monsoon period (June to September) no road cuttings are normally allowed. The Contractor to consider the same while finalising their Construction Program and SIP.
- Detours shall be selected in such a way that the inconvenience to the affected traffic as well as to the inhabitants of the affected areas is kept to a minimum.
- The Contractor shall furnish, install and maintain at all times during the execution of the Works all necessary traffic signs, barricades, lights, signals and other traffic control devices, including flagging and other means of guiding traffic through the work zone. Traffic control shall be managed in accordance with prevailing rules and regulations, and with the approval and to the satisfaction of the Employer.
- All devices mentioned above shall be in conformity with the requirements of the Roads Department. All traffic signs and control devices to be furnished and installed by the Contractor shall be approved by the Employer for their location, position, visibility, adequacy and manner of use under specific job conditions.
- All traffic control devices necessary for the initial stage of construction shall be properly placed and operational before any construction is allowed to start. When work of a progressive nature is involved, the necessary signs shall be moved concurrently where they are needed.
- If the Employer determines that proper provisions for safe traffic control are not being provided or maintained, he may restrict construction operations affected by such defective signs or devices until such provisions are established or maintained, or may altogether order suspension of the Work until a proper traffic control is achieved. In case of serious or willful disregard by the Contractor of the safety of the public or his employees, the Employer may take necessary steps to rectify the situation and deduct the cost thereof from monies due or becoming due to the Contractor. The Contractor shall be responsible for all resulting delays.
- The Contractor shall designate or otherwise employ personnel to furnish continuous surveillance of the traffic control operations. The designated personnel shall be available day and night to respond to calls involving damage due to traffic accidents.
- At sections where traffic is in operation and when ordered by the Employer, the movements of the Contractor's equipment from one place of work to another shall be subject to traffic control. During rush hours movement of larger vehicles, such as

trucks, cranes, dumpers, etc. through main thoroughfare are not permitted by the police. Spillage resulting from hauling operations along or across the road way shall be removed immediately at the Contractor's expense.

Provision of Temporary Services

- When the execution of the Works requires the temporary disconnection of existing public utilities, the Contractor shall provide the affected users with temporary services in at least the same standard as the original services.
- For water supply he may install temporary lines or arrange for regular supply by tankers. The amount of water to be provided for the interruption period for a specific area shall be assessed by the Contractor. The Contractor shall submit to the Employer, for its approval, the recommended volume of water to be provided.
- No valve or other controls in public service facilities shall be operated by the Contractor without approval of the Employer and the relevant authorities. All users affected by such operation shall be notified by the Contractor at least one hour before the operation and advised of the probable time when service will be restored.

Protection of Adjoining Property and Reinstatement upon Completion

- The Contractor shall be responsible and take all measures in order to protect adjoining property including buildings, electrical and telephone poles, bridges and culverts, retaining walls, compound walls and fences, and other structures. Prior to the commencement of the activities, the Contractor shall assess the probability and extent of unavoidable damages, if any, to the building and properties and submit his assessment to the Employer. The Employer may make his own opinion and if required may order arrangements for protection or repair of such likely unavoidable damage in which event the Contractor shall complete the activities.
- Temporary facilities shall be provided by the Contractor, only for as long as required after which he shall dismantle and remove the same from their place of use as speedily as possible. Re-usable components shall be safely stored by the Contractor in his yard. The place of use shall be cleared and reinstated immediately to at least the condition existing before the temporary facilities were provided, and to the satisfaction of the Employer.

Coordination with Other Authorities Statutory Services

- As far as possible the Contractor shall acquaint himself with the actual location of all existing public utilities such as sewers, water mains, drains, cables for electricity, telephone lines, gas lines, lighting poles, masts, etc., before commencing any activities likely to affect the existing utilities. The Contractor shall with the assistance of the Employer obtain such information directly from the responsible authorities as early as possible.

Notices, Permits

- Well in advance of the programmed start of any work which may affect traffic or any existing utilities the Contractor shall give advance information to the Employer indicating the type, the exact location, the programmed starting time and the expected duration of the activities and shall provide whatever particulars may be required by the authorities to issue any required permits and make all necessary arrangements. The Employer will provide necessary permissions. Separate permits need to be taken from the Employer and other authorities when the Contractor is planning for night work.

Submissions by the Contractor

Pre-Construction Surveys and Setting Out

- The Contractor shall verify all measurements and be responsible for their correctness. Any differences which may be found between actual measurements and the dimensions given in the Contract Documents shall be submitted to the Employer, in writing, for consideration and directives before proceeding with the Works.
- Site bench marks shall be accurately and safely established, maintained and removed upon completion of the Works, all to the satisfaction of the Employer. The Employer will indicate the position, co-ordinates and elevation of bench marks near the works, as shown on the Drawings.
- The Contractor shall prepare a plan detailing the location of the bench marks and keep this up-to- date throughout the period of the Contract. Reproducible copies of the plan so prepared shall be supplied to the Employer, as and when he may require.
- The Employer reserves the right to order levels, considered necessary for the full and proper supervision and measurement of the works, to be taken at any time.
- Before the Works, or any part thereof, are commenced, the Contractor and the Employer shall together make a complete survey, and take levels, of the Site and agree on the dimensions and elevations upon which setting out of the Works shall be based.
- These levels shall be related to the bench marks and shall be plotted and drawn up by the Contractor. After agreement of the drawings, which shall be signed by the Employer and the Contractor, these levels shall form the basis of setting out of the Works.
- The Contractor shall be responsible for the true and proper setting out of the Works in relation to reference data given on the Drawings and shall accurately set out the positions, levels and dimensions of all parts of the Works. Any delay or loss resulting from errors in the setting out of the Works shall be the responsibility of the Contractor.
- Setting out shall be reviewed by the Employer before commencing the Works, but any approval shall, in no way, relieve the Contractor of his responsibility for the correct execution of the Work.

Working Drawings

- The Drawings prepared by the Employer, are called Employer's Drawings. They may be modified or added to as provided by the following clauses.
- The proposals shown on the Employer's Drawings are based on information available prior to preparation of the Tender Documents. All levels indicated or proposed are based on survey information previously available but will need to be revised subject to the results of survey and site investigation carried out by the Contractor during SIP.
- Working Drawings of the designs carried out by the Contractor shall be submitted by the Contractor to the Employer. Working Drawings shall include, but not be restricted to, pipeline plans and profiles, reinforcement detail drawings and bending schedules, shop drawings for structural steel and miscellaneous metal work, and drawings for other work for which the Employer's approval is required.
- It shall be the Contractor's own responsibility to prepare such Working Drawings as he may require for the proper setting out and construction of all structures and facilities. Work shall not commence on an individual structure or facilities until the relevant Working Drawings have been approved by the Employer.

- All dimensions shall be in metric units and each drawing shall be properly identified by a drawing head and a numbering code in the form prescribed by the Employer upon commencement of the Works.
- The Contractor shall submit 5 (five) copies of all drawings for approval.
- Any changes or modifications to the Working Drawings that the Employer considers necessary shall be made by the Contractor promptly and the drawings resubmitted for approval.
- Approval of Working Drawings will be given by the Employer in the form of a stamp "RELEASED FOR CONSTRUCTION" together with the date and the authorized signature. Only those Working Drawings carrying the signed and dated stamp shall be used for execution.
- Copies of all such approved Working Drawings together with one unreduced transparency shall be supplied to the Employer by the Contractor immediately after approval. The cost of preparing and providing all Working Drawings shall be included in the Contract Rates.
- Should it be found at any time after approval has been given by the Employer to a Working Drawing submitted by the Contractor that the said Working Drawing does not comply with the terms and conditions of the Contract or that the details do not agree with the Working Drawings previously approved, such alterations and additions as may be deemed necessary by the Employer shall be made therein by the Contractor and the work carried out accordingly without entitling the Contractor to extra payment on account thereof, except where such alternations and additions are to be made in direct consequence of written order by the Employer to vary the Works.
- No examination by the Employer of any document submitted by the Contractor or of the Contractor's Working Drawings, nor the approval expressed by the Employer in regard thereto, either with or without modification, shall absolve the Contractor from any liability imposed upon him by any provision of the Contract. Notwithstanding the Employer's approval of the Working Drawings the Contractor shall be responsible for any dimensional or other errors.

As-Built Drawings and GIS Data Creation

- Such approved Working Drawings as have been selected by the Employer shall be correctly modified for inclusion in the As-Built Drawings incorporating such variations to the Works as have been ordered and executed. Such drawings shall show the actual arrangement of all structures and items of equipment installed under the Contract. The Contractor shall submit 1 (one) reproducible copy and 3 (three) prints of all As-Built Drawings clearly named as such to the Employer for approval before applying for the Taking-Over Certificate for the respective Section of the Works. After approval of the As Built Drawing the Contractor shall supply an electronic copy of the drawing in together with a licensed copy of the drafting software.
- During the course of the Works, the Contractor shall maintain a fully detailed record of all changes from the approval to facilitate easy and accurate preparation of the As-Built Drawing.
- Irrespective of the other contractual prerequisites no Section of the Works will be considered substantially completed until the respective As-Built Drawings have been approved by the Employer.
- In parallel with the preparation of as-built drawings, the Contractor shall produce GIS data of the constructed works. The Contractor shall conduct all necessary survey work, and shall ensure that vertical and horizontal measurements shall be captured at an accuracy of +/- 0.1m at a 95% confidence level, using the most suitable and cost-

effective field data collection technology and methodology. All horizontal and vertical survey measurements will be referenced to the present Survey of India GIS geo-reference.

- The Contractor will survey the three-dimensional position (x,y,z) of all point and line assets constructed under this project, e.g., pipelines, bridge crossings, manholes, chambers, valves, meters, hydrants, plugs, reducers, and tees. Nodes shall be created to clearly delineate different pipe sections in terms of material and/or diameter and to allow for future development of a hydraulic model in the GIS platform. Nodes shall also require a three-dimensional position, and through this, the position of the ends of a pipeline segment shall be defined. Point and line data (i.e., the pipeline) should be consistent with the attributes of the existing Survey of India GIS. However, the Employer and the Employer may require the Contractor, at no additional cost, to create new attributes to include non-survey data, e.g., valve model, name of the manufacturer, images or plans, etc. Prior to the field survey, the Contractor shall submit to the Employer, for approval, the GIS design in terms of themes, feature types and attributes.
- The Contractor shall develop a checklist of QC checks for each type of deliverable and will be responsible for ensuring that these QC checks are performed. The Contractor shall assign a GIS quality officer to manage the quality review process. This officer shall be independent of the capture and production teams.
- The Contractor shall be required to integrate the GIS deliverables with the existing pipe network data, i.e., ensure that the GIS data connects with any existing GIS system. This may entail revising GIS data of existing pipes at connection points. GIS data for the project will be delivered in an ArcGIS compliant file geo-database.

Construction Program and Progress of Works

Construction Program

- Contractor shall prepare Construction Program as part of SIP. Construction Program shall be in the form of a Critical Path Method (CPM) Diagram showing, sequences, dependencies, durations and dates for execution of all major items including sectional completion following the sub-divisions in the Bills of Quantities for the execution of the Works within the periods stated in the Contract. It shall be supported by:
 - Data of the construction methods
 - Equipment Utilization Schedule
 - Manpower Utilization Schedule
 - Subcontracting Schedule
 - Mobilization/Demobilization Schedule
- The CPM diagram incorporating the above mentioned schedules shall be prepared using Microsoft Project, or similar approved project management software, and shall be presented in hard copy and electronic form to the Employer as part of SIP.
- In carrying out the Works due attention shall be paid to all measures which can reasonably be taken in order to diminish the inconvenience which the work may cause to services and access to property.

Updating, Monitoring and Reporting Progress

- The Contractor shall monitor the progress of the Works including information provided by his Sub-contractors and suppliers, as necessary, for purpose of network planning, scheduling and updating and shall confirm the actual progress on each current activity shown on applicable CPM networks. The CPM networks shall form part of the Monthly Progress Report and shall indicate changes of schedule, if any in network activity duration and start/finish imposed dates. It shall also be provided in electronic form.

- The Contractor shall prepare written explanatory notes on the particular activities which are overrunning or going to overrun against the schedule. If any such overrunning work is on the critical path, the Contractor shall state what corrective actions will be taken by him to bring it back on the schedule.

Detailed Fortnightly Program

- The contractor shall submit at the end of each working week a detailed bar chart program for the next fortnight. The program shall identify where further drawings or instructions are to be issued by the Employer to avoid disruption to the progress of the Works.

Progress Reports

- The Contractor shall furnish the Employer with 5 copies of Progress Reports at regular monthly intervals in a form determined by the Employer, containing the following information:
 - physical progress for the report month and estimated progress for the next month;
 - CPM networks and explanatory notices as described in 17.1;
 - updated S-curves for physical progress at different sections of the Works
 - any report which may be specifically requested by the Employer and/or the Employer.
- These monthly progress reports shall be submitted not later than 7 days after the end of the report month.

Operating Performance Report

- The Contractor shall also submit an Operating Performance Report (OPR); the OPR shall include: a detailed progress report on the implementation of the SIP; monthly water account with details of bulk water supplied by the Employer and received at UGR, distribution and billed; Performance Standards achieved or maintained during the month; staff details engaged at various centres; exceptional reports on emergencies; financial information on project cash flows, consumer grievance redressal etc.
- These Operating Performance Report shall be submitted not later than 10 days after the end of the report month and should be done for each of the month of the Operation Services from Initial Taking Over Date till the end of the Contract.

Operation and Maintenance Manual

- The contractor will submit an operation and maintenance manual, providing details of all the plant/ mechanical facilities (valves, meters, etc.) he supplies and give details of recommended maintenance intervals and procedures.

Record / Progress Photographs

- The Contractor shall arrange each month sufficient number of photographs as Record Photographs of progress of works and shall provide the electronic files. Contractor will include progress photos in the progress reports.

6.2.3 Site Safety

The contractor shall take all precautions and measures to ensure safety of works and workman and shall be fully responsible for the same. Safety pertaining to construction works such as excavation, centering and shuttering, trenching, blasting, demolition, electric connections, scaffolds, ladders, working platforms, gangway, mixing of bituminous materials, electric and gas welding, use of hoisting and construction machinery shall be governed by ADB's Safe guard policy, CPWD guidelines, DJB circulars, CVC guidelines, relevant safety codes and all other relevant clauses in the Contract.

The provision and guidelines for site safety are given in Safety Manual in Volume 4 of the Bidding Document; which shall be strictly adhered to.

- The Contractor shall at all times in the conduct of his work and that of his Subcontractors adhere to the established rules and regulations concerning all safety matters at Site such as the recommendations contained in the "Manual of Accident Prevention in Construction", published by the Associated General Contractors of America, Inc., or other internationally recognized recommendations to the extent that such provisions do not conflict with the applicable laws. This is especially important wherever it is necessary to enable the free passage of the public through the Site.
- The Contractor's Environmental Heathy and Safety Supervisor (refer to Clause 6.5) shall have the qualifications and the authority to issue instructions to the Contractor's personnel regarding protection measures to prevent accidents.
- The Contractor shall provide the public with adequate information on all risks with respect to the construction works. If the general public sustains any kind of bodily injury or death, the Contractor shall be responsible for providing all necessary medical care and compensation.
- During construction the Contractor shall erect, maintain and subsequently remove sufficient barricades, guards, lighting, sheeting, shoring, temporary sidewalks and bridges, danger signals as well as temporary covering of potential accident areas, as approved by the Employer.
- All open excavations along pipe lines shall be protected sufficiently to keep out livestock, and ensure the safety of workmen and members of the public and be in accordance with the directives of the police and the other local regulations.
- The Contractor shall be responsible for ensuring that all persons working in the vicinity of power lines are aware of the relatively large distance that high voltage electricity can "short" to earth when cranes or other large masses of steel are in the vicinity of power lines.
- Where work is to be carried out in the proximity of buildings, bridges, tanks or other structures, the Contractor shall take all necessary precautions, including shoring and strutting, where necessary, to ensure the safety of the structures that are at risk.
- The Contractor shall be responsible for all damages or injury which may be caused on any property by trespass by the Contractor's or his Subcontractor's employees in the course of their employment, whether the said trespass was committed with or without the consent or knowledge of the Contractor.

6.2.4 Quality Assurance and Quality assurance & Quality control manual

The Quality Assurance and Quality control manual has been included in Volume 5 of the Bidding Document, which shall be strictly adhered to. In addition to provision in the above manual, following quality control plan and procedures also prevail.

Quality Control Plan and Procedures

- The Contractor shall be responsible for establishing and maintaining procedures for quality control and assurance that will ensure that all aspects of the Works comply with the requirements of the Contract.
- Quality Assurance and Control shall be in accordance with the prevailing CPWD manual, DJB circulars, DJB Quality assurance and Quality Control manual and CVC guidelines and all other relevant clauses in the Contract.
- As soon as reasonably practicable prior to the commencement of Works the Contractor shall submit for approval a Quality Control Plan giving detailed proposals for control of quality of all aspects of work on the Site and at suppliers' workshops.
- The Quality Control Plan shall include the following:
 - a) a list of the Contractor's staff engaged in quality control
 - b) a list of any outside testing agencies employed by the Contractor for work in connection with quality control
 - c) where a testing laboratory is to be established on Site under the Contract, a list of major items of equipment and a layout of the laboratory, together details of the tests which will be carried out there
 - d) a list of manufactured items and materials, obtained by the Contractor for the Works, which require inspection at the suppliers' premises, and the proposed procedures for ensuring quality control
 - e) a list of materials and operations to be inspected by the Contractor at the various stages of construction work on Site, together with inspection procedures, test types and frequencies
 - f) Sample of proposed quality control records, testing and reporting forms.
- Unless the Employer permits otherwise, the approved Quality Control Plan shall be followed throughout the construction of the Works. Any approval by the Employer of the Contractor's plan and procedures shall not relieve the Contractor of his obligation to ensure that the Works comply with the requirements of the Contract.
- The Contractor shall appoint a suitably qualified member of his staff to be responsible for all aspects of quality control and to maintain effective liaison with the Employer.

6.2.5 Environmental Safeguards

Safe guard's measures and requirements during execution of works need to be followed in accordance with **ADB's SPS (Safeguard Policy Statement)**.

The Contractor shall be responsible for ensuring following environmental safe guards measures:

Bidding stage:

- Understand the EMP requirements and allocate necessary resources (budget, staff, etc.,)

- Understand the regulatory compliance requirements related to labour welfare, safety, environment etc.,

Construction stage:

- Ensure that all regulatory clearances (both project related and contractor related) are in place before start of the construction work.
- Mobilize EHS supervisor prior to start of work
- Confirm with PIU availability of rights of way at all project sites prior to start of work.
- Update EMP and prepare SEP
- Prepare Method Statement and get it approved prior to start of work
- Prepare the following duly incorporating EMP measures, and submit to the PIU :
 - Construction waste management (CWM) plan
 - Traffic management (TM) plan
 - Occupational Health & Safety (OHS) Plan
- Implement the mitigation measures as per the EMP including CWM & TM Plans
- Finalize sections for use of trenchless technology considering technical, environmental and social safeguard aspects with the coordination of PIU and PMC
- Follow the EMP measures/guidelines for establishment of temporary construction camps, construction waste disposal sites, and material borrow areas, etc.,
- Implement EMP and ensure compliance with all the mitigation and enhancement measures
- Conduct environmental monitoring (air, noise, water etc.,) as per the EMP
- Undertake immediate action as suggested by PIU / PMU / PMC to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation
- Submit monthly Environmental Monitoring Reports on EMP implementation
- Act promptly on public complaints and grievances related to construction work and redress in a timely manner in coordination with PIU
- Comply with applicable government rules and regulations
- Site clean-up and restoration including clean up and disinfection of pipelines prior to supply

6.3 Drawings

Drawings are provided as Volume 4 of this Bidding Documents

6.4 Supplementary Information regarding Works to be Procured

Consultant engaged by DJB has prepared a Detailed Project Report for this project. This report shall be made available to the successful bidder.

6.5 Personnel Requirements

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. These are the minimum staffing which the Contractor has to ensure as a part of their Design Build and Operation Services Obligation:

Table 6.23: Personnel Requirements during Design Build Period (0-42 months)

Sr. No.	Position	Requirement	Total Work Experience [years]	Experience In Similar Work [years]
1)	Project Manager (1 No.)	In field office from Commencement Date	15	10
2)	Water Supply Engineer(1 No)	In design or field office	12	6
3)	Hydraulic Modelling Engineer (1 No)	In design or field office	12	6
4)	Sr. Construction Engineer (2 Nos.)	In field office on regular basis from prior to construction commencing	12	6
5)	Construction Engineer (2 Nos)	In field office on regular basis from prior to construction commencing	8	4
6)	Material cum store in charge (1 No.)	In field office on regular basis from commencement of construction at the latest	10	5
7)	Environmental Health and Safety (EHS) Supervisor (1 No.)	In field office as required in accordance with provisions of Contract	10	5
8)	Quantity Surveyor (2 Nos.)	In field office on regular basis from commencement of construction at the latest	5	3
9)	Mechanical Engineer (1 No)	In design and/or field office during Procurement of Plant; field office during installation, testing and commissioning	10	5
10)	Electrical Engineer (1 No.)		10	5
11)	Instrumentation Engineer (1 No.)		10	5

During the Operation Services Period (42 – 162 months)

These are the minimum manpower which the Contractor must retain during the Operation Services period. The Contractor need to submit details of manpower deployed on monthly basis as a part of their Operating Performance Report (OPR). Penalty will be levied at the rate of 1% of the annual O&M fee per month(maximum penalty 10% of annual O&M fee) in case the Contractor is unable to demonstrate availability of the following manpower.

Table 6.24 Personnel Requirements During the Operation Services Period (5 – 162 months)

Sr. No.	Position	Requirement	Total Work Experience [years]	Experience In Similar Work [years]
1.	Operations Manager (1 No.)	In field office on regular basis	15	10
2.	Environmental and Safety Expert (1 No.)	In field office as required in accordance with provisions of Contract	10	5
3.	Lab Manager / Technician (1 No)	In field office as required in accordance with provisions of Contract	5	3
4.	Mech. / Equip. Maintenance Engineer (2 Nos.)	In field office	5	3
5.	Electrical Engineer (1 No.)	In field office	5	3
6.	Instrumentation Engineer (1 No.)	In field office	5	3

6.6 Equipment Requirements

Using Form EQU in Section 4 (Bidding Forms), the Bidder must demonstrate that it has the key equipment listed below:

Table 6.25: Equipment Requirements

Sr. No.	Equipment Type and Characteristics	Minimum Number Required
Office Equipment		
1	Desk Top Computer Set	10 Nos
2	Printer A3 size / A4 Size	6 Nos
3	Plotter A0 size	1 Nos
4	Photo copying Machine	4 Nos
5	Office Vehicle/ Mahindra Jeep	4 Nos
Construction Equipment		
1	Mini Excavator for trenching	4 Nos.

Sr. No.	Equipment Type and Characteristics	Minimum Number Required
2	Water Tankers	2 Nos.
3	Trucks / Tractors / Tippers	6 Nos.
4	Concrete Hopper Miller	2 Nos.
5	Vibrators	8 Nos.
6	Concrete batching and Mixer	2 Nos.
7	Mini Smooth Wheeled Roller (3 to 5 T)	2 Nos.
8	Mini Vibrator Roller (3 to 5 T)	1 No.
9	Crane or Hydra (10 Tons)	2 Nos
10	DG Set (30 KVA)	2 Nos
11	Tipper/ Drumer Trucks (10 m ³)	3 Nos
12	Pipe laying accessories like tripod, chain pulley etc.	2Nos

Tools such as under-pressure tapping machines, hot-tapping tools, pipe cutter, also need to be procured by the Contractor. Sufficient standby units are required to be included in the equipment package. Arrangement for maintenance of equipment including toolkits for fitter, electrician etc. would be required to ensure that the programme for the works is smooth without any hindrance due to failure of equipment.

List of Drawings

Refer to Volume 4.

**Annex A: Terms of Reference for Community Mobilization and the
Resettlement Consultant (CRMC)**

TERMS OF REFERENCE FOR COMMUNITY MOBILIZATION AND THE RESETTLEMENT CONSULTANT

A Overview of Investment Program

1. The Delhi Water Supply Improvement Investment Program (DWSIIP) will be implemented over an eight-year period and will improve the infrastructure, management and performance of the water supply services in the proposed Wazirabad Water Treatment Plant (WTP) command area located in North Delhi and having a 2051 design population of 2.64 million (approximately 10% of Delhi's projected population by that time). The DWSIIP will help achieve the National Capital Territory of Master Plan for Water Supply, 2021 objectives of reduced non-revenue water and equitable access to water supply services. The investment program will include the rehabilitation, upgrading and/or replacement of key water supply infrastructure, improvements in the management of the infrastructure and improved customer related services within the Wazirabad WTP command area. The DWSIIP will be implemented as a multi-tranche financing facility (MFF) having two tranches and with each tranche constituting a project loan.

2. The MFF targets a complete improvement to water treatment, transmission and distribution network improvements to Wazirabad Water Treatment Plant Command area to ensure the objective of improved water supply services.¹ The MFF targets benefits to 2.64 million population in terms of 24x7 and quality supply of water. Overall the target includes strengthening 120 MGD water treatment plant, improvements to 54 kms of transmission and associated pumping arrangements, and distribution network improvements through 350 (District Metering Area (DMAs) spread over 11 underground reservoirs (UGR) Commands laying of 1556 kms of distribution network. The institutional development actions to support sustainable service delivery includes: (i) implementation of capacity development plans including training on gender and establishment of a training center or institute; (ii) organizational restructuring for effective and sustainable DMA management; (iii) establishment of project development facility to prepare future projects; (iv) preparation and implementation of an effective community mobilization plan and Gender equity and social inclusion (GESI) action plan; (v) preparation and implementation of asset management plan through use of geographic information system (GIS), hydraulic modelling and supervisory control and data acquisition (SCADA) system; (vi) implementation of operations and maintenance (O&M) embedded performance-based contracts; (vii) establishment and operationalization of water quality monitoring system; and (viii) strengthening of program management capacities. Community mobilization and outreach program will be a key feature of this MFF.

¹ ADB, October 2013. *Country Partnership Strategy (2013-2017)*.



Figure 2: UGR Command Areas

3. Project 1 of the DWSIIP will include (i) a project management consultant (PMC); (ii) a civil works package (DWSIIP/01) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas C-02 (Chitranjan Das Park Jahangirpuri) and C-03 (Model Town including Azadpur Fruit market); (iii) a civil works package (DWSIIP/02) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas G-02 (Punjabi Bagh), H-07 (Shakur Basti) and H-08 (Lawrence Road); and (iii) a civil works package (DWSIIP/04) for transmission mains and clear water pumping stations, and instrumentation and automation (SCADA).

4. Project 2 of the DWSIIP will include (i) a civil works package (DWSIIP/03) for rehabilitation or construction of the Wazirabad WTP; (ii) a civil works package (DWSIIP/05) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas G-01 (Piragarhi), H-05 (Avantika), H-06 (Pitampura); (iii) a civil works package (DWSIIP/06) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas C-01 (Sanjay Gandhi Transport Nagar), P-09 (Burari-A) and P-10 (Burari Transport Planning Authority).

5. Project 2 will also support a project development facility (PDF) to enhance readiness of future investment projects by taking advance actions to prepare the projects. Specifically, the facility can be used for: (i) feasibility studies including techno economic assessments; (ii) surveys and investigations; (iii) engineering design of projects; (iv) preparation of bidding

documents; (v) support for policy, regulatory, and governance reforms; and (vi) capacity building support to the government agencies.

Summary of Works Packages

S.No	Package No.	Description	Tranche
1	DWSIIP /01	Distribution Network Improvement in UGR Command Areas C-02 and C-03 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	1
2	DWSIIP /02	Distribution Network Improvement in UGR Command Areas G-02, H-07 and H-08 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	1
3	DWSIIP /03	Augmentation of water supply – Modernization and Operational Improvements of Wazirabad Water Treatment Plant, :	2
4	DWSIIP /04	Transmission System Improvements - Providing, Laying and Maintaining New DI Transmission Pipelines from Wazirabad WTP to Various UGRs and Providing, Installing and Maintaining SCADA System in 11 UGR Command Areas.	1
5	DWSIIP /05	Distribution Network Improvement in UGR Command Areas G-01, H-05 and H-06 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	2
6	DWSIIP /06	Distribution Network Improvement in UGR Command Areas C-01, P-09 and P-10 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	2

B. Objectives of the Assignment

6. The objective of Community Mobilization and Resettlement (CMRC) consultant is to support DWSIIP in: (i) community mobilization; (ii) public relations and awareness; (iii) implementation of the resettlement plan, and (iv) ensure gender equity and social inclusion (GESI) and its monitoring.

7. The consultant would be required to work/interact with city-level non-governmental organizations (NGO), civil society organizations, resident welfare associations and other stakeholders. The CMRC consultant will coordinate with the project management consultant (PMC) to mobilize the community, bring about awareness as per the Community and Participation (CPP) of this project (Attachment 1) and support PIU in project implementation and various process support to enhance access to metered connections.

8. The selection of CMRC will be primarily for the distribution packages of the project. (DWSIIP/01, DWSIIP/02, DWSIIP/05 and DWSIIP/06). The public outreach activities under DWSIIP/01 area will be the primary responsibility of the contractor (by engaging a social consultant team) who will be undertaking the physical work. The role of CMRC will be monitoring the activities carried out by the social consultant engaged by the contractor and carrying out those activities which are otherwise specifically mentioned in Section C: Scope of services, tasks (Components) and expected deliverables in this document.

C. Scope of services, tasks (Components) and expected deliverables

9. CMRC will work for design and implementation of all community mobilization and participation activities (**CMP CCP Attachment 1**), implementation of gender equality and

social inclusion (**GESI Attachment 2**) action plan, capacity building of DJB/DWSIIP and other stakeholders **(for all packages, otherwise specifically mentioned)** as detailed below:

For all packages excluding DWSIIP/01:

- i. conduct baseline surveys for the service delivery, socio economic status, needs, vulnerability, consumer connections, urban service level;
- ii. design and implement Community Awareness and Public Participation activities on DWSIIP works;
- iii. create awareness on the project and urban management issues like water conservation and water metering, solid waste management, waste water management etc.
- iv. coordinate with Elected Representatives, NGOs and community to facilitate project implementation and sustainability;
- v. design and implementation of extensive media-based awareness programs as per needs of the project;
- vi. conduct special campaign for 100% metering and NRW reduction;
- vii. training programs and community based programs including poverty alleviation plans as required for the target communities;
- viii. conduct Health and Hygiene Education program;
- ix. conduct awareness and publicity program of DWSIIP works; and
- x. involve the community, ward committees, educational institutes, community based organizations (CBOs) and other relevant organizations in awareness campaign;
- xi. conduct project awareness program

Overall²:

- xii. review the work plan, guide and monitor the progress of activities by the Social Consultants engaged by the Contractors
- xiii. motivate and facilitate the end users in accessing connections, metering and to pay the user charges applicable;
- xiv. implement gender equality and social inclusion action plan as per approved GESI; training on GESI activities;
- xv. support the project in preparation and implementation of resettlement plans for affected persons.
- xvi. develop "exit strategy" to enable DJB take over community mobilization and gender related activities;

10. Besides the needs of the project, the design and implementation of CMRC will be based on:

- i. A review of ongoing efforts of DJB in mobilizing community, customer relations and media;
- ii. Approaches adopted by Chandrawal project and private operators managing similar water projects in Delhi; and
- iii. Possible convergence of various ongoing initiatives of DJB and project specific approaches and possible scaling up of the initiatives;
- iv. Replication of best practices (in terms of community mobilization) from similar projects from other Indian states

² Activities under DWSIIP/01 which may require community level activities will be carried out with support from Social Consultant engaged by the contractor under the guidance and monitoring of CMRC.

11. Specific tasks include:

12. Baseline Information Collection/ Survey:

- i. Collect and compiled segregated information on socio economic status, vulnerability, geographical areas with concentration of marginalized and poor, available social capital and organizations working among communities in the communities scattered, prepare a community profile for the command area;
- ii. Conduct census survey for resettlement plan (RP) updating and preparation, in coordination with the PMC's social safeguards specialist, PMU's and PIU's safeguards officers;
- iii. Identify the key issues to be addressed through community mobilization;
- iv. Conduct consultation on project's resettlement plans and framework with identified APs;
- v. Baseline information collection/ survey will include sex disaggregated community profile
- vi. Survey of female-headed households; and
- vii. Linking of these surveys and other surveys for achievement of DMF requirements of providing BPL households and female-headed households with individual water supply and sewer connections.

13. Implement Community Awareness and Participation plan and Health and Hygiene Education:

- i. Prepare an implementation plan with clear-cut activities, targets and timelines based on the Consultation and Participation Plan of the Project
- ii. Map stakeholders and organize stakeholder meetings;
- iii. Conduct community outreach and awareness building on water supply and sanitation in poor and non-poor communities;
- iv. Community campaign for women on awareness on Health and Hygiene Education at ward/community level in the command area;
- v. Conduct project awareness program during Pre-construction, construction and post construction (Limited O&M that would be carried out during the project, specifically in terms of customer response management);
- vi. prepare a Health and Hygiene Education (HHE) that includes water and sanitation inter alia focusing on conservation, reuse of water, public health awareness campaign and activities at various levels (mass level, community, and schools) at all stages of project implementation. Involve the community, ward committees, CBOs and other relevant organizations in the public health education and campaigns;
- vii. Prepare records (Digital & audio visual) of every consultation/ discussions, take actions on recommendations arising from each of the consultations; prepare and disseminate action-taken reports in subsequent meetings;
- viii. Plan and implement various Information, Education and Communication {IEC} strategies such as use of electronic and print mass media; distribution of leaflets, posters, banners, locally relevant user-friendly audio-visual material and broadcast/telecast on local radio/cable, etc.;
- ix. Train and facilitate ward based health and sanitation groups, particularly in the poor areas with the objective of improving personal health and hygiene, household cleanliness, keeping drinking water safe and clean, use of toilets, washing hands, etc.
- x. Organize water connection camp and motivate / support the consumers for 100% connectivity.
- xi. Design and use mass media and city level meetings with the DJB, local authorities and stakeholders to inform potential beneficiaries of the Project, especially women, community leaders, political leaders and NGOs;
- xii. Develop a sense of community "ownership" of local infrastructure and services, as well as

a community cognizance of the importance of maintenance, and the necessity of paying sufficient fees to cover operations and maintenance costs. Help develop management skills, community awareness and operation and maintenance responsibility for the schemes, especially for the slum area improvements;

- xiii. Promote education for attitude change and awareness in the target communities on solid waste disposal, environmental protection and water conservation;
- xiv. Introduce participatory community-based approaches to the communities in implementation of the project, and further educate them on their roles and responsibilities under such an approach; and
- xv. Promote taking of connections to the water systems.

14. Implement Gender Equality and Social Inclusion (GESI) Action Plan:

- i. Implement all actions identified in the GESI Action Plan for the project;
- ii. In consultation with PMC prepare a gender strategy and its implementation including setting up of a Social Unit in DJB;
- iii. In coordination with the PMC, plan and monitor all the project activities including construction for ensuring gender sensitivity and social inclusion as per project designs;
- iv. Assist the PIU in ensuring participation of women and disadvantaged group members of the relevant committees of any user groups if formed in important stakeholder meetings and decisions during the project implementation;
- v. Orient and sensitize the community and the relevant institutions including other stakeholders on gender and social inclusion with respect to the project design, implementation and operation and maintenance services etc.;
- vi. Mainstream gender oriented training in all programs of DJB; and
- vii. Support BPL, female headed families to take individual water and sewerage connections.

15. Design and implementation of training programs:

- i. Design training programs as required, for the target communities, DJB staff/ local SHG group/ local CBOs/ NGOs/ Enumerators/ community workers. Such activities will be thoroughly documented (Hard, digitized copy and audio visual), and a thorough assessment of outcomes to be made.
- ii. Implement trainings programs & seminars/ Workshop to NGOs, community leaders, DJB staff, Enumerators/ community workers, political leaders, PMU, PIU and contractor's staff (including laborers) on Gender Policy, Safety, Sanitation, Health hygiene, Construction Management System (CMS), O&M of developed infrastructure, Safeguard policy, GESI Action Plan and any specific aspects of all important development activities. Design and implement specific sub- projects training program which meet the needs of local communities.

16. Design and implementation of extensive media-based programs:

The CMRC will be responsible to inform and educate policy makers, stakeholders and the general public about the proper and effective use of environmental services (water supply, sanitation, solid waste disposal, etc.) and the need to pay for the costs of providing such services. In addition to the tasks described above, tasks will include:

- i. Within the approved framework, design a series of centrally administered programs designed to foster community awareness and commitment, taking full advantage of appropriate media;
- ii. Design and implement an extensive, long-term, media-based program, suitable for city-wide replication, to inform and educate government officials, policy makers and the general public about the need to establish appropriate charges and an enhanced willingness to pay on the part of the consumers for improved level and quality environmental services,

- particularly for water supply, sanitation and solid waste management;
- iii. In conjunction with the preceding activity, design and implement an extensive, long-term, media-based program, suitable for Delhi-wide replication, to encourage and promote attitudinal changes. Design and implement periodic "consumer surveys" to assess the impacts of the above programs on the knowledge and attitudes of the government officials, policy makers and general public, and to help identify any changes in programming that may be required to attain the desired objectives. The Media Strategy could possibly cover the following along with the adherence to Delhi Jal Board Advertisement Policy 2015:

Electronic Media:

▪ **Television & Radio:**

- i. **Documentary films:** Production of Documentary films on DWSIIP initiatives in general and in particular on water conservation and reuse of treated waste water initiatives undertaken by CMRC, technical achievements and quality control measures undertaken by DWSIIP. Films could be telecast through regional channel/ Local cable network.
- ii. **Message Spots:** ad spots on issues related to disposal of waste, save water, payment for the improved facilities, operation and maintenance of improved facilities. Medium of production selected should be such which could be displayed on cinema halls during intervals and before starting of commercial films as well as through TV channels;
- iii. **Audio Visual Jingles:** Prepare audio-visual Jingle which clearly displays the mission, vision and activities of **DWSIIP and develop animated videos for awareness generation;**
- iv. **Quiz programs:** Organize live quiz competitions among government and private school children about works of DWSIIP and proper disposal of solid and liquid waste;
- v. **Video Documentation of major events and use in publicity:-** Video documentation and telecast of major events organized by DWSIIP;
- vi. **Dramas through Radio:** Broadcast dramas on DWSIIP themes;
- vii. **News coverage of major initiatives:** Periodic media briefings; and
- viii. **Songs with drama:** Produce Audio albums to be broadcasted through all mediums of Radio.

Social media:

- i. **Social Networks:** Develop and disseminate information on social network sites such as **Facebook**.

Mobile Communication:

- i. **Bulk SMS:** on DWSIIP works (Disruption in services), project outcomes, awareness messages.
- ii. **WhatsApp:**

Media

- i. **Print Media** Newspaper, Magazines, Booklets, Brochures, Leaflets, Pamphlets Appeals, Posters, **Stickers**, Calendar and advertisements etc.
- ii. **Unconventional Media:** Postal Stationary, Events like fairs and festival, Cinema vans, Shop Fronts, Media Vehicle, Stickers putting on tree guards etc.
- iii. **Traditional Media:** Street Plays, Puppet Shows, Dramas, Dance, Storytelling, Song, Music, Painting, Motifs and Symbols etc.

17. Developing an Appropriate "Exit Strategy" for the CMRC: During the course of the project, CMRC will develop an appropriate exit strategy to help ensure that the initiatives can be taken over and carried on by DJB on completion. Tasks will include:

- i. Identify appropriate unit within DJB to carry on with the programs that have been developed on Project completion, possibly the proposed social unit;
- ii. Develop and maintain a comprehensive resource library of all relevant documents, media materials and training manuals, etc., and hand these over to the PMU or to other agencies as may be otherwise agreed by the PMU and
- iii. Institutionalize CMRC related tasks.

18. Consultant will submit their assessment of alternative ways and means of helping ensure the long term benefits of the initiatives taken up under the CMRC, along with a proposed "exit strategy" to the PMU six months prior to completion of the Services. Following approval of the PMU, the consultant will actively engage the selected agency(s) in the implementation of the program to transfer skills and knowledge, and finalize details of handover arrangements.

D. Scope of Services Resettlement Planning

19. The CMRC will be required to mobilize appropriate specialists, as and when required, to assist the PIU in preparing and implementing the RPs and performing consultation activities as necessary. Key tasks include the identification and survey of all displaced persons (DPs) and the implementation of measures to address temporary impacts resulting from program construction activities.

20. If required, the RPs will be prepared by the Resettlement Specialist of the PMC, with survey and implementation support from the CMRC. The CMRC will therefore be required to work in close association with the PMC Resettlement Specialist to ensure smooth implementation of the program.

21. The specific scope of activities include:

- (i) Organize and execute stakeholder consultation and feedback sessions regarding:
 - The investment program, its components and the anticipated benefits and impacts on the community;
 - The anticipated extent of resettlement, if any, and the level of temporary impacts;
 - The resettlement and rehabilitation policy and the entitlements;
 - Mechanisms and arrangements to assist DPs; and
 - The role of the CMRC in assisting them in availing their entitlements, assistance in proper utilization of the same as well as mechanisms to voice their grievances and concerns.
- (ii) Assist in providing assistance to the DPs during the resettlement and rehabilitation process and to ensure all entitlements are made in a timely manner prior to displacement;
- (iii) Work in close association with the affected community and disseminate information to ensure correct and complete information is available to affected households;
- (iv) Take the lead responsibility in planning and implementing the livelihood activities identified under the RPs;
- (v) Ensure gender equality and safeguard the interests of the poor and marginalized;
- (vi) Issue Identity Cards and Entitlement Cards;
- (vii) Conduct revalidation surveys of the DPs (titled and non-titled) experiencing land acquisition and resettlement impacts;
- (viii) Verify and update the inventory of loss;
- (ix) Record details of the extent of land available in the resettlement area (in the cases where resettlement is to be done) for resettling and for allotment of land to the affected households;

- (x) Estimate the monthly earnings of each household and assess the extent of possession of immovable properties;
- (xi) Prepare a list of persons who have lost or are likely to lose their employment or livelihood or who have been or likely to be alienated wholly or substantially from their main sources of trade, business, occupation or vocation consequent to the acquisition of land or the project or involuntary displacement due to any other cause;
- (xii) Ensure that each of the eligible DPs are contacted and consulted, either individually or in groups. It is imperative to carry out consultations with the vulnerable groups which include the following:
 - Those who are BPL
 - Those who belong to the Scheduled Castes
 - Those who belong to the Scheduled Tribes
 - Women headed households (WHH)
 - Elderly
 - Disabled persons
- (xiii) Facilitate the process of disbursement of compensation to the DPs, coordinating with the revenue department/ DJB, informing the DPs of the compensation disbursement process and timeline;
- (xiv) Assist DPs in opening bank accounts explaining the implications, the rules and the obligations of a joint account and how she/he can access the resources she/he is entitled to;
- (xv) In close consultation with the DPs, the CMRC shall inform the Land Acquisition Officer about the shifting dates agreed with the DPs in writing and the arrangements desired by the DPs with respect to their entitlements;
- (xvi) Assist the PIU in ensuring transition (during the part or full relocation of the DPs), helping the DPs to take salvaged materials and shift;
- (xvii) Organize training programs for income restoration;
- (xviii) Assist the PIU in establishing the grievance redress mechanism;
- (xix) Participate in the grievance redressal process;
- (xx) Assist the PIU in keeping detailed records of progress and establish monitoring and reporting systems regarding resettlement;
- (xxi) Maintaining a computerized database of DPs;
- (xxii) Assist the DPs to access and participate in the grievance redress process and also in availing their entitlements and proper utilization of the same;
- (xxiii) Tracking and recording the disbursement of assistances;
- (xxiv) Act as the information source center for community interaction with the investment program and maintain liaison between the community, contractors and project management and implementing units during the execution of the works; and
- (xxv) Assist the PIU in carrying out the asset acquisition process and disbursement of entitlements;
- (xxvi) Support PMC/PIU in preparing monitoring reports; and
- (xxvii) Assist the PIU in the implementation of the provisions of the resettlement framework (RF) relating to temporary impacts.

22. The CMRC will assist the PIU in the following tasks:

- (i) carry out the asset acquisition process through identification and verification of the eligible (displaced persons) DP's;
- (ii) inform the community about the investment program, of any changes in the technical design, Resettlement & Rehabilitation policy, entitlements, progress of the RP implementation etc.;
- (iii) disburse the assistance due to the affected households;

- (iv) maintain a database of all the transactions related to the disbursements of entitlements and the progress of the same;
- (v) carry out consultations with the affected community especially the vulnerable section of the affected community; and
- (vi) Provide with suggestions and other supportive services to the PIU as and when required.

E. Staffing Requirements

23. Team Composition & Qualification Requirements for the Key Experts and any other requirements which will be used for evaluating the Key Experts. The personnel requirements are estimated in Table-1. The basic requirements are shown in Table-2.

Table 1: Personnel requirements for CMRC

Sl. No.	Position	Person	Person Months
1	Team Leader cum Community Development Expert	1	27
2	Deputy Team Leader/Social Development Specialist	1	16
3	Communication Expert	1	25
4	Community Development and Resettlement Specialist	2	34
5	Gender Specialist	1	17
6	Training Specialist	1	13
7	Resettlement Coordinator	1	20
8	Monitoring & Evaluation Specialist	1	25
9	Social Development Expert cum Gender executive	2	59
10	Community Relation Executive	3	59
	Total	14	295

Table 2: Qualification Requirements for the Key experts

S. No.	Position	Qualification Requirement	Responsibility
1.	Team Leader cum Community Development Expert	<ul style="list-style-type: none"> • Graduate degree with Post Graduate degree in social science or equivalent • Good experience as a Team Leader or at senior position. • 15 years of total experience in community development activities • Experience in design and implementation of community based programs in water supply and sewerage projects. 	<ul style="list-style-type: none"> i. Overall Project Management and Administration of Community awareness and participation plan (CAPP) - CMRC Activities; ii. Overall supervision for mobilization of CMRC team personnel in terms of agreed manpower in required time frame; iii. Co-ordination with Project Management Unit (PMU), Project Implementation Units (PIU), PMC and line agencies; iv. Design of CAPP CMRC programs and community-level programs; v. Selection and supervision activities of local NGOs as required vi. Supervision for the CAPP of CMRC activities; and vii. Prepare and submit post facto analysis of implemented CAPP CMRC activities/ safeguard activities.
2	Deputy Team Leader Team Leader/Social Development Specialist	<ul style="list-style-type: none"> ▪ A post-graduate qualification in sociology or a related field, with at least 10 years' experience in Resettlement planning and implementation development projects and programs ▪ Conversant with the India land administration system and land acquisition laws; ▪ Report writing capability and ability to demonstrate personal and accountable work environment ▪ Handling externally funded projects will be an added advantage 	<ul style="list-style-type: none"> i. Coordinate and provide assistance in the implementation of the resettlement plans. She/he will take the lead responsibility in handling all resettlement related issues including safeguards. She/he will also coordinate and assist in conducting of validation surveys during resettlement plan implementation; ii. Coordination and networking with all the stakeholders in the various sub-projects and providing guidance to all team members; iii. She/he, along with the sector specialists, will be responsible for: managing a detailed analytical framework capturing the direct and indirect impact on economic and social indicators related to program investments; iv. Identification of displaced person (DPs) within the program target groups; (iii) assist in implementation of safeguard measures for identified target groups ; v. Design and implementation of the strategy relating to the resettlement plan, rapport development with the affected community members; vi. Assist and guide in implementation of the Gender Equality and Social Inclusion Action Plan; vii. Continuously monitor the progress of the activities as per the prepared resettlement plan and take appropriate

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			<p>corrective actions;</p> <p>viii. Submission of all reports and prepare the detailed work plan based on action to be taken; and at the field level and monitor the progress of the activities undertaken, attend client meetings and workshops as and when required and assist with the determination of all program requirements from time to time.</p>
3	Communication Expert	<ul style="list-style-type: none"> • Graduate degree in Public Relations, Communications, Media Management or related disciplines. Post graduate degree would be an advantage • Diploma in design and production of mass media will be preferred • 10 years' experience in media/ communication/ education work. • Experience in production of mass media in both Hindi and English. • Experience design of in Information education and communication (IEC). 	<p>i. General management and administration of team activities;</p> <p>ii. Liaison with PMU and PIU. Preparation of all reports</p> <p>iii. Preparation of advertisements/ media campaign/ leaflets for community awareness;</p> <p>iv. Preparation of video clippings and documentaries for community awareness/ audio visual and print media advertisement;</p> <p>v. Conceptualization, Drafting, Framing workshops/ Rallies/ Nukkar Natak/ Talk Shows etc., for public awareness;</p> <p>vi. Conceptualization, Drafting, Framing of community-level programs; and</p> <p>vii. Preparation of IEC material gender mainstreaming and equality.</p>
4	Community Development and Resettlement Specialist	<p>A post-graduate qualification in sociology or a related field with at least 8 years' experience in:</p> <ul style="list-style-type: none"> ▪ Public participation and community development techniques; ▪ Community mobilization, especially on social and environment safeguards, sanitation, gender, HIV/AIDS etc.; ▪ Livelihood and social development work, especially in the field of infrastructure; ▪ Working on programs for the poor and disadvantages groups, especially in externally funded projects; ▪ Implementation of resettlement 	<p>i. Develop and strengthen social networks and use them as agents of change on issues related to resettlement plan implementation;</p> <p>ii. Needs analysis for specific communities for DWSIIP</p> <p>iii. Lead capacity building workshops/activities focused on participatory action planning;</p> <p>iv. Assist in the implementation of the resettlement plans at community level;</p> <p>v. Conduct frequent site visits and interact with community members;</p> <p>vi. Assist in updating the resettlement plans in close coordination with the PIU and PMC;</p> <p>vii. Distribute identification cards to DPs;</p> <p>viii. Conduct consultations with the stakeholders and DPs and provide inputs from these consultations to the PIU and PMC for incorporating changes (if any) in the Resettlement Plans;</p> <p>ix. Ensure compensation, rehabilitation, and income</p>

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		<p>and rehabilitation plans in urban infrastructure projects;</p> <ul style="list-style-type: none"> ▪ Conducting training and capacity building programs; ▪ Fluency in Hindi and good writing skill in English is desirable. 	<p>restoration measures, are done prior to construction in relevant sections and as per the RPs;</p> <ul style="list-style-type: none"> x. Facilitate the PIU in responding to any public grievances and assist the PIU in maintaining a database of the grievances; xi. Submit monthly reports on RP implementation; xii. Assist in conducting validation surveys; xiii. Assist in the implementation of Gender Equality and Social Inclusion Action Plan; xiv. Liaison with local NGOs; xv. Establish baseline and maintain a consumer database xvi. Analysis of baseline survey, house hold survey for community based future planning for optimum utilization of infrastructure facilities; xvii. Prepare & Assist in Establishment of baseline and maintain a consumer database disaggregated by sex, ethnicity, poverty and vulnerability levels; and xviii. Collection of information relative to needs of Monitoring and Evaluation system.
5	Gender Specialist	<ul style="list-style-type: none"> • Graduate degree in social science • Post Graduate degree in social science and gender focus diploma will be preferred • 8 years of experience in community mobilization and Social development works • Experience in implementation of Gender Action Plan. 	<ul style="list-style-type: none"> i. Draft Gender Policy for DJB and support formulation of Gender unit in DJB; ii. implementation of gender action plan and monitoring and evaluation Gender equality capturing results; iii. Conceptualization, Drafting, Framing and Conduct training program for women ward councilors and staff to include: relevant aspects of project preparation, appraisal, financing, supervision, monitoring and evaluation to develop effective and gender-inclusive management of water supply and sanitation schemes; iv. Conduct training workshops on gender-responsive urban management for all officials and elected representative and Gender awareness training workshops; and, v. Ensure that health and welfare schemes targeting BPL/ women headed households benefit the intended beneficiaries .
6	Training Specialist	<ul style="list-style-type: none"> • Graduate degree in MBA HRD or Masters in Social Sciences • 8 years' experience in health and hygiene education and community 	<ul style="list-style-type: none"> i. Prepare training manuals and modules and monitoring of the training programs and their Effectiveness; ii. Conceptualization, Drafting, Framing and Conduct training needs analysis for Community Liaison Officers and Identify

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		<p>development work;</p> <ul style="list-style-type: none"> • Experience in design and implementation of trainings programs & seminars/ workshops for capacity building of urban local bodies. • Experience in linking of public with health and social welfare schemes 	<p>training requirements & develop a comprehensive training plan to meet identified needs;</p> <ul style="list-style-type: none"> iii. Conceptualization, Drafting, Framing and implementation of competency- based / Gender -based, training programs, seminars workshops & Community Awareness & Participation Program trainings for NGOs, community, leaders, elected representatives, PMU, PIU & PMC staff and contractor staff; iv. Assist Gender specialist in conducting training workshops on gender-responsive urban management for all officials and elected representative; and v. Conducting effective hygiene education campaigns in the target communities and conduct a range of community orientation seminars on project-related issues such as procedures for water and sewerage connections, and tariffs;
7	Resettlement Coordinator	<p>A post-graduate qualification in sociology or a related field with around 5 years' experience in:</p> <ul style="list-style-type: none"> ▪ Public participation and community development techniques; ▪ Community mobilization, especially on social and environment safeguards, sanitation, gender, HIV/AIDS etc.; ▪ Livelihood and social development work, especially in the field of infrastructure; ▪ Working on programs for the poor and disadvantaged groups, especially in externally funded projects; ▪ Handling of emergencies through a networking approach ▪ Implementation of resettlement and rehabilitation plans in urban infrastructure projects; ▪ Conducting training and capacity building programs; 	<ul style="list-style-type: none"> i. The Coordinator will be hired from local population and will assist the Team Leader and Community Development and Participation Specialist in the implementation and coordination of activities including: ii. assessment of DPs or property; iii. collection of primary and secondary information; iv. regular coordination with the PIU and PMC officials and experts, district administration for technical support and guidance required at field level; v. keep track of the day to day progress and provide overall support to the project team; vi. ensuring that the standards are met during resettlement plan implementation; vii. coordinate with community workers for the timely completion of the assigned tasks within the stipulated time frame; and VIII. preparation of regular progress reports and take appropriate corrective action.

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		<ul style="list-style-type: none"> • Fluency in Hindi and good writing skill in English is desirable. 	
8	Monitoring & Evaluation Specialist	<ul style="list-style-type: none"> • Graduate degree in social science • 8 years of experience • experience in surveys, making indicators, evaluation of benefits 	<ul style="list-style-type: none"> i. Feedback surveys relating to awareness activities/ Training program/ GESI action plan, CAPP and its monitoring & evaluation; ii. Ensure achievement of targets of the project and prepare work plans accordingly; iii. Develop performance milestones for community-based programs; iv. Organize surveys for data collection and analysis of investigation results; v. Aggregate, analyze data elicited from city-based programs and assess efficacy of programs; vi. Train appropriate staff in collection, analysis and utilization of Monitoring information; vii. Design and implement computer-based monitoring and evaluation system to assess quality and outcomes of city-based programs; viii. Familiarize community leadership with monitoring and evaluation system; and ix. Prepare monitoring and evaluation reports for submission to PMU.
9	Social Development Expert cum Gender Specialist	<ul style="list-style-type: none"> • Graduate Degree in social sciences or related field • 8 year experiences in design and implementation of community based programs • experience in implementation of gender action Plan 	<ul style="list-style-type: none"> i. Responsible for implementation of community program in field; ii. Conduct training programs; iii. Public Consultation and effective participation of women councilors local bodies; iv. Support in implementation of RPs, meetings with Aps; v. Support in establishing grievance redressal mechanism at city level; vi. Awareness and health and welfare schemes targeting BPL/ Women headed households with specific focus on women/children; vii. Utilize strategies to create a women-friendly work environment and increase the proportion of women in PMU/PIU and contractor offices; viii. Conduct training programs, seminars workshops & Community Awareness & Participation Program; ix. Awareness campaign in water supply and sewerage connections, NRW reduction, contract works, O&M

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			<p>services at city level;</p> <p>x. Conduct a community orientation seminars / workshops/ consultation on project-related issues such as procedures for water and sewerage connections, and tariffs; public meetings and women-only FGDs with women leaders, RWAs, women's SHGs and other community-based groups on issues such as: water, sanitation and health, personal/female hygiene, social safety, women's access to property rights; and</p> <p>xi. Prepare the Monthly & Periodic progress report.</p>
10	Community Executive Relation	<ul style="list-style-type: none"> ▪ A Graduate in social science with around 5 years' experience in ▪ Organizing community level meetings, ▪ Social mobilization on health and hygiene, environment and sanitation, gender, and HIV/AIDS; ▪ Understanding of health hygiene and gender issues; ▪ Implementation of development projects/programs for the community in urban localities; ▪ Conducting census surveys for development projects; ▪ Fluency in Hindi is desirable and a working knowledge of English will be an added advantage. 	<p>i. Organizing community level meetings/consultations and ensure their participation and cooperation in resettlement plan implementation and community empowerment;</p> <p>ii. social mobilization on water, health and hygiene etc.;</p> <p>iii. environment and sanitation, gender issues, HIV/AIDS;</p> <p>iv. maintain appropriate rapport with community and local authorities to steer the social mobilization;</p> <p>v. encourage the participation of women as per the Gender Equality and Social Inclusion Action Plan;</p> <p>vi. assist the community and the PIU in addressing grievance and redress related issues; and</p> <p>vii. ensure that the genuinely DPs get the timely compensation due under the resettlement plans.</p>

F. Time Frame

24. Consultancy contract will initially be made for five years i.e. 60 months, which can be extended further on mutual acceptance at the same terms and conditions if required.

G. Reporting Requirements and Time Schedule for Deliverables

25. As a minimum, following are the deliverables:

- a. Inception Report in 30 days' time of mobilization of consultant containing approach, methodology, work plan and staffing schedule for the project activities and schedule for deliverables etc. in hard and one soft copies. This would be in consultation with the PMC and PMU/PIU;
- b. The initial consumer survey will be conducted within three months of inception of the Services to establish a baseline of consumer knowledge and attitudes, and subsequent surveys will be conducted at the approximately six month intervals to assess any changes which have taken place;
- c. Monthly, quarterly progress reports; semiannual/biannual environmental and RP implementation reports in hard and soft copies and
- d. any other reports as required by DWSIIP.

H. Client's Input and Counterpart Personnel

- (a) Services, facilities and property to be made available to the Consultant by the Client: None
- (b) Professional and support counterpart personnel may be assigned by the Client to the Consultant's team: Client will not provide any staff from DWSIIP to work as part of CAPP CMRC team. However, counterpart staff will be available in PMU and PIU to interact and support their activities.
- (c) Client will provide the following inputs, project data and reports to facilitate preparation of the Proposals:
 - Data, reports etc. as available with the Government
 - Due Diligence report prepared by PPTA consultant engaged by ADB

Attachment 1: CONSULTATION AND PARTICIPATION PLAN

A. Introduction

1. The Delhi Water Supply Improvement Investment Program (DWSIIP) will be implemented over an eight-year period and will improve the infrastructure, management and performance of the water supply services in the proposed Wazirabad Water Treatment Plant (WTP) command area located in North Delhi and having a 2051 design population of 2.64 million (approximately 10% of Delhi's projected population by that time). The DWSIIP will help achieve the National Capital Territory of Delhi (NCTD) Master Plan for Water Supply, 2021³ objectives of reduced non-revenue water (NRW) and equitable access to water supply services. The investment program will include the rehabilitation, upgrading and/or replacement of key water supply infrastructure, improvements in the management of the infrastructure and improved customer related services within the Wazirabad WTP command area. The DWSIIP will be implemented as a multi-tranche financing facility (MFF) having two tranches and with each tranche constituting a project loan.

The MFF targets a complete improvement to water treatment, transmission and distribution network improvements to Wazirabad Water Treatment Plant Command area to ensure the objective of improved water supply services.⁴ The MFF targets benefits to 2.64 million population in terms of 24x7 and quality supply of water. Overall the target includes strengthening 120 MGD water treatment plant, improvements to 54 kms of transmission and associated pumping arrangements, and distribution network improvements through 350 DMAs spread over 11 UGR Commands laying of 1556 kms of distribution network. The institutional development actions to support sustainable service delivery includes: (i) implementation of capacity development plans including training on gender and establishment of a training center or institute; (ii) organizational restructuring for effective and sustainable DMA management; (iii) establishment of project development facility to prepare future projects; (iv) preparation and implementation of an effective community mobilization plan and GESI action plan; (v) preparation and implementation of asset management plan through use of geographic information system (GIS), hydraulic modelling and supervisory control and data acquisition (SCADA) system; (vi) implementation of O&M embedded performance-based contracts; (vii) establishment and operationalization of water quality monitoring system; and (viii) strengthening of program management capacities. Commonalty mobilization and out reach program will be a key feature of this MFF.

³Study on Improvement of Water Supply System in Delhi in the Republic of India; Japan International Cooperation Agency September 2011

⁴ ADB, October 2013. *Country Partnership Strategy (2013-2017)*.



Figure 2: UGR Command Areas

Project 1 of the DWSIIP will include (i) a project management consultant (PMC); (ii) a civil works package (DWSIIP/01) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas C-02 (Chitraranjan Das Park Jahangirpuri) and C-03 (Model Town); (iii) a civil works package (DWSIIP/02) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas G-02 (Punjabi Bagh), H-07 (Shakur Basti) and H-08 (Lawrence Road); and (iii) a civil works package (DWSIIP/04) for transmission mains and clear water pumping stations, and instrumentation and automation (SCADA).

Project 2 of the DWSIIP will include (i) a civil works package (DWSIIP/03) for rehabilitation or construction of the Wazirabad WTP; (ii) a civil works package (DWSIIP/05) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas G-01 (Piragarhi), H-05 (Avantika), H-06 (Pitampura); (iii) a civil works package (DWSIIP/06) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas C-01 (Sanjay Gandhi Transport Nagar), P-09 (Burari-A) and P-10 (Burari Transport Planning Authority).

Project 2 will also support a PDF to enhance readiness of future investment projects by taking advance actions to prepare the projects. Specifically, the facility can be used for: (i) feasibility studies including techno economic assessments; (ii) surveys and investigations; (iii) engineering design of projects; (iv) preparation of bidding documents; (v) support for policy, regulatory, and governance reforms; and (vi) capacity building support to the government agencies.

Summary of Works Packages

S.No	Package No	Description	Tranche
1	DWSIIP /01	Distribution Network Improvement in UGR Command Areas C-02 and C-03 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	1
2	DWSIIP /02	Distribution Network Improvement in UGR Command Areas G-02, H-07 and H-08 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	1
3	DWSIIP /03	Augmentation of water supply – Modernization and Operational Improvements of Wazirabad Water Treatment Plant, :	2
4	DWSIIP /04	Transmission System Improvements - Providing, Laying and Maintaining New DI Transmission Pipelines from Wazirabad WTP to Various UGRs and Providing, Installing and Maintaining SCADA System in 11 UGR Command Areas.	1
5	DWSIIP /05	Distribution Network Improvement in UGR Command Areas G-01, H-05 and H-06 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	2
6	DWSIIP /06	Distribution Network Improvement in UGR Command Areas C-01, P-09 and P-10 Targeting Continuous Pressurized Water Supply and DMA Based NRW Reduction and Providing House Service Connections.	2

4. The impact of the proposed investment program will be improved coverage, quality and continuity of urban water supply services in alignment with the ADB's Country Partnership Strategy India 2013-2017. The outcome will be improved access to sustainable and reliable water services in the Wazirabad WTP command area. The DWSIIP will have three outputs: (i) improved water supply infrastructure in the Wazirabad WTP command area; (ii) improved water supply infrastructure management; and (iii) improved customer related services within the Wazirabad WTP command area.

5. The DWSIIP will be carried out under the oversight of the Government of the NCTD. The Delhi Jal Board (DJB) has been appointed as the executing agency and will be responsible for the management, coordination and execution of all the activities funded under the MFF. DJB has established a Program Management Unit (PMU), which will be chaired by the Member (Water Supply). A Program Implementation Unit (PIU) has been established under the overall management of the PMU and will act as the implementing agency. The Program Director will head the PIU and oversee the investment program, while the day-to-day management and implementation will be the responsibility of the Program Manager. The Chief Engineer (Projects) Water of the DJB will be the Project Director.

6. The primary purpose of the consultation and participation plan (CPP) is to disseminate information and to open up the lines of communication between the DJB and all stakeholders to

facilitate the implementation of the DWSIIP and the early resolution of any conflict issues that may arise. The CPP includes the following key activities which will take place throughout the course of the DWSIIP:

- (i) Stakeholder identification and survey;
- (ii) Generate community awareness of the DWSIIP and its benefits;
- (iii) Involve all stakeholders in the decision making processes and develop community ownership of the schemes;
- (iv) Provide stakeholders with advance knowledge of the social safeguard frameworks and associated documents and the applicable mitigation measures;
- (v) Provide stakeholders with advance knowledge of the DWSIIP's GRM;
- (vi) Issue important messages to the community regarding good water supply practice and operation;
- (vii) Educate the contractors and workers on key program issues to ensure smooth interaction with stakeholders and on-site safety;
- (viii) Share work schedules and progress updates to facilitate program implementation; and
- (ix) Monitoring and evaluation of DWSIIP progress.

7. The CPP will be implemented by the CMRC to assist with all aspects of the plan, particularly community liaison. and to assist in the implementation of any land acquisition and resettlement matters arising, together with the resolution of any temporary impact issues.

B. Activities

8. The key activities envisaged under the CPP are summarized below.

9. **Activity 1: Stakeholder identification.** The primary stakeholders of the DWSIIP include:

- (i) Government agencies and their employees;
- (ii) Beneficiaries: residents in the DWSIIP area, residents' welfare association (RWA) and the poor and vulnerable;
- (iii) Community leaders, public representatives;
- (iv) Community-based organizations (CBOs), NGOs, social and cultural groups, ward level citizen forums;
- (v) Committees and sub-committees of the wards;
- (vi) Schools/student groups;
- (vii) Women's groups;
- (viii) Contractors and their workers;
- (ix) Vendor associations and labor union federations;
- (x) Self-help groups; and
- (xi) Special groups formed for socially-excluded segments of the population.

10. The key stakeholders group for the DWSIIP is the estimated 2.28 million people currently living in the program area. An initial baseline survey has been conducted under TA-8415. This will be expanded and updated by the PMC and shall target the collection of information on the socioeconomic profile of the program beneficiaries including current water supply and sanitation access and service levels, together with the current water pricing and willingness to pay. The survey will cover all elements of society including the vulnerable, marginalized and poor.

11. **Activity 2: Generate community awareness.** The PMC will undertake a public outreach program that will generate community awareness of the investment program and its benefits. The outreach program will include the initiatives being taken to promote enhanced access to water supply services, gender equality, employment opportunities created under the program and the level of inconvenience caused during program implementation and the proposed mitigation measures. This activity will include the organization of consultation meetings with appropriate government agencies, local NGOs, ward members, resident welfare associations and other stakeholders. As students are excellent carriers of messages of social and national relevance, special efforts will be made to plan and implement outreach programs for schools and colleges. A key aspect of this activity is the preparation of an information, education and communication (IEC) strategy including leaflets, posters, banners, rallies, video, audios etc. and which will focus on the pro-poor, gender and socially-inclusive design features of the DWSIIP.

12. **Activity 3: Involve stakeholders in the decision-making processes.** Discussions with stakeholders will include a presentation of the DWSIIP rationale, target impact and outcomes, design policies and decisions, the size and scope of the subprojects and all environmental and social safeguard issues. If significant technical option decisions are required during the course of scheme preparation, stakeholders will be included in the decision making process.

13. **Activity 4: Disclosure of the environmental and social safeguards.** The Environmental Assessment and Review Framework (EARF) and the Resettlement Framework (RF) together with the Initial Environmental Examinations (IEEs) and Resettlement Plans (RFs) if applicable, will be disclosed to the public at an early date through a series of UGR level meetings held throughout the DWSIIP area.

14. **Activity 5: Disclosure of the GRM.** A program-specific GRM will be established to receive, evaluate, and facilitate the resolution of affected persons' concerns, complaints, and grievances about the social and environmental performance of the subprojects. The GRM will provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the investment program.

15. **Activity 6: Issue important messages to stakeholders.** As part of the public outreach program the PMC will implement appropriate multi-media public awareness and information campaigns covering:

- (i) The measures being taken by DJB to develop and improve the water supply services to the citizens of Delhi;
- (ii) The importance of environmental health and hygiene and the benefits of high quality potable water;
- (iii) The importance of conserving water and the development of a 24x7 water supply;
- (iv) The need for NRW reduction, regular water loss assessments, service delivery standards and benchmarking;
- (v) The need for all connections to be authorized together with the need to report illegal activities;
- (vi) The need to avoid inappropriate practices involving the use of water main suction pumps, meter tampering and the fraudulent preparation of meter reading records;
- (vii) The benefits of maintaining all household water storage and plumbing fixtures; and
- (viii) The need to harvest rainwater.

16. **Activity 7: Educate contractors and workers.** As contractors and workers are the primary points of contact with the DWSIIP area residents, efforts will be made to educate them on the program's structure, components, benefits, risks and mitigation measures. They shall be educated on the importance of avoiding public nuisance, minimizing public inconvenience, and avoiding disruption to public activities and mobility. Awareness creation shall also focus on health and hygiene, HIV/AIDS, communicable diseases, labor rights and gender issues. Contractors and their personnel will also be educated on the best practices in construction, including safety during construction activities and quality of works. Consultations with contractors will be carried out during the subproject implementation phase by the PMC in close liaison with the PIU.

17. **Activity 8: Share work schedules.** Throughout the DWSIIP implementation period it is critical that the public are given advance warning of when works will actually be carried out in order that appropriate preparations can be made to the extent possible. In many parts of the DWSIIP area, work will be executed in narrow lanes and alleys which will make access difficult for a limited period of time. It will be vital that residents are aware of the upcoming work and indeed the need for it to progress smoothly and quickly. The CMRC, retained by the DJB, will play a vital role in assessing any temporary impacts and advising on the necessary mitigation measures and compensation payable as set out in the provisions of the RF.

18. **Activity 9: Implementation and feedback.** The PMC, with the assistance of the CMRC, will prepare full documentation of the consultation activities and will conduct periodic progress reviews. Activity-wise periodic action-taken reports shall be prepared and communicated. The program website shall provide easy access to stakeholders listing the proposed plans, progress of implementation, and outcomes.

19. The detailed CPP is presented in Table 2. The costs of implementing the CPP are fully covered under a combination of the PMC's budget and the CMRC contract.

Table 2: Consultation and Participation Plan

Stage	Target Stakeholders	Type of Participation	Objectives	Time Frame	Outcome/ Indicators	Sources of Verification	Responsibility
DWSIIP Inception.	<ul style="list-style-type: none"> DJB officers; Government agencies and their employees; Beneficiaries; Community leaders; CBOs, NGOs and other groups; others, as identified. 	<ul style="list-style-type: none"> General DWSIIP orientation workshop in DJB headquarters; Specific gender mainstreaming orientation workshop and follow-up training. 	<ul style="list-style-type: none"> Overview of the DWSIIP including rationale, target impact and outcomes, design policies, procedures, subproject design and packaging, safeguard frameworks, plans, IEEs, RFs, disclosure and reporting requirements, gender and other plans and the monitoring and reporting requirements. Stakeholder identification. 	Year 1	<ul style="list-style-type: none"> Stakeholder understanding and appreciation of the program; Specific understanding of the need for gender mainstreaming. 	<ul style="list-style-type: none"> Workshop reports. 	ADB, PMU, PIU PMC and CMRC.
DWSIIP Planning	<ul style="list-style-type: none"> Government agencies and their employees; Beneficiaries; Community leaders; CBOs, NGOs and other groups; others, as identified. 	<ul style="list-style-type: none"> Baseline survey; UGR command area level meetings and presentations; Key informant interviews and focus group discussions. 	<ul style="list-style-type: none"> Determine the current socioeconomic profile and level of water services; Initiate community awareness of the DWSIIP; Mobilization for improved access to connectivity and metering Stakeholder inclusion in the decision making processes; Disclosure of the environmental and social safeguards. 	Year 1	<ul style="list-style-type: none"> Base data sufficient to finalize program analysis and planning; Base line indicators in relation to the DMF targets; Initial beneficiary awareness of the DWSIIP as indicated by the number of meeting participants from the various stakeholder groups and particularly the number of women consulted; Registrations for connections Beneficiary feedback as indicated by the number of appropriate comments and suggestions received and incorporated. 	<ul style="list-style-type: none"> Consultation meeting reports. Metering Reports of DJB 	PMC and the CMRC in consultation with the PIU.
Subproject design.	<ul style="list-style-type: none"> Government agencies and their employees; Beneficiaries; Community 	<ul style="list-style-type: none"> UGR command area level meetings and presentations; Key informant 	<ul style="list-style-type: none"> Consolidate community awareness of the DWSIIP; Stakeholder inclusion in the decision making 	Years 1 & 2	<ul style="list-style-type: none"> Improved beneficiary awareness of the DWSIIP as indicated by the number of meeting participants from the various stakeholder groups and particularly the 	<ul style="list-style-type: none"> Consultation meeting reports; Random household 	PMC and the CMRC in consultation with the PIU.

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Stage	Target Stakeholders	Type of Participation	Objectives	Time Frame	Outcome/ Indicators	Sources of Verification	Responsibility
	<ul style="list-style-type: none"> leaders; ▪ CBOs, NGOs and other groups; ▪ others, as identified. 	<ul style="list-style-type: none"> interviews and focus group discussions; ▪ Multi-media public awareness and information campaigns as part of a broad IEC strategy; ▪ Social media. 	<ul style="list-style-type: none"> processes; ▪ Present the outline of each work package to the stakeholders; ▪ Present the expected benefits; ▪ Outline any environmental and/or social impacts and the proposed mitigation measures; ▪ Disclosure of the GRM. ▪ Issue important water service related messages to stakeholders. 		<ul style="list-style-type: none"> number of women consulted; ▪ Beneficiary feedback as indicated by the number of appropriate comments and suggestions received and incorporated; ▪ Beneficiary knowledge of the DWSIIP implementation procedures; ▪ Beneficiary understanding of the DWSIIP objectives. 	surveys.	
	<ul style="list-style-type: none"> ▪ Low income or slum communities. 	<ul style="list-style-type: none"> ▪ Community level meetings; 	<ul style="list-style-type: none"> ▪ Ensure community awareness of the DWSIIP; ▪ Learn the communities' priorities and concerns; ▪ Identify opportunities for participation in the DWSIIP; ▪ Improve health and hygiene awareness. 	Years 1 & 2	<ul style="list-style-type: none"> ▪ The subproject designs are fully inclusive of the poor and vulnerable communities. 	<ul style="list-style-type: none"> ▪ Consultation meeting reports; ▪ Random community surveys. 	PMC and the CMRC in consultation with the PIU.
	<ul style="list-style-type: none"> ▪ Displaced persons. 	<ul style="list-style-type: none"> ▪ Survey and consultation. 	<ul style="list-style-type: none"> ▪ Inform the identified displaced persons and discuss options; ▪ Determine mitigation measures. 	Years 1 & 2	<ul style="list-style-type: none"> ▪ Appropriate resettlement and compensation solution identified and agreed. 	<ul style="list-style-type: none"> ▪ Meeting records. 	PMC and CMRC in consultation with the PIU
Subproject implementation	<ul style="list-style-type: none"> ▪ Government agencies and their employees; ▪ Beneficiaries; ▪ Community leaders; ▪ CBOs, NGOs and other groups; ▪ others, as 	<ul style="list-style-type: none"> ▪ Site level meetings with local residents; ▪ Connection drive and facilitation camps at local level; ▪ Key informant interviews and focus group 	<ul style="list-style-type: none"> ▪ Consolidate community awareness of the DWSIIP; ▪ Share work schedules and ensure readiness; ▪ Mobilize community to connect to water and adopt metering; ▪ Relevance of water management; 	Years 2 to 5	<ul style="list-style-type: none"> ▪ Smooth implementation of the DWSIIP with minimum disruption and inconvenience to program beneficiaries; ▪ All temporary impact issues are adequately recorded, addressed and resolved ▪ Corrective action taken if required; ▪ Beneficiary satisfaction with the program implementation 	<ul style="list-style-type: none"> ▪ Consultation meeting reports; ▪ Random household surveys; ▪ GRM records. 	PMC and the CMRC in consultation with the PIU.

TOR-CMRC for DWSIIP Project 1 in Wazirabad Command Area

Stage	Target Stakeholders	Type of Participation	Objectives	Time Frame	Outcome/ Indicators	Sources of Verification	Responsibility
	identified.	discussions; ▪ School and college presentations and discussions; ▪ Partner with women's organizations; ▪ Multi-media public awareness and information campaigns as part of a broad IEC strategy; ▪ Social media.	▪ Inform beneficiaries of DWSIIP progress; ▪ Follow-up regarding the quality and adequacy of environmental and/or social impact mitigation measures; ▪ Promote gender mainstreaming; ▪ Ensure that the GRM is functioning; ▪ Follow-up regarding the important water service related messages to stakeholders.		procedures; ▪ Appropriate participation by women.		
	▪ Low income or slum communities.	▪ Community level meetings; ▪ Formulate WMGs.	▪ Mobilize community to connect to water and adopt metering; ▪ Relevance of water management; ▪ Ensure that the communities are fully included and are being provided with appropriate solutions.	Years 2 to 5	▪ Low income and slum communities receiving full project benefits.	▪ PMC reports.	PMC and the CMRC in consultation with the PIU.
	▪ Contractors and workers	▪ Presentations and discussions.	▪ Contractors and workers fully educated on public interaction and cooperation; ▪ Ensure high standard of site health and safety; ▪ Promote gender mainstreaming.	Years 2 to 5	▪ Increased awareness of issues relating to the public; ▪ Reduced incidence of accidents on site; ▪ Appropriate participation by women.	▪ Contractor, PMC and PIU site reports.	PMC and the CMRC in consultation with the PIU.
	▪ Displaced persons	▪ Follow-up consultations and information sharing.	▪ Ensure that the RF mechanisms are being implemented as intended; ▪ Address pending issues; ▪ Take corrective action if necessary.	Years 2 to 5	▪ All resettlement issues are adequately recorded, addressed and resolved.	▪ Signed minutes of meetings	PMC and the CMRC in consultation with the PIU.

TOR-CMRC for DWSIIP Project 1 in Wazirabad Command Area

Stage	Target Stakeholders	Type of Participation	Objectives	Time Frame	Outcome/ Indicators	Sources of Verification	Responsibility
Defects liability	<ul style="list-style-type: none"> ▪ All stakeholders 	<ul style="list-style-type: none"> ▪ UGR command area level meetings ▪ Website; ▪ Service and feedback camps ▪ Community level meetings; ▪ Social media 	<ul style="list-style-type: none"> ▪ Ensure that the DWSIIP was implemented as intended; ▪ Response to complaints/ pending issues ▪ Follow-up regarding the important water service related messages to stakeholders. ▪ Ensure water service improvement measures are fully implemented. 	Year 6	<ul style="list-style-type: none"> ▪ Beneficiary satisfaction with the outcome of the DWSIIP; 	<ul style="list-style-type: none"> ▪ On-line surveys; ▪ Random household surveys; ▪ GRM records. 	PMC and the CMRC in consultation with the PIU.

ADB = Asian Development Bank, CBO =Community-based organization, CPPI = DMF= design and monitoring framework, DWSIIP = Delhi Water Supply Improvement Investment Program; GRM = grievance redress mechanism, IEC = information, education and communication, NGO = non-governmental organization, PIU = program implementation unit, PMC = project management consultancy, PMU = program management unit, RF = resettlement framework, UGR = underground service reservoir

Attachment 2: GENDER EQUALITY AND SOCIAL INCLUSION (GESI) ACTION PLAN

Activity	Target/ Indicator	Responsibility	Time
Output 1 and 2: Water Supply Infrastructure Expanded and Strengthened with Women Participation			
1 Ensure equitable benefits are extended to women and vulnerable households:	<ul style="list-style-type: none"> By the end of the program, 2.41 million population will be served with improved water supply services comprising all project area households, 100% poor households and households headed by women 	PMU, PIU PMC and CMRC	Years 1-6
2 Conduct intensive awareness programs including IEC campaigns, public meetings, women-only FGDs with women leaders, RWAs, women's SHGs and other community-based groups to empower women on women's rights and safety, disseminate knowledge on project related activities, and discuss issues such as personal/female hygiene, social safety, etc.	<ul style="list-style-type: none"> Develop IEC campaigns (leaflets, posters, banners, rallies, competitions, etc.) in project influence area to publicize the pro-poor, gender- and socially-inclusive design features of the project; Public service advertisements (18) on program features focusing on women and the poor developed and played in radio, newspapers, and television programs (three/year); Conduct public meetings and FGDs pertaining to health and hygiene, social safety, property rights, water connections and tariffs, water conservation, management and recycling etc. with women beneficiaries, women leaders; RWAs, women SHGs, other CBOs etc. (Conduct 50 general public meetings-and an additional 50 meetings with leaders/SHGs/RWAs etc.); Conduct gender-focused activities on water management, health & hygiene etc. in schools within project influence area. (50% girl student participation/meeting, cover 20 schools/year); Proper record of consultations with disaggregated data (by sex, caste, social strata, and ethnicity) of participants prepared; suitable action taken on the suggestions/comments received from all groups; action-taken-reports prepared and disseminated in subsequent consultation sessions in the same area. 	PIU, PMC and CMRC	Years 1-6
3 Engage women workers in construction and rehabilitation work, ensuring implementation of core labor standards such as equal pay for work of equal value, and protection of women from discrimination and other forms of harassment.	<ul style="list-style-type: none"> Ensure around 30% of the unskilled workforce in project construction activities are women; Payrolls showing worker's name, sex, and paid wages available with the contractors for inspection. Evidence that payment is directly paid to women through a bank account; EMP implementation and monitoring reports must include comments on safe working conditions available for workers including safety equipment and the availability of separate toilets for women and men on work sites; Application of labor standards by contractors monitored regularly and reported. All engaged contractors and workers oriented on gender-related aspects 	PIU, PMC and CMRC	Years 1-6

TOR-CMRC for DWSIIP Project 1 in Wazirabad Command Area

Activity		Target/ Indicator	Responsibility	Time
		with focus on appropriate legislations and regulations; and		
Output 3: Institutional Capacities, Human Resources, and Program Management Strengthened is Gender Focused				
1	Encourage women employment and promote collaboration between the program implementation entities in partnership with women so that gender issues are highlighted and adequately discussed.	<ul style="list-style-type: none"> Adequate representation (around 20%) of women at managerial, technical and administrative levels of PMU, PIUs, consultants and nongovernment organizations involved in DWSIIP; Employ women as field /operational staff including meter readers (target around 10%); Ensure maximum participation of women from all entities during regular program meetings (Minutes of meetings should reflect the participation of women and discussions on gender issues. 	PIU, PMC, CMRC, contractors etc.	Years 1-6
2	Conduct gender awareness training workshops /seminars and develop gender-sensitive water management checklists and guidelines to strengthen the role of women under DWSIIP.	<ul style="list-style-type: none"> Conduct one-day orientation workshop involving representatives PMU and PIU on gender mainstreaming, sensitize on various aspects of GESI implementation and establish consensus on gender-inclusive program implementation (total participation ~100-150); Hold a two day-long training workshop to develop a comprehensive strategy for involving women within the mainstream of project planning and implementation (at least 40% women participation); Conduct annual gender awareness training workshops (6 No.) for representatives from PMU and PIU (at least 40% women participation); Annual day-long training workshops (6 No.) for women staff of the DJB involved in program planning, implementation, O&M, monitoring and evaluation and Mainstream Gender awareness as part of all training programs of DJB 	PIU, PMC and CMRC	Years 1-6
3	Create a women-friendly work environment in DWSIIP offices to promote occupational health and safety, safe water supply and sanitation, protection of women from discrimination and other forms of harassment etc.	<ul style="list-style-type: none"> Provide separate and safe toilets and changing facilities for women in PMU, PIU, PMC, NGO and contractor's offices and work sites etc.; One-day training workshop for the orientation of contractors on gender-related aspects of project implementation at the start of construction activity; Implement Government of India policy on zero tolerance for sexual harassment and other forms of gender-based discrimination in the workplace; Periodic meetings should include discussions on issues faced by women staff workers in DWSIIP offices and at work sites. 	PMU, PIU, PMC CMRC and contractors	Years 1-6
4	Incorporate gender indicators in project management information system.	<ul style="list-style-type: none"> Robust PPMS and MIS developed for M&E with gender-relevant indicators and sex-disaggregated data for reviews and quarterly progress reports which include GESI progress report, CPP and project impact evaluation; Expand and update the baseline survey conducted during PPTA to cover 	PMC & CMRC	Years 1-6

TOR-CMRC for DWSIIP Project 1 in Wazirabad Command Area

Activity		Target/ Indicator	Responsibility	Time
		2.0% of the DWSIIP area households (approximately 5,000) to: (i) establish a consumer database with respect to socioeconomic status and water supply service levels, focusing on women, poverty and vulnerability; (ii) carry out gender-segregated analysis; and (iii) identify below poverty line and women headed households. Prepare UGR command area wise rosters of vulnerable households eligible for concessions /subsidies. Database disaggregated by sex, ethnicity, poverty and vulnerability levels compiled and reported in quarterly and annual progress reports.		
5	Create awareness on DJB's web-portal and ensure that it is customer friendly. Also institutionalize customer relation management center	<ul style="list-style-type: none"> Develop citizen friendly e-platform⁵ for interaction, information dissemination, tariff plans and applicable changes, bill payment, grievances reporting and redressal. Establish and manage full fledged customer relation management center to deal with service related issues efficiently and without hassle. More than 90% consumer complaints redressed within 72 hours. 	PMU, PIU, PMC and CMRC	Years 1- 6
6	Gender Strategy for DJB	<ul style="list-style-type: none"> Prepare a gender strategy for DJB focused on mainstreaming gender through human resources management and training in a gender responsive manner. 	PMC and CMRC	Year 2

ADB = Asian Development Bank, CBO =Community-based organization, CMRC= Community mobilization and resettlement consultant; CPPI = consultation and participation plan implementation. DJB = Delhi Jal Board, DWSIIP = Delhi Water Supply Improvement Investment Program, EMP = environmental management plan, FGD = focus group discussions, GESI = gender equality and social inclusion, IEC = information, education and communication, M&E = monitoring and evaluation, MIS = management information system, NGO = non-governmental organization, No. = number, O&M = operation and maintenance, PIU = program implementation unit, PMC = project management consultancy, PMU = program management unit, PPMS = project performance management system, RWA = resident welfare associations, SHG = Self-help Groups, UGR = underground service reservoir, WMG = Water Management Groups, WTP = Water Treatment Plant.

⁵ The baseline survey conducted under TA-8415 indicated low awareness of DJB's web portal (one percent).

GESI ACTION PLAN MONITORING FORMAT

Date Prepared:

Project Title:

Country:

Project No.:

Loan No.:

Type of Project:

Approval and Timeline/Duration of the Project:

Gender Category:

Mission Leader:

Name of Gender Specialist/ Gender Focal Point:

Quarter Covered by Update:

Project Impact:

Project Outcome:

Activities, Indicators, Baseline, Targets, Time Frame and Responsibility	Progress to Date		Issues and Challenges (Please include reasons why an activity was not fully implemented, or if targets fall short, or reasons for delay, etc.)
	Progress for the Quarter (This should include information on progress for the current quarter-- qualitative and quantitative updates (sex-disaggregated data))	Cumulative Progress (This should include information on progress (qualitative and quantitative updates including sex-disaggregated data) from the start of the implementation of the GAP to the previous quarter's progress report.)	
Output 1.			
1. Targets/Indicators: Baseline: Responsibility: Time Frame:	•	•	
2. Targets/Indicators Baseline:	•	•	

TOR-CMRC for DWSIIP Project 1 in Wazirabad Command Area

Responsibility: Time Frame:			
Output 2.			
1. Targets/Indicators Baseline: Responsibility: Time Frame: Year 1-5	•	•	
2. Targets/Indicators Baseline: Responsibility: Time Frame:	•	•	
Outputs 3.			
1. Targets/Indicators Baseline: Responsibility: Time Frame:	•	•	
2. Targets/Indicators Baseline: Responsibility: Time Frame:	•	•	

Comments/ Remarks:

Accomplished by: _____

Date Accomplished: _____

Annex B: Extracts from Terms of Reference for Project Management Consultant

Annex B: Extracts from Terms of Reference for Project Management Consultant (PMC)

Public Outreach Program

The PMC will undertake a public outreach program that will generate community awareness of the investment program and its benefits. The PMC will engage with civil society organizations (CSOs) to seek community participation in the investment program and ensure that it is socially inclusive. The PMC will keep the community informed of the objectives and progress of the investment program and employ suitable means to communicate the information including social media, leaflet campaigns etc.

The PMC shall work with the DJB Public Relations staff to improve the image of DJB and to implement appropriate multi-media public awareness and information campaigns covering the measures being taken by DJB to develop and improve the water supply services to the citizens of Delhi, the need to conserve water, the need for all connections to be authorized, the need to avoid inappropriate practices involving meter tampering or fixing meter reading records, the need to maintain/upgrade all household water storage and plumbing fixtures, the need to harvest rainwater and on-going improvements in customer services.

Gender Action Plan and Gender Equality and Social Inclusion Plan

The PMC shall undertake the following tasks in order to ensure compliance with the ADB's policies on gender and social inclusion:

- Prepare and integrate indicators related to gender, social inclusion and poverty in all program activities; ensure collection of disaggregated data and analysis of the results, especially benefits from the Project corresponding to these indicators;
- Update the Gender Action Plan and the Gender Equality and Social Inclusion Action Plan for the active involvement of women as equal partners in all decision making processes and as prime beneficiaries of the program activities, and for benefiting the poor and weaker sections of society;
- Provide inputs and sensitize important stakeholders regarding Project objectives related to poverty, gender and social inclusion ensuring the inclusion of poor, women, indigenous people, and other marginalized and vulnerable groups in each subproject;
- Prepare socio-economic profiles of the subproject areas including social maps using appropriate techniques regarding social, economic, health and sanitation status of the community, especially focusing on the likely improvement in health status of the citizens, likely impact of health and hygiene, community participation and public education program to be implemented during the Project, willingness and ability to pay for improved water supplies and current and likely change in water consumption pattern, etc.;
- Work in collaboration with selected NGOs to develop specific criteria to identify the poor and generate suitable mechanisms to target the poor for inclusion in the services to be developed in the Project; and
- Implement, in collaboration with DJB, the Gender Action Plan and the Gender Equality and Social Inclusion Plan over the period of the DWSIIP

Annex C: Draft Initial Environmental Examination Report



Updated Draft



Draft Initial Environment Examination Report

Project Number: 47176

November 2019

Design and Planning Stage

IND: Delhi Water Supply Improvement Investment Program

Subproject: Improvement of Transmission System to Various UGRs and construction of UGRs & Clear Water Pumping stations within Wazirabad Water Treatment Plant and providing SCADA and Instrumentation system including Operation and Maintenance for 10 years (DWSIIP/04)



NJS Consultants Co. Ltd. Japan



**In Joint Venture with
ICRA Management Consulting Services Ltd.
Tata Consulting Engineers Ltd.
NJS Engineers India Pvt. Ltd**

Prepared by the Delhi Jal Board for the Asian Development Bank

This is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature

ABBREVIATIONS

ADB	–	Asian Development Bank
ASI	–	Archeological Survey of India
CAPP	–	Community Awareness and Public Participation
CFE	–	Consent for Establishment
CFO	–	Consent for Operation
CMRC	–	Community Mobilization and Resettlement Consultant
DJB	–	Delhi Jal Board
DoF	–	Department of Forest
DoL	–	Department of Labour
DPCC	–	Delhi Pollution Control Committee
DWSIIP	–	Delhi Water Supply Improvement Investment Program
EAC	–	Expert Appraisal Committee
EARF	–	Environmental Assessment and Review Framework
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
GRM	–	Grievance Redress Mechanism
IEE	–	Initial Environmental Examination
LARRA	–	Land Acquisition, Rehabilitation and Resettlement Authority
MFF	–	Multi-Tranche Financing Facility
MoEFCC	–	Ministry of Environment and Forest, Climate Change
NCTD	–	National Capital Territory of Delhi
NMA	–	National Monument Authority
NGT	–	National Green Tribunal
PGMS	–	Public Grievance Monitoring System
PIU	–	Program Implementation Unit
PMC	–	Project Management Consultancy
PMU	–	Program Management Unit
PPTA	–	Project Preparatory Technical Assistance
RMS	–	Revenue Management System
ROW	–	Right of Way
SMS	–	Short Message Service
SPS	–	Safeguard Policy Statement
TOR	–	Terms of Reference
UGR	–	Underground Service Reservoir
WTP	–	Water Treatment Plant

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I. Executive Summary

1. The Delhi Water Supply Improvement Investment Program (DWSIIP) will complement past and ongoing efforts of the Government of National Capital Territory of Delhi (NCTD) to improve water supply services to the residents of NCTD. DWSIIP targets a complete improvement to water treatment, transmission and distribution network improvements to Wazirabad Water Treatment Plant Command area located in northern part of Delhi to ensure the objective of improved water supply services. The MFF targets benefits to 2.64 million population in terms of 24x7 and quality supply of water. The DWSIIP will help achieve the National Capital Territory of Delhi (NCTD) Water Supply Master Plan objectives of reduced non-revenue water (NRW) and equitable access to water supply services. The investment program will include the rehabilitation, upgrading and/or replacement of key water supply infrastructure, improvements in the management of the infrastructure and improved customer-related services within the Wazirabad WTP command area. The DWSIIP will be implemented as a multi-tranche financing facility (MFF) having two tranches and with each tranche constituting a project loan.

2. The Scope of work under the project includes Transmission System Improvements- Providing, laying and maintaining New Mild Steel (MS)/ Ductile Iron (DI) Transmission Pipelines from Wazirabad WTP to various UGRs and Providing, Installing, and Maintaining SCADA system in 11 UGR Command areas. As per the ADB's safeguard policy statement 2009 (SPS), its mandatory to prepare Initial Environmental Examination (IEE) report is for the subproject of "Transmission network improvement in underground service reservoir (UGR) command areas for C-01 (Sanjay Gandhi Transport Nagar), C-02 (CD Park Jahangir Puri),C-02 A(Fruit Mandi), C-03 (Model Town), C-03 A (Mukherjee Nagar), G-01 (Peera Garhi), G-02 (Punjabi Bagh), P-09 (Burari A), P-10 (Burari TPA), H-05 (Avantika), H-06 (Pitampura), H-07 (Shakur Basti) and H-08 (Lawrence Road) "proposed under the tranche-1.

3. **The Subproject.** The Subproject is for Improvements to the clear water pumping stations and transmission mains, and located in the northern part of the National Capital Territory of Delhi, India's national capital. The proposed transmission system will transmit treated water from the Wazirabad Water Treatment Plant (WTP) on the north west part of Delhi to the 11 UGRs spread in the northern part of Delhi. Each UGR has its own command area for water supply, so this transmission system will improve water supply in the entire project area comprising 11 UGR command areas. These are spread over in the districts of West Delhi, North Delhi, Northeast Delhi and Northwest Delhi. As per the census 2011, the total population of the project area is 2.64 million and the total area is 120.0 sq. km. The subproject includes the following civil works: (i) laying of transmission main of length 37.28 km (Ductile Iron (DI) and Mild Steel (MS) pipe of diameter 600 mm to 1500 mm, and (ii) installation of 9 new pumps (including 3 standby) of 950 HP each in the existing clear water pumping stations at Wazirabad WTP. The Subproject will be implemented over a period of 42 months, under a single civil works contract package. Followed with 10 years, operation and maintenance phase.

4. **Program Implementation Arrangements.** Implementation under the supervision of the GNCTD for which Delhi Jal Board (DJB) has been appointed as the executing agency (EA) and will be responsible for the management, coordination and execution of all the activities funded under the MFF. Project Steering Committee (PSC) headed by Member (Water) will provide overall guidance and strategic directions to the program.

- Project Steering Committee (PSC) headed by Member (Water) will provide overall guidance and strategic directions to the program.

- Program Management Unit (PMU), headed by Chief Engineer (Water Projects) will oversee program implementation.
- Program Implementation Unit (PIU) under the PMU; will be the implementing agency (IA). Project Manager, an Executive Engineer rank officer and will be supported by technical, financial, safeguards and administrative staff. PIU will be assisted by a PMC, which will design the infrastructure, manage the tendering of contracts, supervise the construction process, assure the technical quality of design and construction, and provide advice/assistance on institutional capacity development. PIU, will appoint contractors, to build infrastructure elements. PIU will also appoint Community Mobilization & Resettlement Consultant (CMRC) to assist in program implementation. For safeguards, a qualified Environmental/Civil Engineer of Assistant Engineer rank will be posted to the PIU and designated as the Safeguards Officer (SO). PMC will support PIU in all safeguard activities.

5. **Screening and assessment of potential impacts.** ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. As per the GoI; EIA Notification, 2006, this subproject do not require EIA study or environmental clearance. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist for Water Supply. The potential negative impacts were identified in relation to pre-construction, construction and operation. REA checklist showing the major potential impacts has been placed as Appendix 3.

6. **Categorization.** Based on results of the assessment and ADB SPS, the subproject is classified as environmental Category B, i.e., the subproject is judged to be unlikely to have significant adverse environmental impacts. An initial environmental examination (IEE) is required to determine whether significant environmental impacts warranting an environmental impact assessment are likely.

7. **Purpose of IEE.** This IEE aims to achieve the following

- Provide critical facts, significant findings, and recommended actions;
- Present the national and local legal and institutional framework within which the environmental assessment has been carried out;
- Provide information on existing geographic, ecological, social and temporal context including associated facilities within the subproject's area of influence;
- Assess the subproject's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the subproject's area of influence;
- Identify mitigation measures and any residual negative impacts that cannot be mitigated;
- Describe the process undertaken during project design to engage stakeholders and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation;
- Describe the subproject's grievance redress mechanism for resolving complaints about environmental performance;
- Present the set of mitigation measures to be undertaken to avoid, reduce, mitigate, or compensate for adverse environmental impacts;
- To describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and

- Identify indicative costs and who is responsible for carrying out the mitigation and monitoring measures.

8. **Description of the Environment.** The subproject components locations are in northern parts of Delhi, the capital city of India. The proposed transmission pipeline will be laid along the public roads, mostly main wider roads that can accommodate large diameter transmission pipelines. Mostly of urban character, subproject area is devoid of any significant sensitive environmental features in the alignment of proposed pipelines. Delhi climate is a distinct humid subtropical, and semi-arid climate, with seasonal temperature variations. Extreme dryness with intensely hot summer, dust storms, and very cold winters are the characteristics of the Delhi's weather. Due to dry dust weather condition, coupled with traffic and other activities, the ambient air quality of Delhi in general is poor with high levels of particulate matter. Roads in the subproject area are congested with traffic, pedestrians and activities. Alignment of transmission main at this planning stage is fixed as proposed alignment, and same may be fine-tuned by the contractor as the project progresses to final implementation phase. Refer Appendix 4 pertaining to National Ambient Air Quality Standards.

9. Transmission Mains starts from Wazirabad WTP and is aligned along the main arterial roads of Outer Ring Road (ORR), Banda Bahadur Marg, NH1, Mahatma Gandhi Road (Inner Ring Road IRR), Rohtak Road, Azadpur road, Maharaja Nahar Singh Marg, Lawrence Road, Britannia Road, Guru Harkishan Marg, Vashisht Kumar Gulla Marg, S Manohar Singh Marg, Maharaja Nahar Singh Marg, Muni Maya Ram Jain Marg, Maharaja Agrasen Marg, Guru Gowalkar Marg, Saiyyad Nangloi Marg and Bhao Rao Devars Marg Santi Swaroop Tyagi Marg, Grand Trunk Road (NH1), Bawana Road, Libaspur Road, etc., except Outer Ring Road (ORR), which is very wide and carry comparatively less traffic, all other roads carry high traffic, congested with pedestrian and commercial activities abutting the roads. There are also several important traffic junctions along the pipeline alignment (e.g, Mukarba chowk). On the NH1, IRR, and Rohtak roads pipe will be laid along the service roads, which again carry significant volumes of traffic. Where the service roads are available, the pipeline will be accommodated. For ease of pipeline laying operations, certain portions of pipelines may be laid in to the Najafgarh drain or its other associated drains. In such cases, formal permission will be accessed as per the GNCTD, the state governmental rules and procedures.

10. There are two Archeological Survey of India (ASI) protected monuments in the project area. Shah Alam Tomb is situated near Wazirabad WTP (this located along the road leading to WTP), and Sheesh Mahal in Shalimar Bagh area. The existing transmission line is beyond 300 m regulated zone of Shah Alam Tomb,so there is no requirement of prior permission during construction phase. If due to any change in the alignment, if new proposal falls with the distance of 300 m from the protected monument the due process for availing the permission from ASI will be followed. Similarly, in case of Shalimar Bagh, the proposed alignment is about 1 km from the monument; therefore, permission may not be required. This is to be rechecked during the finalization of alignments by the contractor, and as far as possible pipelines will be avoided within 300 m regulated zone.

11. **Potential environmental impacts.** The subproject is unlikely to cause significant adverse environmental impacts because:

- The components will involve straight forward construction and operation, so impacts will be mainly localized;
- There are no significant sensitive environmental features in the project sites and

- Predicted impacts are site-specific and likely to be associated with the construction process and are produced because the process is invasive, involving excavation and earth movements.

12. Environmental impacts as being due to the project design or location are not significant. As the subproject activities are mainly located in an urban area congested with traffic, pedestrians and many of the roads carry heavy traffic and are abutted with busy commercial establishments frequented by people, necessary measures to align the pipelines along the wider roads to minimize the impacts are suggested.

13. During the construction phase, impacts mainly arise from the construction dust and noise; from the disturbance of businesses, traffic, residents and important buildings by the construction work, and from the need to dispose of large quantities of waste soil and import of construction material. The social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the roads where pipes will be laid. Impact of dust pollution is considered significant. As Delhi air already has high particulate matter content, and therefore any further increase due to dust from construction activities will deteriorate the situation, though temporarily. Trenchless technology is proposed for laying pipelines; this will therefore avoid / minimize the dust generation, traffic disruptions and other public inconveniences. However, this technology may not be suitable for all locations, open trenching may be required to certain extent. Appropriate measures are suggested to minimize the construction impacts. Also, to avoid impacts, in all the locations that are sensitive from traffic and public inconvenience the pipelines are proposed to be laid by trenchless method. Trenchless method will have minimal impacts, and all standard construction practices and safety precautions will be undertaken to further reduce the impacts.

14. **Environmental Management Plan.** An Environmental Management Plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. Locations and siting of the proposed infrastructures were considered to further reduce impacts. Pipelines are being laid in road right of way (RoW) alongside main/access roads, to reduce acquisition of land and impacts on livelihoods.

15. The EMP includes design and location related measures such as;

- Energy efficient pumping equipment
- quick leak detection and rectification to save the resources, etc.,
- measures to avoid water supply contamination from sewers and drains,
- fine tuning pipeline alignments based on the type of roads, etc.,
- During construction, the EMP includes intensive mitigation measures such as;
 - of barricading, dust screens, dust-suppression methods such as watering and/or covering of stockpiles to control dust,
 - Implementation of traffic management plan in coordination with local traffic police to minimize traffic impacts;
 - Awareness campaigns and consultations to inform residents and businesses of potential disturbances;
 - Provision of walkways and planks over trenches to ensure access will not be impeded;

- Provision of immediate temporary road restoration with C: C layer; for prevention of spread of dust particle;
- Provision of trenchless pipe laying technology in lieu of open cut method for better control on traffic congestion and prevention of spread of dust particle;
- Socio-technological provision to reduce and minimize the requirement of tree removal;
- Use of noise-dampening measures in areas with sensitive receptors such as hospitals, schools, places of worships and other silence-zones; and
- Finding beneficial use of excavated materials to extent possible to reduce the quantity that will be disposed-off.

16. Subproject include improvement of distribution network, mainly focusing on enhancing efficiency and coverage of the system. Subproject do not include any supply side measures (like water source augmentation, treatment etc.,) and therefore there are no impacts during operation envisaged. In the IEE the discussion focused mainly on construction phase activities, as water pipelines are not generally associated with any significant impacts during operation. Public inconvenience, dust, and traffic disruptions are typical impacts that are envisaged for pipeline repair work during operation. These however will be rare and infrequent. The EMP includes mitigation measures and monitoring plan for O&M phase.

17. The EMP will guide the environmentally sound construction of the subproject and ensure efficient lines of communication between project management unit (PMU), project implementing unit (PIU), consultants and contractors. The EMP will include following;

- ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site;
- guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

18. The contractor will be required to submit a site environmental plan (SEP) to PMC for review and to PIU for review and approval, including;

- Proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes;
- Specific mitigation measures following the approved EMP;
- Monitoring program as per SEP; and
- Budget for SEP implementation.

19. No works are allowed to commence prior to approval of SEP. A copy of the EMP/approved SEP will be kept on site during the construction period at all times. The EMP included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

20. **Consultation, disclosure and grievance redress mechanism.** The stakeholders were involved in developing the IEE through discussions on-site. As part of subproject level public consultation activity public consultations have been conducted (under Rapid Environmental Assessment) during detailed design phase, and views expressed by the stakeholders have duly been recorded in the public consultation sheets for incorporating into the IEE and also in the planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the ADB and DJB websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism is described within the IEE to ensure any public grievances are addressed quickly. Appendix 10 provides the details of public consultation and Appendix 18, illustrates the details of the consultation. Public Information Notice to be placed at each of the project site is shown under Appendix 25. The stakeholder's consultation and subsequent release of press notes will help the project information to reach the local people to a greater extent. However, upon disclosing the safeguard documents, the project relevant information shall be better understood by the local communities.

21. **Monitoring and Reporting.** The PMU, PIU and PMC will be responsible for monitoring. The PMC will submit semi-annual monitoring reports to PIU, which will review and submit to ADB. ADB will post the environmental monitoring reports on its website. Sample Grievance Registration Form is shown as Appendix 33.

22. **Conclusions and Recommendations.** Therefore, as per ADB SPS 2009, the project is classified as environmental category B and does not require further environmental impact assessment. This IEE has been updated during the detailed design stage by the PMC to reflect construction technology and any other changes, amendments in the projects and will be reviewed and approved by ADB. The Draft IEE shall be endorsed by the ADB if the IEE report fulfills the SPS, 2009 requirements. Upon endorsement, the Draft IEE shall be disclosed on project website

II. Introduction

A. Project Background & Context

23. The Delhi Water Supply Improvement Investment Program (DWSIIP) will complement past and ongoing efforts of the Government of National Capital Territory of Delhi (NCTD) to improve water supply services to the residents of NCTD.¹ DWSIIP targets a complete improvement to water treatment, transmission and distribution network improvements to Wazirabad Water Treatment Plant Command area located in northern part of Delhi (see Figure 1) to ensure the objective of improved water supply services.² The MFF targets benefits to 2.64 million population in terms of 24x7 and quality supply of water. The DWSIIP will help achieve the National Capital Territory of Delhi (NCTD) Water Supply Master Plan objectives of reduced non-revenue water (NRW) and equitable access to water supply services.³ The investment program will include the rehabilitation, upgrading and/or replacement of key water supply infrastructure, improvements in the management of the infrastructure and improved customer-related services within the Wazirabad WTP command area. The DWSIIP will be implemented as a multi-tranche financing facility (MFF) having two tranches (project 1 & project 2) and with each tranche constituting a project loan.

24. Project 1 of the DWSIIP will include a PMC; civil works packages (DWSIIP/01& 02) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas C-02 (Chitranjan Das Park Jahangir Puri), C-03 (Model Town) G-02 (Punjabi Bagh), H-07 (Shakur Basti) and H-08 (Lawrence Road); and a civil works package (DWSIIP/04) for transmission mains and clear water pumping stations, and instrumentation and automation (SCADA). Project 2 will include civil works package (DWSIIP/03) for rehabilitation or construction of the Wazirabad WTP; civil works packages (DWSIIP/05& 06) for distribution network improvement, including UGR, clear water pumping station, DMA feeder mains and distribution pipes, bulk flow meters and house service connections for UGR command areas G-01 (Peera Garhi), H-05 (Avantika), H-06 (Pitampura), C-01 (Sanjay Gandhi Transport Nagar), P-09 (Burari-A) and P-10 (Burari Transport Planning Authority). Project 2 will also support a Project Development Facility (PDF) to enhance readiness of future investment projects by taking advance actions to prepare the projects.

25. **Proposed Subproject.** The proposed subproject is for laying of clear water transmission main pipelines from the Wazirabad WTP to 11 UGRs spread in the northern part of Delhi. This transmission system will improve water supply in the entire project area comprising 11 UGR command areas. These are spread over in the districts of West Delhi, North Delhi, Northeast Delhi and Northwest Delhi. As per the census 2011, the total population of the project area is 2.2 million and the total area is 129.6 sq. km. The subproject includes the following civil works: (i) laying of transmission main of length 21.08 km ductile iron (DI) pipe of diameter 250 mm to 1000 mm, (ii) laying of transmission main of length 14.59 km of mild steel (MS) pipes of diameter 1100 mm to 1500 mm and 1.60 km pipe laying 500mm – 1500 mm dia through trenchless (iii) installation of 9 new pumps (including 3 standby) of 950 HP each in the existing clear water pumping stations at Wazirabad WTP, (iv) Four units of Surge vessels and 03 compressor rooms, (v) three new UGRs (02 of 19kl capacity and 01 of 15 kl capacity). Refer Appendix 17 for sub project shown on

¹ The Asian Development Bank (ADB) provided project preparatory technical assistance: ADB. 2013. *Technical Assistance to India for Preparing the Delhi Water Supply Improvement Investment Program*. Manila (TA 8415-IND).

² ADB, October 2013. *Country Partnership Strategy (2013-2017)*.

³ Japan International Cooperation Agency. 2011. *Study on Improvement of Water Supply System in Delhi in the Republic of India*. New Delhi.

google map which verifies that there is no protected forest or other sensitive area under the sub project area.

26. The DWSIIP will be carried out under the oversight of the GNCTD. The DJB is the Executing Agency (EA) responsible for the management, coordination and execution of all the activities funded under the MFF. DJB has established a PMU, chaired by the Member (Water Supply). A PIU has been established under the PMU to act as the Implementing Agency (IA). The Program Director will head the PIU and oversee the investment program, while the day-to-day management and implementation will be the responsibility of the Program Manager. The Chief Engineer (Projects) Water of the DJB will be the Program Director, and the Program Manager will be an Executive Engineer (Civil) rank officer. PIU will be assisted a Project Management Consultant (PMC).

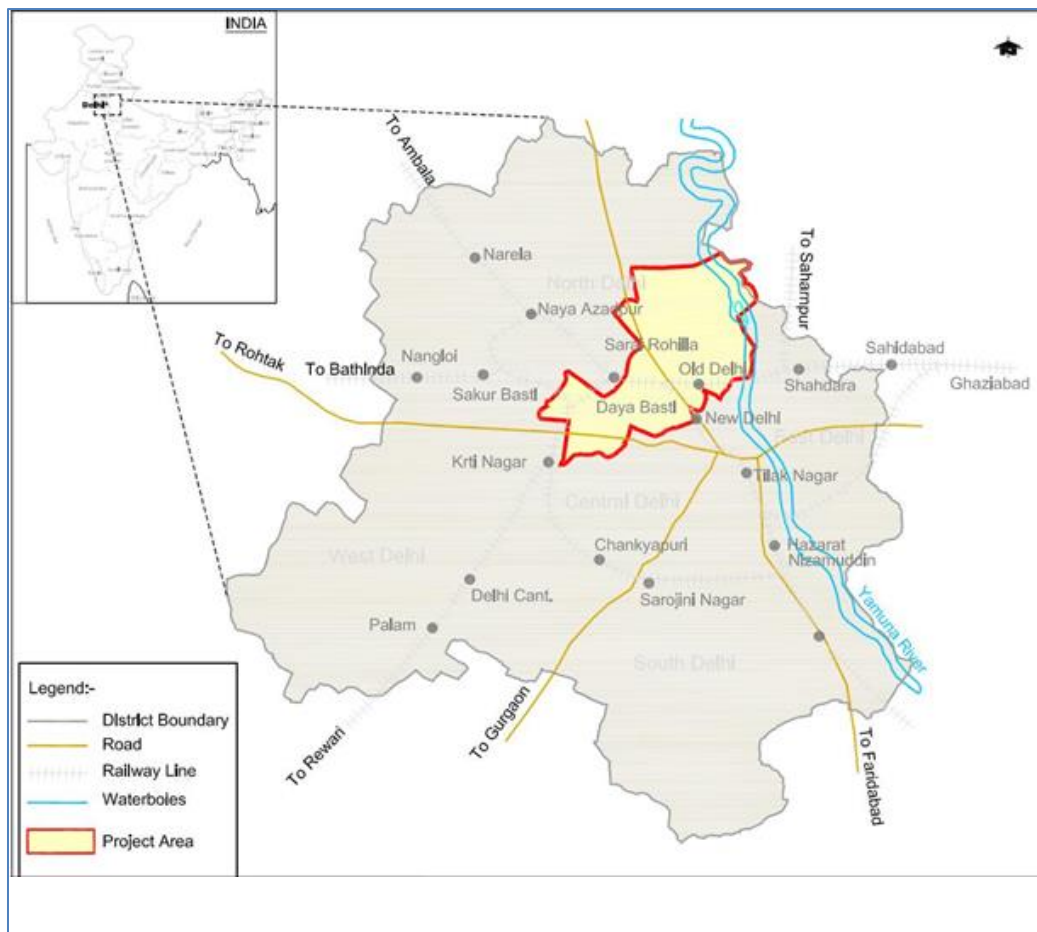


Figure 1: Location of the Investment Program Area in the NCTD

27. The Subproject will have access to the water source as Wazirabad barrage made-up on Yamuna river, through an existing Water Treatment Plant constructed and managed by IA; i.e. Delhi Jal Board. The Schematic diagram showing water source, WTP, UGRs, and other major ancillaries with flow of water has been placed in the figure 2.

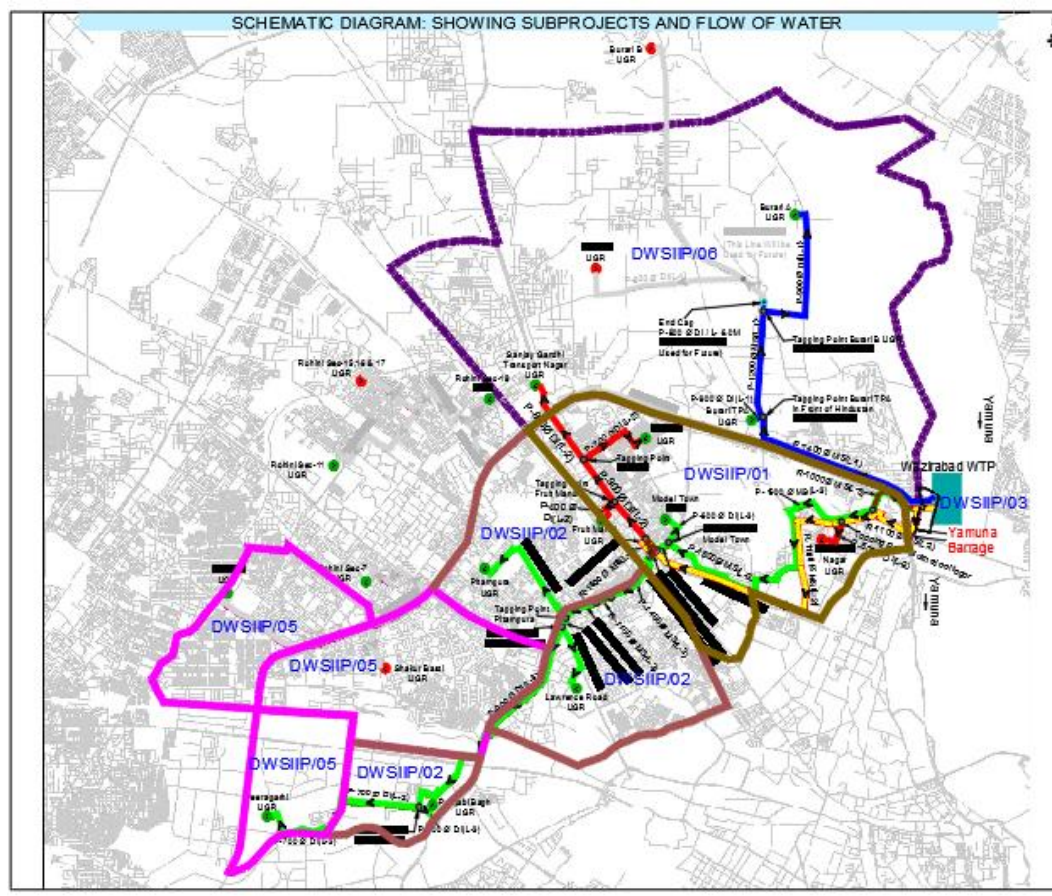


Figure 2: Schematic Diagram Showing Subprojects and Flow of Water

Source: DPR/DWSIIP-Package-04

B. Purpose of this IEE Report

28. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist for Water Supply (Appendix 1). Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

29. This IEE is based on the feasibility study Report, prepared by PPTA team and thus has been revised, in the detailed design stage by the PMC team. This revised IEE, therefore has duly been updated during the detailed design process, to reflect the changes, and amendments to the subproject.

30. This IEE has been conducted mainly based on detailed field surveys and primary as well as secondary sources of information. Few Field monitoring (environmental) surveys were conducted however, the environmental monitoring program developed as part of the

environmental management plan (EMP) will require the contractors to establish the baseline environmental conditions prior to commencement of civil works. The results will be reported as part of the environmental monitoring report and will be the basis to ensure no degradation will happen during subproject implementation. Stakeholder consultation was an integral part of the IEE.

C. Report Structure

31. This Report contains the following ten (10) sections:

- (i) Executive summary;
- (ii) Introduction
- (iii) Description of the project
- (iv) Policy, legal and administrative framework
- (v) Description of the environment;
- (vi) Anticipated environmental impacts and mitigation measures;
- (vii) Public consultation and information disclosure;
- (viii) Grievance redress mechanism;
- (ix) Environmental management plan, and,
- (x) Conclusion and recommendation.

III. Description of the Project

A. Project Area

32. Subproject is located in the northern part of the National Capital Territory of Delhi, India's national capital. The proposed transmission system will transmit treated water from the Wazirabad Water Treatment Plant (WTP) on the northeastern part of Delhi to the 11 UGRs spread in the northern part of Delhi. Each UGR has its own command area for water supply, so this transmission system will improve water supply in the entire project area comprising 11 UGR command areas. Which are spread over in the districts of West Delhi, North Delhi, Northeast Delhi and Northwest Delhi. Project area comprises 56 municipal wards, some of which are partially covered. As per the census 2011, the total population of the project area is 2.2 million and the total area is 129.6 sq. km.

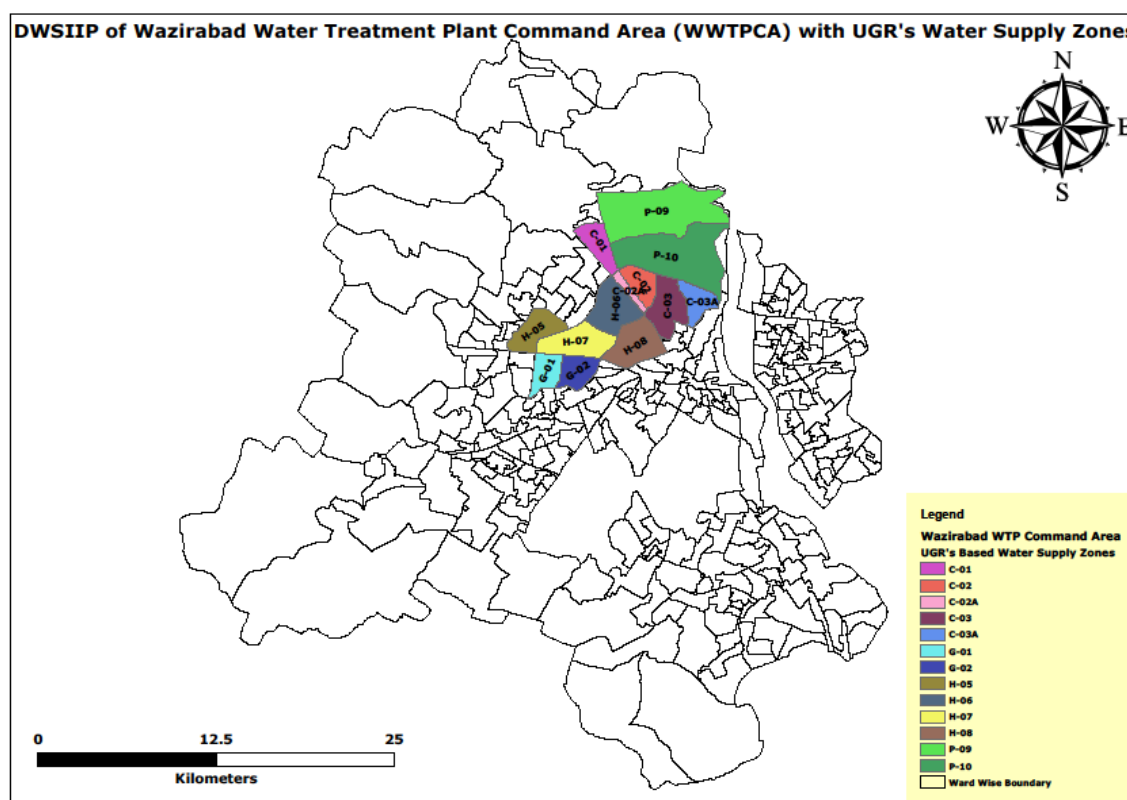
B. Existing Water Supply Situation

33. Delhi falls in the Yamuna sub basin of Ganga basin with Yamuna as the only river flowing through it. Along with sub surface water extracted through tube wells and Ranney wells, Delhi meets its demand through water received from the Western Yamuna Canal (WYC), River Yamuna and the Upper Ganga Canal. Supplies in WYC are supplemented by Delhi's share of the Ravi-Beas water transferred through the Narwana-Branch Link of the Bhakra system. Delhi gets its share of Ganga water through the Upper Ganga Canal (UGC) system. Water supply services in Delhi are provided using treated water from 11 WTPs, and water from many tubewells and several Ranney wells. The total capacity of these production facilities amounts to 925 MGD. Treated water is supplied to consumers via the transmission and distribution system and the tanker water supply in the areas having inadequate distribution network

34. In the existing system, the subproject area is supplied water from various water treatment plants. The Wazirabad Water works, with a total capacity of 131 MGD, supplies to 4 UGR command areas (C-02, C-03, G-02 and H-08) in the subproject jurisdiction. Under the reorganization of command areas; it is proposed that Wazirabad WTP will supply to all 11 UGRs covered under the subproject area, besides it will also supply to additional UGRs and provides bulk water supply to New Delhi Municipal Corporation (NDMC) area.

C. Proposed Sub-Project

35. The existing transmission system from Wazirabad WTP comprises of six mains (of material two each from the three WTP units). Of this six, three mains are currently supplying to the 4 UGR command areas, which will continue to receive water from Wazirabad WTP, and the rest 3 are supplying to areas outside the subproject area. 7 new UGRs are added to the command area of Wazirabad WTP besides the existing 4 UGRs. Therefore, new transmission lines are required to be laid to these UGRs, which is proposed under this subproject. Besides, the existing transmission lines will be replaced if required based on a field study to ascertain its condition as well as carrying capacity. The existing transmission mains consists mainly of cast iron (CI), DI and MS pipes. Adequate pumps will also be installed at the clear water pumping stations in the WTP. The Figure 3, illustrates the area under the Wazirabad Water Treatment plant.



Source : JICA Master Plan report

Figure 3: DWSIIP, Wazirabad Water treatment Plant Command area (WWTPCA) with UGRs for water supply zones

36. Following Table 1 shows the nature and size of the various components of the subproject. Subproject is presently in feasibility stage and therefore the alignments and pipe sizes may be changed as the project preparation progresses.

Table 1: Proposed Water Supply Subproject Components

S. No	Components	Function	Indicative Quantities	Location
1.	Clearance of site, providing guard fencing, signals board etc, complete.	Area demarcation Site marking, safety and clearance	LS	As per SEMP at WTP Wazirabad site under government ownership; i.e. IA- DJB
2.	Design, investigation, survey and providing, laying, testing and commissioning of Transmission Pipe main pipe (MS/ DI, K9 with K12 special) including allied works such as valve chamber, crossings, thrust block, valve chamber etc. for Burari, Civil Lines and West Delhi	Laying of transmission lines to supply adequate water quantity of distribution mains	Approx. 37.278 Km is new and 10.98Km existing to be retained (after carrying out hydraulic testing, after checking whether lines are lined or not).	As per SEMP at WTP Wazirabad site under government ownership; i.e. IA- DJB
3.	Design, investigation civil construction of single UGR including electro-mechanical. Instrumentation etc. all complete like interfacing with the proposed pump house	Construction of a Combined UGR for phase 1, phase 2 and phase 3 to cater the requirement as per estimated water demand	1 No.	Combined UGR at existing WTP site Wazirabad site under government ownership; i.e. IA- DJB
4.	Design, investigation civil construction of single Pump houses and ancillary building including electro-mechanical. Instrumentation etc. all complete as per specification etc. all complete	Installation of energy efficient equipment	1 No.	Combined UGR at existing WTP site Wazirabad site under government ownership; i.e. IA- DJB
5.	Supply, Installation of Pumps, motors, and associated E&M works, Instrumentation, SCADA all complete (including all allied works)	Installation of energy efficient equipment	12 numbers of pump sets of specified capacity.	At specified UGR/Pump house locations site under government ownership; i.e. IA- DJB
6.	Survey and connection with existing Filter house and proposed single UGR combined for phase 1, phase 2 and phase 3	To provide the water supplies to Combined UGR	1	Combined UGR at existing WTP site Wazirabad site under government ownership; i.e. IA- DJB
7.	Connection between phase 04 UGR to Phase 3 Pump house sump	Water Supply to the main transmission line	As per actual site condition	at existing WTP site Wazirabad site under government ownership; i.e. IA- DJB
8.	Design, investigation civil construction of Surge Vessel and related compressor house	For safety of transmission lines and pumps	3 numbers of specified capacity	At each of the Transmission mains outside clear water

S. No	Components	Function	Indicative Quantities	Location
	for phase 1, phase 2 and Phase 3 pump houses			pump house at site under government ownership; i.e. IA- DJB
9.	Demolition of existing UGR and Pump house, related ancillary building after construction of the new proposed units	To create space for compensatory plantation and other extension works etc.	3+3	WTP Wazirabad site under government ownership; i.e. IA- DJB
10.	Utility shifting of both underground and over ground facilities like existing pipes lines, transmission tower etc.	To operationalize the proposed transmission system as per the design	LS	WTP Wazirabad site under government ownership; i.e. IA- DJB
11.	Design Supply Commission of Electromagnetic flow meter	To quantify the actual quantity of water	3 Nos at UGR	WTP Wazirabad site under government ownership; i.e. IA- DJB
12.	Design Supply Commission of Electromagnetic flow meter at tapings to UGR	To quantify the actual quantity of water	3 Nos at UGR	WTP Wazirabad site under government ownership; i.e. IA- DJB
13.	Construction of RCC chambers for installation of inline valve, flow meters within command area of UGR.	For efficient operation and maintenance of valves	4 Nos	WTP Wazirabad site under government ownership; i.e. IA- DJB
14.	Providing and Laying of MS Transmission pipes using trenchless technology in the service area	To avoid the traffic abstraction during laying of transmission lines in critical junctions/ bust roads etc.	1.60 Km	Identified critical junctions and road crossings etc. Road owning departments are Government agencies
15.	Supply and installation of necessary SCADA enabled instrumentation equipment and system	For automated control of valves and operation of W/s system	LS	WTP Wazirabad site under government ownership; i.e. IA- DJB
16.	Supply and installation of SCADA hardware, software and communication equipment at each proposed Pump House and establish communication with WTP-PLC through FOC cable.	To provide the M&E support for adequate function of W/s	LS	WTP Wazirabad site under government ownership; i.e. IA- DJB
17.	Providing and Maintaining water quality monitoring points including collection of samples and get the water quality monitored on regular basis as per applicable standards and requirements at UGR.	To ensure the supply of potable water	3 UGR outlets	WTP Wazirabad and UGR inlet points site under government ownership; i.e. IA- DJB
18.	Design, Install, Commission vacuum chlorinators of liquid Chlorine at UGR in WTP etc.	Treatment of water to ensure its portability as per IS 10500	3 Nos. of specified capacity	WTP Wazirabad and UGR inlet points site under government ownership; i.e. IA- DJB

S. No	Components	Function	Indicative Quantities	Location
19.	Design, installation, Commission Surge Protection system at proposed clear Water Pump House including all allied works, etc. Complete etc.,	To ensure the safety of equipment	4 nos.	At Pump House in WTP Wazirabad site under government ownership; i.e. IA- DJB

37. **Construction works (pipelines).** Civil works in the subproject include laying of water supply transmission pipes from diameters ranging from 700mm to 2000 mm. These works will include linear excavation for laying pipes along the roads, placing pipes in the trench, jointing, hydro testing and refilling with the excavated soil. Rohtak Road, GT Road (NH1), MG Road, ORR are the main transport corridors along which pipeline will be laid. Other important and busy roads include Santi Swaroop Tyagi Marg, Bawana Road, Libaspur Road, Banda Bahadur Marg, Maharaja Nahar Singh Marg, Vashisht Kumar Gulla Marg, Maharaja Nahar Singh Marg, Maharaja Agrasen Marg, Guru Gowalkar Marg, Saiyyad Nangloi Marg and Bhao Rao Devars Marg etc., All these roads carry heavy traffic. Subsequent to completion of works, the contractor as part of the civil works will undertake road reinstatement immediately.

- Excavation: The pipes will be laid by open cut trench type method while on critical sites for traffic congestion, public inconvenience trenchless construction method will be adopted. The open excavation will be carried out with excavators and where there is space constraints it will be done manually. Proper barricading will be done all around the excavated area for the safety and if required traffic diversion will be considered. Suitable trenchless technology will be adopted by the contractor such as modern micro tunneling with boring pipe jacking technique. Trenchless technology will be adopted at all locations, which are convenient/suitable to use such technology, with a purpose to avoid public inconvenience and safety, traffic disruptions, dust control, and avoid blocking access to properties. The exact trenchless technology to be adopted and selection of alignment/locations where it will be adopted once the contractor is appointed. However, the overall adoption of trenchless technology will be kept maximum under the subproject. Tentative list of the identified sites for trenchless technology has been placed as Appendix 2.
- Tree removal and transplanting: The proposed alignment of different diameters passes through various types of roads, pedestrian path, institutional areas, industrial areas, parks and open scrub forests thus it is suggested to lay the pie in a way that minimal damage is caused to the floral wealth of the areas. Wherever possible the transplantation technique will be adopted and if at all it becomes obvious to cut a tree then due procedure will be followed and permission will be sought prior to initiation of the construction works in such area. Appendix 13 depicts the details of the trees to be cut / pruned. As the subproject DWSIIP- Package 04, is under a hybrid DBO mode of contract agreement therefore the exact number of trees to be cut would be as per the detailed engineering surveys done by the DBOC and will be revealed in the SEMP.
- Barricading: To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, torches, red lanterns and guards, as required, will be placed and maintained during the progress of the work. The hard barricading will be done at all construction locations. The dust screens will be placed above the barricading to avoid/minimize the spread of the dust.
- Temporary construction material storage: Due to space constraints and heavy traffic, the temporary construction of material storage at site will be limited. Material will be brought to the site as required. Material required for a day's work is only kept at the work site.

- Temporary storage of excavated soil, refilling & disposal of surplus soil: All excavated material will be stacked in such a distance from the trench edge that it will not endanger the work or workmen and it will avoid obstructing footpaths, roads and drive ways. The excavated soil will be refilled on the same day. The surplus soil will be transported to the identified disposal sites.
- Traffic diversions: Traffic diversions may be required at some locations. Public will be informed in advance and approval of the competent authorities will be obtained. Traffic plan will however be prepared by the contractor. Appendix 12 illustrates the sample outline for traffic management plan.
- Testing and refilling: Pipe laying and testing activities will be planned meticulously. Excavation will be planned in such a way that, back filling will be done by the end of the day's activity. All smaller diameter pipes will be hydraulically tested before backfilling.
- Pipes clean up prior to supply: Prior to supply of water through newly laid pipelines, ensure that pipes are properly cleaned and disinfected.
- Road relaying: Backfill material in the trench will be consolidated mechanically, and road restoration will be taken up immediately. If it is not possible to take up the road restoration immediately for technical reasons of road construction, a plain concrete layer will be laid over the trench to make the surface smooth for driving and also to arrest the dust generation and erosion.
- Safe disposal and recycling waste material: Safe disposal and recycling of waste material as in many places the old pumps, pipes, various major and minor machines due to replacement as per new designs with new and energy efficient equipment and accessories. So as per the state /DJB scrape disposal policy safe disposal of such materials will be ensured.

38. Contractor will prepare a method statement in detail for laying of pipeline. Approval of method statement by the Engineer is prerequisite for the start of work. Method statement will be specific to each site/road section as appropriate and should clearly identify sections for trenchless technology and open trenching. The overall work shall be split into individual tasks (per say, site clearance, excavation, pipe laying and up to final road restoration), and each task shall be detailed out in the method statement. The method statement shall provide a activity-space-time graph along the alignment for each section, which should clearly show section-wise, for example, how many days the trench will be open kept open. All the works shall be taken as per the documented procedures only.

39. All the construction works will be carried out during day time. Only in case of emergency or site conditions (like crossing a main road) night work will be taken up with due permission from the civic agencies. Proper precautionary measures will also be followed.

D. Implementation Schedule

40. The subproject is currently at DPR stage. The details of tentative implementation schedule have been placed below as Table 2.

Table 2: Tentative Implementation Schedule

Sr. No.	Sectional Milestone	Time from Commencement Date (days)	Event of start
1	Mobilisation	30	Commencement Date
2	Preparation of Service Improvement Plan (SIP)	120 Days – SIP Submission 150 Days – SIP Approval	Commencement Date
3	SIP Implementation	1260	approval of SIP in part or full
4	Construction on 1 No. UGR and Pumping Station	900	Commencement Date
5	Implementation of one priority transmission Line	900	Commencement Date
6	Completion of entire works including, preparation of as built drawing etc.,	1260	Commencement Date
7	Operation and maintenance of entire system as per scope of work	4830 days	from the date of initial takeover
8	Handing over back to Employer	4860 days	30 days before End of Operation Services period

The below Figure 4 illustrates the spatial arrangement proposed transmission mains

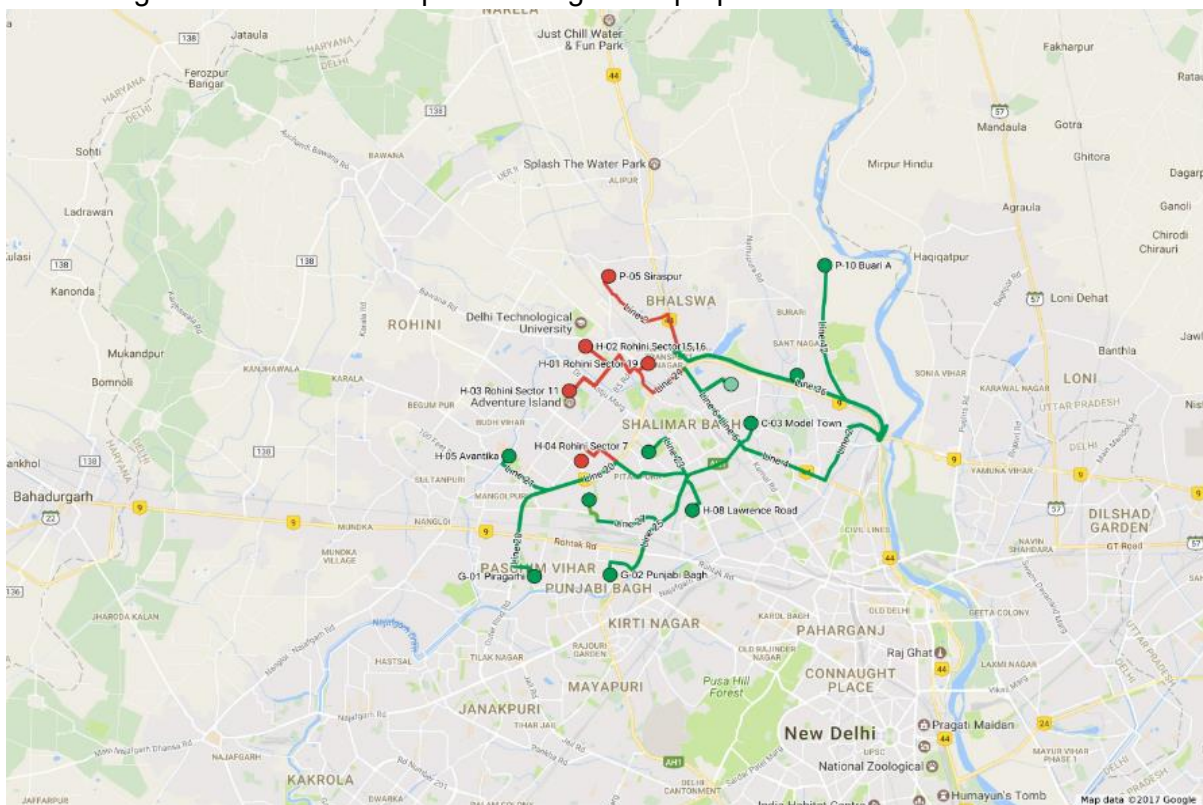


Figure 4 : Transmission Main 1 Alignment

IV. Policy, Legal & Administrative Framework

A. ADB Policy

41. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

42. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

- **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
- **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

43. **Environmental management plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

44. **Public disclosure.** ADB will post the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

- for environmental category A projects, draft EIA report at least 120 days before Board consideration;
- final or updated EIA and/or IEE upon receipt; and
- environmental monitoring reports submitted by the implementing agency during project implementation upon receipt.

45. **ADB SPS Additional Requirements on Pollution Control, Health & Safety.** During the design, construction, and operation of the project the PMU and PIUs will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines⁴. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these

⁴ http://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/ifc+sustainability/our+approach/risk+management/ehsguidelines

levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS. Table 3 and Table 4 shows the WHO Ambient Air Quality Guidelines and World Bank Group's EHS Noise Level Guidelines respectively. Corresponding National standards pertaining to Air Quality and EHS noise level are shown under Appendix 04 and Appendix 05 shows the national standards for Vehicle Exhaust Emission Norms. Whereas, Appendix 06 shows the National Ambient Air Quality Standards in respect of Noise.

Table 3: WHO Ambient Air Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines ^{7, 8}		
	Averaging Period	Guideline value in $\mu\text{g}/\text{m}^3$
Sulfur dioxide (SO_2)	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	500 (guideline)
Nitrogen dioxide (NO_2)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM_{10}	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter $\text{PM}_{2.5}$	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Table 4: World Bank Group's EHS Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines ⁵⁴		
Receptor	One Hour L_{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational ⁵⁵	55	45
Industrial; commercial	70	70

B. National Environmental Laws

46. **Environmental assessment.** The GoI, EIA Notification of 2006, (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

47. Category A projects requires EC from the central Ministry of Environment and Forests (MoEF). The proponent is required to provide preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MoEF prepares comprehensive Terms of Reference (ToR) for the EIA study. On completion of the study and review of the report by the EAC, MoEF considers the recommendation of the EAC and provides the EC if appropriate.

48. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study) and prepares ToR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the EC based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

49. None of the components of this water supply subproject falls under the ambit of the EIA Notification 2006, and, therefore EC is thus not required for the subproject.

50. **Applicable environmental regulations.** Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 5.

Table 5: Applicable Environmental Regulations

S. No.	Law	Description	Requirement
1.	National Environment Policy, 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by central, state and local government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	The subproject under DWSIIP should adhere to NEP principle of “enhancing and conservation of environmental resources and abatement of pollution”.
2.	EIA Notification	The EIA Notification of 2006 and 2009 (replacing the EIA	The MoEF & CC has issued a notification S.O. No. 3999 (E)

S. No.	Law	Description	Requirement
		Notification of 1994), set out the requirement for environmental assessment in India. This states that Environmental Clearance is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Category A projects requires Environmental Clearance from the National Ministry of Environment, Forest and Climate Change (MoEFCC). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	dated 09.12.2016 for integrating standard and objectively monitorable environmental conditions with building permissions for buildings of different sizes; for rigorous monitoring mechanism for implementation of environmental concerns and obligations in building project None of the components of this subproject falls under the ambit of the notification
3.	Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments.	Under the Water Act, 1974 & Air Act, 1981 and Authorization under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, DPCC, WTP is listed as category II(a), cases by the committee headed by Chairman DPCC. Provision of periodic monitoring of the surface water to monitor the situation and avert any possibility of pollution.
4.	Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	The subprojects having potential to emit air pollutants into the atmosphere must obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from JSPCB before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	For the subproject, the CTE and CTO from DPCC is required for (i) diesel generators; and (ii) hot mix plants, wet mix plants, stone crushers, etc. if installed for construction. If contractor is procuring from third party, contractor has to ensure that third party is having CTE/CTO from DPCC and Contractor to collect the copy of these and submit to PIU for approval. Refer Appendix 04.

S. No.	Law	Description	Requirement
			Pollution Under Control (PUC) certificates should be available for all the vehicles and construction equipment CTE to be obtained prior to start of construction and CTO to be obtained prior to commissioning. CTO renewal to be undertaken during operations stage.
5.	Environment (Protection) Act, 1986 and CPCB Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the Notified standards notified.	Appendix 5 & 32 provides applicable Contractor is required to keep all his vehicles maintained and control all the construction activities so that ambient air quality remain within prescribed Limit
6.	Noise Pollution (Regulation and Control) Rules, 2002 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Appendix 30 provides applicable noise standards Contractors are required to ensure all noise-producing activities during civil works conform to applicable standards. Refer Appendix 06
7.	National Institute of Occupational Safety and Health (NIOSH) Publication No. 98- 126	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Internationally recognized environmental standards. Contractors are required to provide hearing -protection equipment and ensure exposures of workers to noise - generating activities are within allowed NIOSH standards.
8.	Municipal Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	Solid waste generated at proposed facilities shall be managed and disposed in accordance with the Rules
9.	Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and to waste resulting from construction, remodeling, repair and demolition of any civil structure. Rules define C and D waste as waste comprising of building materials, debris resulting from construction, re-modeling, repair and demolition of any civil structure.	Construction and demolition waste generated from the project construction shall be managed and disposed as per the Rules. Refer Appendix 07.
10.	Hazardous and Other Wastes (Management and Trans boundary	According to the Rules, hazardous wastes are wastes having constituents specified in Schedule	If during excavation works, the excavated material is analyzed to be hazardous,

S. No.	Law	Description	Requirement
	Movement) Rules, 2016	II of the Rules if their concentration is equal to or more than the limit indicated in the said schedule.	they are to be stored and disposed of only in such facilities as may be authorized by the DPCC for the Purpose
11.	Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non- forest purposes, shall seek approval of the Central Government.	Not applicable as subprojects components are not located in designated forest area
12.	Wetlands (Conservation and Management) Rules, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.	Not applicable as subprojects components are not located in designated wetland area
13.	Indian Wildlife (Protection) Act, 1972 amended 1993 and Rules 1995; Wildlife (Protection) Amendment Act, 2002	An Act to provide for the comprehensive protection of wild animals, birds and plants. This would cover matters concerning Appointment of forest authorities, hunting of wild animals, protection of specified plants, conservation of national parks and sanctuaries, trade commerce in relation to plants and animals and prevention of any offences. Wildlife protected areas are notified under this act.	Not applicable as subprojects components are not located in designated protected area
14.	Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Defines hazardous chemicals <ul style="list-style-type: none"> • Stipulates rules, procedures to manufacture, storage and import of hazardous chemicals • Requires permission, authorization from various agencies if the total storage exceeds specified quantity; Requires emergency management plan 	Requires permission, authorization from various agencies if the total storage exceeds specified quantity;
15.	The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010	The Rules designate areas within a radius of 100 m and 200 m from the "protected property/ monument/ area" as "prohibited area" and "regulated area" respectively. Henceforth, no permission for construction of any public projects or any other nature shall be	There is no construction activity within 300 M regulated zone of two protected monument in the subproject area. The contractors will be required to follow due process for availing the permission for construction works / protocol if due to change in the

S. No.	Law	Description	Requirement
		<p>granted in the prohibited areas of the protected monument and protected area</p> <p>In respect of regulated area, the Competent Authority may grant permission for construction, reconstruction, repair and renovation based on recommendation of the National Monument Authority duly taking note of heritage bye-laws, which shall be prepared in respect of each protected monument and protected area</p>	alignment any construction activity lies within the regulated zone.
16.	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR)	Private land acquisition is guided by the provisions and procedures under this Act. Before the acquisition of any land, the Government is required to consult the concerned Panchayat or Municipal Corporation and carry out a Social Impact Assessment in consultation with them.	No land acquisition is required for the sub project. All lands are available under project implementation authority. Refer Appendix 08
17.	The Child Labour (Prohibition and Regulation) Amendment Act, 2016 The Child Labour (Prohibition and Regulation) Act, 1986	<p>No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule.</p> <p>Child can help his family or family enterprise, which is other than any hazardous occupations or processes set forth in the Schedule, after his school hours or during vacations</p>	No children between the age of 14 to 18 years will be engaged in hazardous working conditions. Refer Appendix 08
18.	The National Green Tribunal (NGT) Act, 2010	NGT provides an effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith. NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment	Stakeholders / affected persons may approach NGT to resolve project induced environmental Issues. Appendix 26 to 29 for such details..

S. No.	Law	Description	Requirement
		(Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to environment falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes.	
19.	Contract Labour and Abolition) Act, 1970	The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.	<ul style="list-style-type: none"> • Applicable to all construction works under DJB • IA to obtain a Certificate of Registration as the principle employer; Refer Appendix 08
20.	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996	<p>All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government</p> <ul style="list-style-type: none"> - Cess should be paid at a notified rate; - The employer must obtain a registration certificate from the Registering Officer 	<ul style="list-style-type: none"> • Applicable to any building or other construction work employing 10 or more workers; • provide safety measures at the construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the work place etc., Refer Appendix 08

S. No.	Law	Description	Requirement
21.	The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.,	<ul style="list-style-type: none"> Contractor shall register with Labour Department if Inter-state migrant workmen are engaged Adequate and appropriate amenities and facilities to be provided to workers - housing, medical aid, traveling expenses Refer Appendix 08
22.	The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014	The Act aims to protect the rights of urban street vendors and regulates street vending activities. It provides for survey of street vendors and their protection from eviction or relocation; issuance of certificate for vending; provision of rights and obligations of street vendors; development of street vending plans; and organizing of capacity building programs to enable the street vendors to exercise the rights contemplated under this Act.	<p>There is no private land acquisition or resettlement Applicable if any sub-projects may likely impact street vendors, kiosks and hawkers.</p> <p>A separate Resettlement Plan and Resettlement Framework have been prepared to examine these and related issues and provide appropriate mitigation. Contractor is required to implement RP</p>
23.	Minimum Wages Act, 1948.	The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.	<p>All construction workers should be paid not less than the prescribed minimum wage.</p> <p>Refer Appendix 08</p>
24.	Workmen Compensation Act, 1923.	The Act provides for compensation in case of injury by accident arising out of and during employment.	<p>Compensation for workers in case of injury by accident.</p> <p>Refer Appendix 08</p>
25.	Equal Remuneration Act, 1979.	The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.	<p>Equal wages for work of equal nature to male and female workers.</p> <p>Refer Appendix 08</p>
26.	Delhi Ancient and Historical Monuments and Archaeological	An Act to provide for the preservation, protection, upkeep, maintenance, acquisition and	There is no construction activity near regulated zone of protected monument in

S. No.	Law	Description	Requirement
	Sites and Remains Act, 2004.	<p>regulation of, and control over, ancient and historical monuments and archaeological sites in Delhi;</p> <ul style="list-style-type: none"> - Under the Act, State Government declares various monuments, sites etc. as protected monument/sites; - Requires prior permission of the Department of Archeology if the construction work is situated within 100 m of any monument or if the site is declared as protected by the Government of NCTD under this Act; - Department provides conditional permission, including time for completion, procedures to be followed during the work and for chance finds etc. 	the subproject area. The contractors will be required to follow the protocol as defined in the Environmental Management Plan (EMP) and access the process to initiate the permission if there is any change in the alignment due to which any if the construction item falls in the regulated zone
27.	Delhi Preservation of Trees Act, 1994.	<ul style="list-style-type: none"> - Imposes restrictions on the felling and removal of trees on any land in NCTD irrespective of land ownership; - Prior permission is required from the Tree Officer to cut/prune trees - Plant trees as per the direction of the Tree Officer. 	As there are some plants on the proposed site so as per the final plan submitted by the DBOC the number of trees to be removed or pruned will be decided and due permission will be availed, following the provisions as per the Delhi Preservation of Trees Act, 1994. Refer Appendix 13 for the tentative list of Trees to be cut./ Pruned assessed in the design stage.

51. Though equivalent environmental legislations (National and State) are adopted in the subproject, but to comply with the safeguards monitoring standards as per ADB's- SPS-2009 PIU and PMU shall adopt stringent measures as specified in the World Bank Group Environment, health and Safety guidelines.

A. International Conventions and Treaties and their applicability for Sub Project

In addition to national and state rules and regulations, international conventions such as the International Union for Conservation of Nature and Natural Resources, Convention on Migratory Species of Wild Animals, Convention on International Trade in Endangered Species of Wild Fauna and Flora, and Ramsar Convention on Wetlands of International Importance are applicable in the selection and screening of subprojects under restricted/sensitive areas. India is a party to these conventions.

B. International Union for Conservation of Nature and Natural Resources

The International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species (also known as the IUCN Red List or Red Data List), founded in 1963, is a comprehensive inventory of the global conservation status of plant and animal species. The IUCN is an authority on the conservation status of species. A series of Regional Red Lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit. The IUCN Red List is set upon precise criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. The aim is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community to try to reduce species extinction.

C. Convention on Migratory Species of Wild Animals

The Convention on Migratory Species of Wild Animals (CMS) was adopted in 1979 and entered into force on 1 November 1983. CMS, also known as the Bonn Convention, recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges. CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.

D. Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES were first formed, in the 1960s. Annually, international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods, wooden musical instruments, timber, tourist curios and medicines. Levels of exploitation of some animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction. Many wildlife species in trade are not endangered, but the existence of an agreement to ensure the sustainability of the trade is important in order to safeguard these resources for the future. Because the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation.

E. Ramsar Convention on Wetlands of International Importance 1971

The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The Ramsar Convention is an international treaty for the conservation and sustainable utilization of wetlands. The Ramsar Convention is the only global environmental treaty that deals with a particular ecosystem. According to the Ramsar list of Wetlands of International Importance, there are 25 designated wetlands in India which are required to be protected. Activities undertaken in the proximity of these wetlands should follow the guidelines of the convention. There are no Ramsar designated wetlands reported within subproject areas. Hence, restriction of subproject activities within a Ramsar site is not applicable.

ADB SPS Requires that during the design, construction, and operation of the project necessary compliance to all applicable laws and international conventions / treaties along with pollution prevention and control technologies and practices consistent with international good practice, are ensured. Table 6 shows indicative statutory clearance requirements. Certificate issued by the IA, regarding NOCs regarding land ownership and permission for laying of pipe line along the road are shown in Appendix 19 and Appendix 20

Table 6 : Indicative Statutory Clearance Requirements

S. No	Subproject Component	Statutory Requirements	Time required for obtaining clearance
1	Tree cutting for laying of pipelines / UGR rehabilitation	- prior permission from Tree Officer, Department of Environment and Forest, GNCTD -Application form and procedure is available at the following web link; http://delhi.gov.in/wps/wcm/connect/9288ae004f06d0c8aeb4bee1feedd58c/Procedure+for+obtaining+tree+cutting+permission.pdf?MOD=AJPERES&lmod=526989464&CACHEID=9288ae004f06d0c8aeb4bee1feedd58c	60 days
3	Pipelines to be laid within in the regulated zone of ASI protected monuments	-Prior permission from National Monument Authority (NMA) -Application available at following web link http://www.nma.gov.in:8080/documents/10157/bdfcc912-4c2c-4d48-b612-712c20e400c4Proposed scenario attached : Appendix14	90 days
4	Other clearances required for pipelines based on the alignment location	- Permission from National Highway Authority of India, Municipal Corporation of Delhi, Public Works Department, Delhi Metro Rail Corporation, Irrigation & Flood Control Department etc., as the case may be.	60 days
5	Other requirements like CTE and CTO for DG set, Hot mix plants, Crushers and Batching plants, procurement of sand mining, quarries and borrowed areas	Other requirements required from DPCC like Hot mix plants, Crushers and Batching plants Requirement of CTE and CTO for DG set Requirement of Authorization for Storage, handling and transport of hazardous materials EC requirement for new Sand mining, quarries and borrow areas. Requirement of PUC for all construction project and construction vehicles	30 days

F. Administrative Framework, Enforcement & Grievance Redress

Environmental Clearance. Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, governs and enforces the environmental clearance requirements in India. Clearances are handled at two levels –clearance to Category A projects is issued at central level by MoEFCC, and for Category B projects, clearance process is decentralized at state-level, and clearance is issued by the respective State-level EIA Authorities set up under the EIA Notification, 2006. This subproject does not fall under the ambit of EIA Notification, therefore this is not applicable.

52. **Enforcement of Pollution Control Laws.** Delhi Pollution Control Committee (DPCC) enforce the pollution control laws and regulations (water pollution, air pollution, solid waste, hazardous waste and biomedical waste management, etc.) in NCT Delhi. DPCC enforces the pollution control law through issuance of consent for establishment and operation of industries and activities with pollution potential – notified by as Red, Orange and Green categories. The activities/projects that are not notified do not need to go through the consent process. Consent for establishment (CFE) is issued to an activity based on review of project proposal, pollution control measures and visit to proposed site. Consent for operation (CFO) is issued after the construction is completed. The consent specifies the conditions to be complied with pertaining to emissions, effluents, and solid waste. The consent must be renewed annually or as specified by DPCC. The standards for discharge and other regulations to be followed are established by the Central Pollution Control Board, while at state level, DPCC can further strengthen the standards, but cannot relax. DPCC monitors the pollution levels and regulates environmental protection related activities in Delhi. The involvement of DPCC in subproject implementation and monitoring will be limited, as none of the components require consent of DPCC. However, as per the recent NGT's (National Green Tribunal) direction, DPCC monitors the construction activities to check pollution and control activities (especially dust and air emissions) irrespective of scale and size, and whether or not a project requires environmental clearance from MOEFFCC or consent from DPCC. NGT ruling also provides for levying of penalty (INR 50,000) for non-implementation of dust-control norms as per the Manual on Construction Projects published by MoEFCC. The subproject construction activities shall also comply with the dust control measures.

53. **Grievance Redress.** Complaints on pollution and waste management is handled by the DPCC. Public can approach the DPCC which will review, and take necessary steps to redress, and if requires takes punitive actions including closure of such polluting industry/activity. A grievance redress mechanism is established at MoEFCC on all matters related to environment, forest, wildlife etc. This system accepts, acknowledges and acts on the complaints in a time bound manner, with the help of regional offices as required.

54. Established under the National Green Tribunal Act, 2010, the National Green Tribunal (NGT) provides an effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith. NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to environment, falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes, NGT provides speedy justice (within 6 months). If not satisfied with the NGT decision, aggrieved party can approach the Supreme Court within the specified period of time. Matters relating to the Wildlife (Protection) Act, 1972 do not fall under the jurisdiction of NGT. Appendix 10 provides the details of public consultation and Appendix 25 shows the Public Information Notice template.

55. Project specific grievance system will be introduced to expedite the redressal of the site specific construction work related grievances by following social and institutional arrangements, such as allocating a toll free project specific grievance number, disclosing the phone number and name of safety officer of the contractor, advertisement in the newspapers scroll clippings in the cable TV network. Relevant data and feedback regarding DWSIIP from DJB's existing GRM system like Public Grievance Management System (PGMS), Revenue Management System (RMS), Central Control Room (CCR), online grievances registered on Facebook page, web portal,

Short Message System (SMS) etc; will also be used for quick redressal of project related grievances.

56. The SEMP prepared by the Hybrid Design Build and Operate Contractor (will have to deploy the EHS supervisor) will consist of closure plan for laying of the roads, spoil management plan and traffic diversion plan as per relevant Appendixes; like Appendix 7: Extract from Construction & Demolition Management Rules, 2016, Appendix 11: Sample Outline Spoils (Construction waste) Management Plan and Traffic mangment plan and get its approval from PIU before initiation of the construction activites. The Updated/Final IEE and SEMP should provide specific information on how the design (i) applies pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines and (ii) adopts cleaner production processes and good energy efficiency practices. If less stringent levels or measures are appropriate in view of specific project circumstances, the contractor will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPR. Refer Appendix 32 for a comparative table for National standards and World Bank Group's Environmental, Health and Safety Guidelines, highlighting the applicable stringent standard for the project.

V. Description of Environment

A. Methodology Used for Baseline Study

57. Data collection and stakeholder consultations. Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites.

58. The literature survey broadly covered the following:

- Project details, reports, maps, and other documents prepared by technical experts of the ADB PPTA Team
- Discussions with Technical experts of the PPTA team, DJB authorities, relevant government agencies like ASI, DPCC, etc.
- Secondary data from previous project reports and published articles, and
- Literature on land use, soil, geology, hydrology, climate, socioeconomic profiles, and other planning documents collected from Government agencies and websites.

59. **Ocular inspection.** Several visits to the project sites were made during IEE preparation period in 2017-2019 to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed project. A separate socioeconomic study was conducted to determine the demographic information, existing service levels, stakeholder needs and priorities. Refer Appendix 16 the google map showing land use pattern along with the proposed alignment, it shows the 10 Km area periphery around subproject area . The Map verifies the ocular observations that there is no protected forest in the region. Physical Resources

Location, Area & Connectivity

60. The Project area is situated in National Capital Territory (NCT) Delhi, the Capital of India. Spread over 1,483 sq. km on the banks of River Yamuna, Delhi is geographically located in

northern part of India, between 28°24'15" and 25°53'00" North latitude and 76°50'24" and 77°20'30" East Longitude. It is bordered by Uttar Pradesh in the east, and the remaining three sides by the State of Haryana. The population of NCT Delhi as per the census 2011 was 16.8 million, grew from 13.9 million in 2001. The subproject area falls in north, northeast, northwest and west districts. Area is 129.56 sq. km and inhabiting a population of 2.2 million (2011 census).

61. Delhi, being national capital, and an important trade, commerce and educational center in north India, enjoys best connectivity with the rest of the world and within the country. It is connected by highways and railways, and it has a world-class airport.

Topography, Soils & Geology

62. Delhi is located between the mountain ranges of the Great Himalayas and Aravalli. River Yamuna flows in the eastern part of Delhi. The topography of Delhi is defined by three distinct features: the plains, Yamuna flood plains and the Aravalli ridge. Delhi is in the western fringes of Gangetic plains, and the Yamuna flood plains are covered with fertile alluvium. The ridge, the extension of Aravalli mountain ranges extends into Delhi in south from Rajasthan, and spreads further to west, northwest and northeastern parts, and is a distinct feature in the otherwise plain topography. Average elevation is about 215 m above the mean sea level (MSL), within a range of 200 m to 300 m above MSL. The highest point on the ridge is at 317 m above the MS. Subproject areas is spread from the west bank of Yamuna in northern part of Delhi. The topography is flat, and slopes very gently and ultimately drains into Yamuna River.

63. The Delhi ridge which is the northernmost extension of Aravalli mountain consists of quartzite rocks and extends from southern parts of the territory to western bank of Yamuna for about 35 km. The alluvial formations overlying the quartzitic bedrock have different nature on either side of the ridge. The Yamuna flood plain contain a distinct river deposit. The areas near the ridge are occupied by alluvium derived from the adjacent quartzite ridge.

64. Subproject area, in the Yamuna alluvial plains, comprises of the newer alluvium made up of fine to medium sand, silts, gravel, clay and kankar. The surface layers made up of wind-blown sediments or recent age. These alluvial sediments are underlined by hard formations of Delhi system of rocks. Following is the general sequence of formations:

- Recent to Sub – Recent: Alluvium
- Post-Delhi Intrusive: Pegmatic and basic intrusive
- Algonkian (Delhi System): Alwar Quartzites

65. The soils of the Delhi area are mostly light with subordinate amount of medium texture soils. The light texture soils are represented by sandy, loamy, sand and sandy loam, while medium texture soils are represented by loam silty loam.

Seismology

66. As per the seismic zoning map of India, project area falls under Zone IV, which is termed as "high damage risk zone". A micro zonation seismic zoning map of Delhi classified Delhi into low, medium and high hazard areas. The subproject areas, located in the trans Yamuna, fall under high hazard zone. Adequate design considerations are done to deal with the aspect of seismicity.

Climatic Conditions

67. Influenced by its proximity to Himalayan range and Thar desert in the west, Delhi climate is a distinct humid subtropical, and semi-arid climate, with seasonal temperature variations. Extreme dryness with intensely hot summer, dust storms, and very cold winters are the characteristic of Delhi climate. There are predominantly three seasons: summers, from the beginning of April to late June until the arrival of southwest monsoon, and May being the hottest month; monsoon season from late June to mid-September, followed by a post monsoon season up to October end. Winter starts in late November / December and extends up middle of February. January experiences peak winters. Winter temperatures are often influenced by cold waves, chill winds due to its proximity with Himalayan ranges. Heavy fogs are common feature in Delhi, during which visibility falls drastically, which always leads to disruption of road, rail and air traffic. Winter is followed by spring season up to the beginning of summer in April.

68. Annual average rainfall (long term normal rainfall) is 778.4 mm. As presented in the following Figure 5, rainfall data from 2004-2014 indicated erratic nature rainfall, with large deviations from the long term normal rainfall. Highest rainfall was received in 2013 (43% higher), while 2014 was the lowest rainfall year (-30% below).

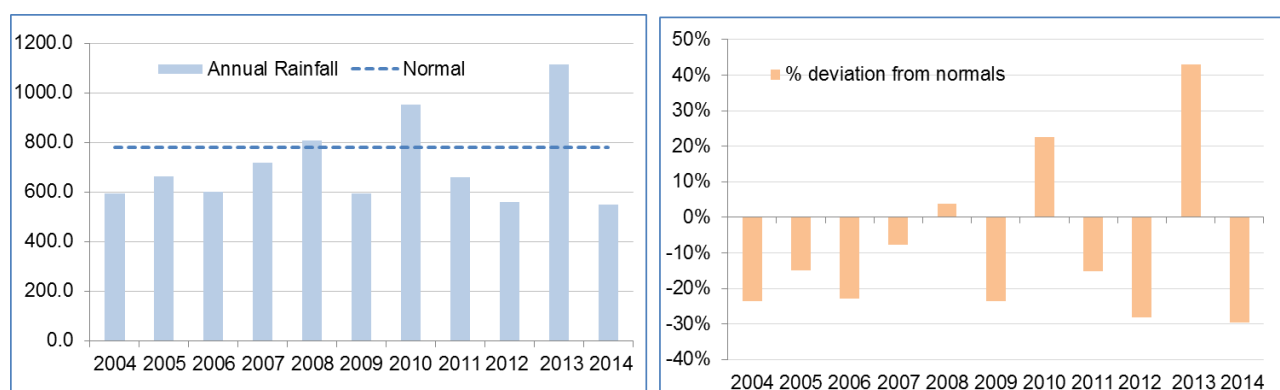


Figure 5 : Annual Rainfall in Delhi 2004-2014 & Deviation from Normal

69. Delhi receives its rainfall under the influence of southwest monsoon in the period of late June to mid-September. Over 82% of rainfall is received during this period. About 4-5% rainfall is received during the follow on post monsoon period, i.e. October – November. As depicted in the following Figure 6 and Figure 7, there are large deviations observed from normal in the monthly rainfall, though the overall pattern of southwest monsoon is followed.

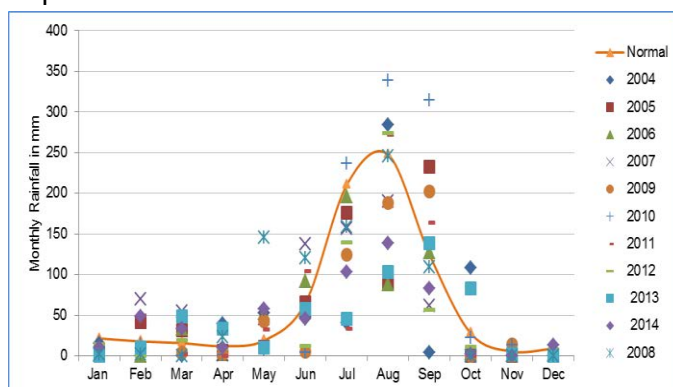


Figure 6: Monthly Rainfall in Delhi 2004-2014

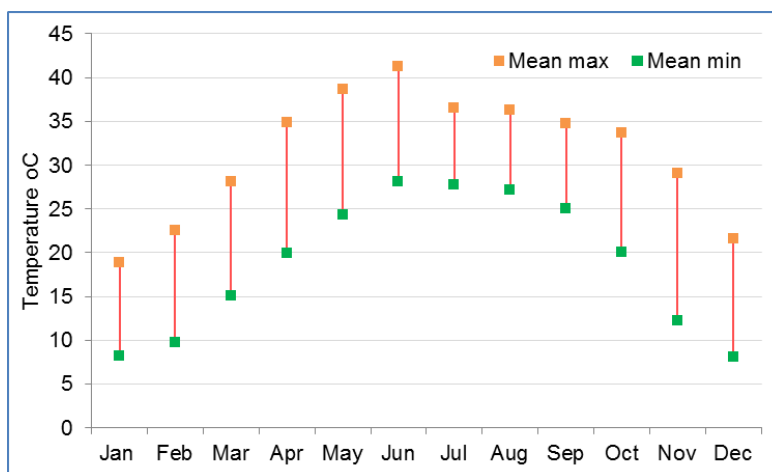


Figure 7 : Annual temperature trend in Delhi

70. Delhi experiences very high seasonal temperature variation. The summer temperatures peak in May, and the maximum temperature can go as high as 46°C or even more especially during the heat wave conditions. Hot conditions continue in June until the onset of monsoon by the end, after which the temperature gradually drops. Average maximum and minimum temperature recorded in 2014 summer were 41.3°C and 24.3°C respectively, while in winter the figures were 18.8°C and 8.1°C. The extreme maximum and minimum temperatures recorded in Delhi were 48.4 °C and -2.2 °C respectively. Occasional dust storms occur during summer, and are accompanied by strong waver, which can be severe and destructive.

71. Winds are generally light to moderate (0.9 to 4.9 m/sec) but increases in April-May-June. Wind direction is mostly from North, North East; and North West. Two most important wind patterns influencing Delhi's climate are the Western Disturbance and the South-West Winds. As can be seen, the air is generally dry. The relative humidity peaks during the monsoon, and after which reduces drastically. Summers have very low humidity.

Surface Water

72. Delhi is developed on the western banks of Yamuna River. Originating in lower Himalayan glacier Yamunotri, Yamuna is one of the longest and most important rivers of India. River is a tributary of the Ganga. After travelling 1,376 km Yamuna joins the Ganga at Allahabad in Uttar Pradesh. The river enters Delhi at Palla village, 15km upstream of Wazirabad barrage, which is a main source of water for Delhi. After travelling for nearly 45 km, the river exits Delhi at Okhla barrage, and enters Uttar Pradesh. Naini Lake and a canal is in the study area. Najafgarh drain passes through the boundary in the south.

73. Yamuna water quality, in Delhi stretch particularly, is very poor. Besides the pesticide-laden agricultural runoff from vast agricultural areas in the upper reaches of Wazirabad barrage, Shahdara drain and Najafgarh drain that join the river downstream of Wazirabad barrage carry most of the untreated / partially treated sewage and industrial effluents of Delhi. As there is no water release from Wazirabad barrage during the summers, the water downstream of the barrage throughout its course in Delhi compromise of only wastewater. This wastewater is flushed down the river during the monsoon heavy flows. Following Table 7 shows the water quality of Yamuna in Delhi from the entry at Palla village to the exit point at Agra canal from Okhla barrage. Water quality at the entry of Delhi is fairly good with low BOD and high DO, and as it runs through the Delhi, the quality is degraded, due to entry of wastewater.

Table 7 : Yamuna Water Quality in Delhi – Annual Average 2015-16

S. No	Monitoring Location	pH			COD			BOD			DO		
		Min	Avg	Max	Min	Avg	Max	Min	Avg	Max	Min	Avg	Max
1	Palla	7.1	7.4	7.7	8	10.4	12	1.8	2.19	2.9	7	8.9	10
2	Surghat	7.1	7.3	7.5	16	21.6	32	4.6	5.62	9.2	6	7.61	9
3	Khajuri Pantoor Pool	7.1	7.4	7.7	120	161.2	188	42	51.2	56	Nil	Nil	Nil
4	Kudesia Ghat	7.1	7.4	7.8	92	124.4	140	28	38.7	47	Nil	Nil	Nil
5	ITO Bridge	7.1	7.4	7.7	84	93.2	100	25	29.6	34	Nil	Nil	Nil
6	Nizamuddin Bridge	7.0	7.3	7.6	96	119.2	156	28	34.7	43	Nil	Nil	Nil
7	Agra canal Okhla	7.2	7.4	7.7	80	94.4	112	28	31.3	38	Nil	Nil	Nil
8	Shahdara (downstream)	6.3	7.2	7.6	100	128	172	37	44	53	Nil	Nil	Nil
9	Agra canal jaitpur	6.8	7.3	7.6	92	109.2	136	26	32.9	42	Nil	Nil	Nil

Source: DPCC

74. Najafgarh drain, the Delhi's most infamous polluted water body, flows through southern boundary of the study (G-01 UGR) area. This drain is originally a river – River Sahibi, which is channelized in its course through Delhi, joins River Yamuna downstream side of Wazirabad barrage. Due to entry of untreated sewage and industrial effluents from industrial areas flows into the drain and it is one of highly polluted water bodies. Supplementary drain that carries mostly sewage except during the monsoon passes through the project area. Balswa lake is situated in the subproject area.

Ground Water

75. Delhi state is occupied by Quartzite interbedded with Mica-Schist belonging to Delhi Super Group, uncomfortably overlain by unconsolidated Quaternary to Recent sediments. The ground water availability in the territory is controlled by the hydrogeological situation characterized by occurrence of alluvial formation and quartzite hard rocks. The hydrogeological set up and the following distinct physiographic units influence the ground water occurrence in Delhi: (i) Alluvial plain on eastern and western sides of the ridge (ii) Yamuna flood plain deposits, (iii) Isolated and nearly closed Chattarpur alluvial basin, and (iv) North-Northeast (NNE)-South-Southwest (SSW) trending Quartzite Ridge. The alluvial deposits are of quaternary age. The newer alluvium belongs to recent age and consists of sediments deposited in the flood plains of Yamuna River. The older alluvium is of Pleistocene age and occurs extensively in the alluvial plains. In Chattarpur basin, the alluvial formation is derived from the weathered quartziterocks. The hard rock formations in Delhi are mainly the Alwar quartzites of Delhi System belonging to Pre-Cambrian age. Table 8 shows the salient feature of Aquifers system of NCT of Delhi.

Table 8: NCT Delhi Aquifer System

Sl.No.	Aquifer system	Depth (m)	Discharge (m ³ /hr)	Drawdown (m)
1	Fractured Quartzite	50-150	2-18	8-30
2	Older Alluvium (kanker & fine sand)	30-115	18-135	2-24
3	Newer Alluvium (fine and medium sand)	40-50	100-200	1.5-3

76. The North-West district area characterized by unconsolidated quaternary alluvium deposits. Thick pile of alluvium over the basement rock possesses varied sediment strata in an alternate fashion of geological setting. Nearly fine to medium and silt grade of sediment are frequent up to the depth of 50 m along with buff coloured clayey bed admixed with Coarse kankars. On the other hand after the depth of 50 m, silty-clay and clay (Light yellow) beds with Kankars increases with depth. Clay beds are common at deeper depth i.e. 80 m.bgl to 250 m.bgl. In large part of the district the water levels are shallow ranging from 2 to 8 m.bgl, whereas in a limited area towards the northern border (Narela) the water levels are somewhat deeper ranging from 6 to 12 m.bgl.

77. The West district is occupied by unconsolidated Quaternary alluvium underlain by Precambrian meta-sediments of Delhi System. Quaternary alluvium comprises of sand, clay, silt, gravels/pebbles, kankars. The aquifer system include sand fine to coarse grained admixed with kankars with little amount of clay and silt. The depth of water level varies in the district, 2 m to 15 m. The depth of fresh saline interface also varies from 25 m to 50 m at different places. The depth of fresh water zone varies from 10 m to 45 m.

78. As per the CGWB, the depth to water level recorded in NCT Delhi during May-2014 ranges from 1.19 to 74.41 m.bgl (below ground level). South district has deeper groundwater levels, with more than half of the wells monitored showing water levels deeper than 40 m bgl. In New Delhi and South-West districts the water level is in the range of 10 to 20 m bgl, and in North East, East and North-West districts, the level is in the range of 5-10 m bgl. Lowest water levels are recorded in East, North, North-East, North-West, and West districts, in the range of 2 to 5m. The entire Yamuna flood plain falls in the 2 to 5m category. The fluctuation of water level between May-2013 and May-2014 shows rise in water level (in the range of 0.10 m to 4.53 m) in some parts, while there was a fall in water level (0.04 to 3.34 m) in the other part. Maximum fall in water level is recorded in South and South-West districts.

79. As per the CGWB Report⁶(July 2014), annual replenishable groundwater resource, and net groundwater availability in NCT Delhi is estimated as 0.31 billion cubic meter (bcm), and 0.29 bcm respectively. Annual groundwater draft is estimated as 0.39 bcm, which include 0.14 bcm for irrigation, and 0.25 bcm for domestic and industrial water supply. The stage of groundwater development thus is at 137% (over exploited category), which varies widely across the Delhi. In places such as Preet Vihar, Seema puri, Shahdara, Hauz Khas, Kalkaji, Delhi Cantonment, and Rajouri Garden, the groundwater resource is under severe pressure, as the water abstraction is over twice that of availability (over 200%). Of the total 22 tehsils in NCT Delhi as assessed by CGWB, 18 are in overexploited category. The Figure 8 depicting the ground water scenario is placed below .

⁶ Dynamic Groundwater Resource of India (As of March 2011), Central Groundwater Board, Ministry of Water Resources, River Development & Ganga Rejuvenation, Government of India (July 2014)

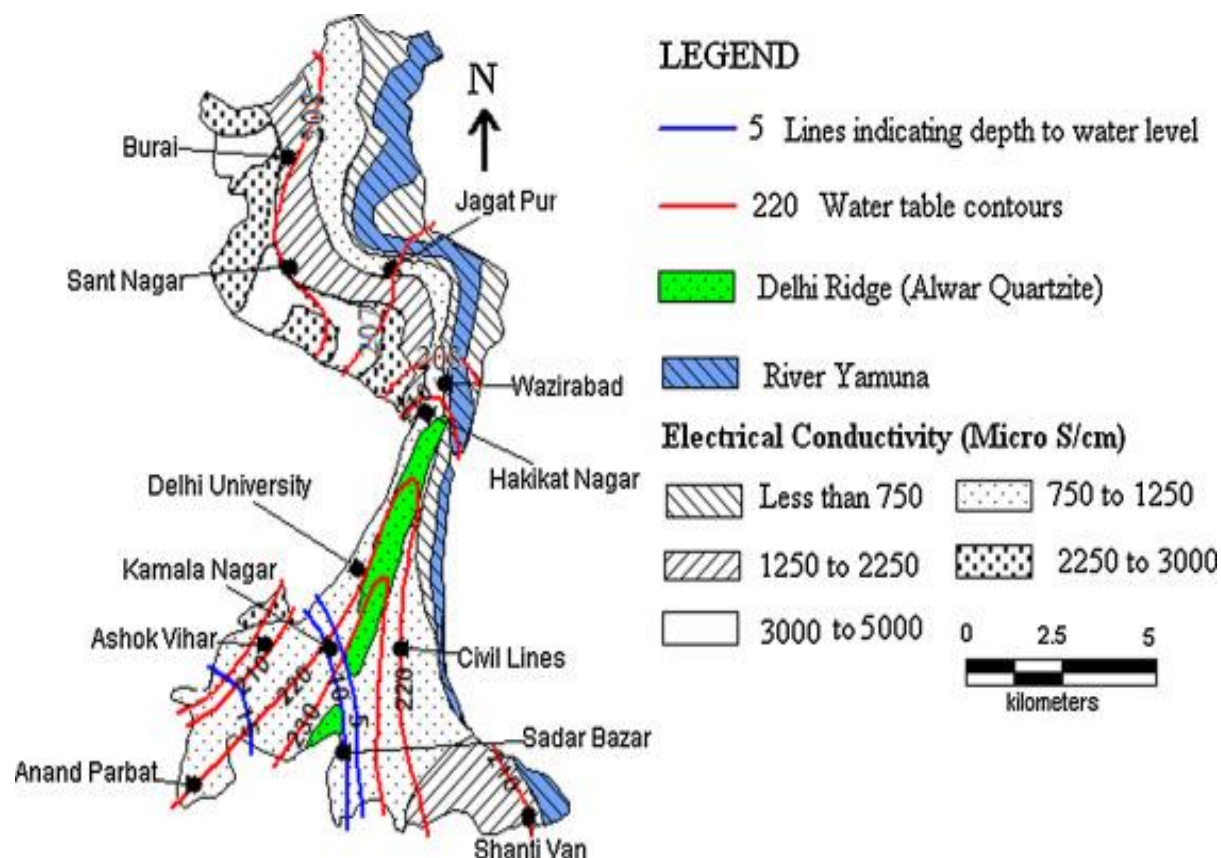


Figure 8: Ground Water Scenario of Sub Project Area

80. **Groundwater Quality.** Groundwater quality varies widely across Delhi. Brackish ground water exists at shallow depths in Northwest, West and Southwest districts with minor patches in North and Central districts. Brackish / Saline water and fresh water interface is in the range of 30-40 m. As per the CGWB, high fluoride content in water (above 1.5 mg/l) is reported in East, New Delhi, North West, South, South West, North and West Delhi districts. Nitrate concentration more than the permissible limit (45 mg/l) is reported in East, Central, New Delhi, North, North West, South, South West and West Delhi districts. No arsenic (As) or iron (Fe) content reported above the permissible limits. In Heavy metals, lead is reported above permissible limits (0.01 mg/l) in some wells along Najafgarh drain in North, West and South-west districts, and Cadmium (above 0.003 mg/l) in some wells in Southwest district and Chromium (above 0.05 mg/l) in some wells in Northwest, South, New Delhi and East districts. The line of fresh-saline water interface also varies greatly in entire area of North West District; all along the western Yamuna Canal and along Yamuna Flood Plain it is between 40 to 70 m, whereas in rest of the area it is at 22 to 40 m deep. It was also observed from the exploratory well data in NW district that salinity of water increases with depth and there are no fresh water aquifers in between the saline zone.

Ambient Air Quality

81. Delhi, in terms of air quality, is considered one of the most polluted cities in the world. There are multiple sources of air pollution in Delhi: vehicles, industries, diesel generators, construction activities and road dust, burning of agricultural waste / solid waste etc. The ambient air quality monitoring is conducted regularly by Central Pollution Control Board and Delhi Pollution Control Committee. Following Figure 9 and Figure 10 shows the annual average concentration of carbon monoxide (CO), particulate matter (PM₁₀), and oxides of sulfur and nitrogen in ambient

air of Delhi from 1997 to 2014. In comparison with National Ambient Air Quality Standards (NAAQS), particulate matter (PM₁₀) is very high, 3 to 5 times higher than the standard. Very high CO values were recorded during 1997-2001 (2 times above the standard), and after which the concentration declined, and in 2014, the concentration was within the permissible limit. SO₂ values during the monitored period were always well below the permissible limit, while NO₂ concentration was higher than the concentration, by nearly 2 times in 2014.

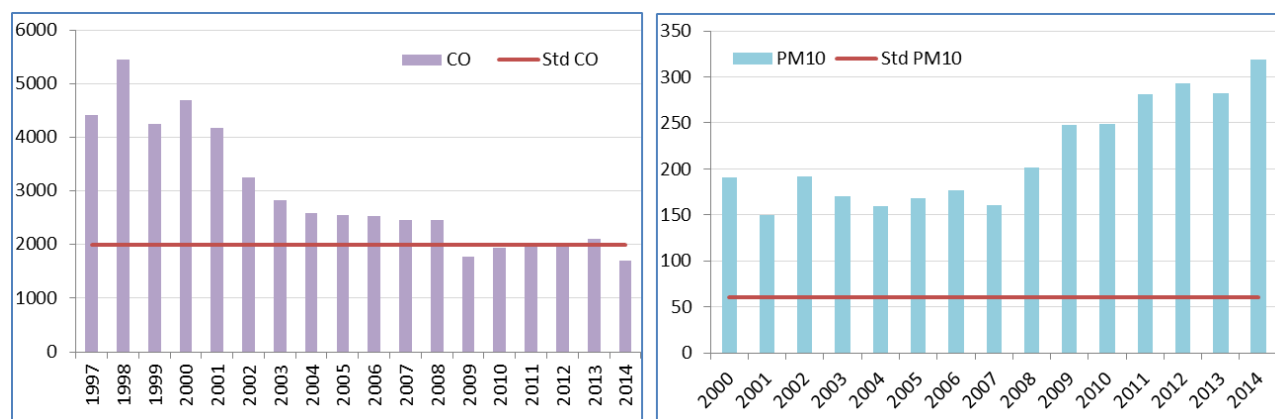


Figure 9: Ambient Air Quality in Delhi - CO & PM₁₀ (in µg/m³)

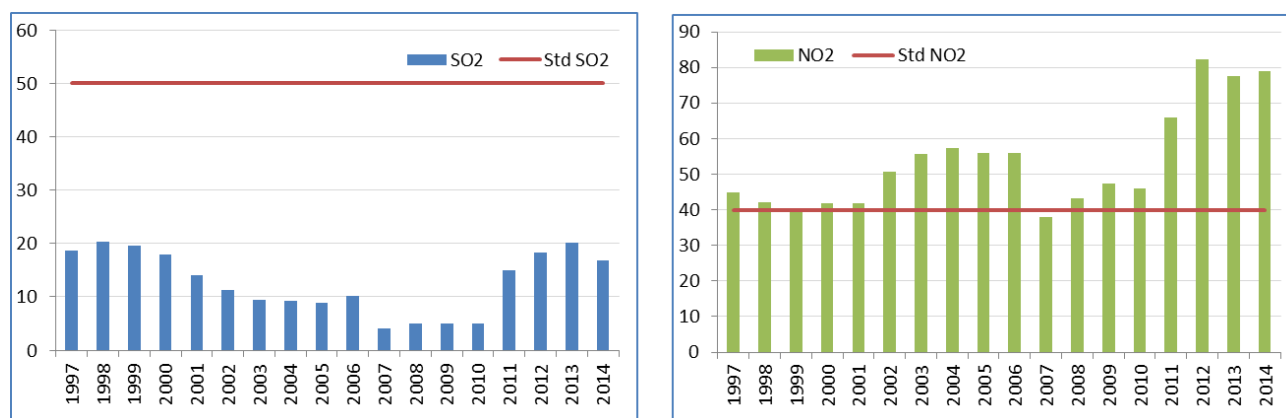


Figure 10: Ambient Air Quality in Delhi -SO₂&NO₂ (in µg/m³)

82. Following Table 9 shows the annual average concentration of air pollutants (2014) at two monitoring stations located close to the subproject area. Particulate matter (both PM_{2.5} & PM₁₀) and NO₂ are several times higher than the limits, while SO₂ is well within the limits at both the stations. CO levels are higher, while ozone levels are close to standard at civil lines.

Table 9: Ambient Air Quality in Delhi, 2014

Monitoring Location	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	O ₃	CO
Punjabi Bagh	17.3	106.4	248	139	39	1.86
Civil Lines	19.7	79.4	318	141	96	2.64
NAAQ Standard	50	40	60	40	100	2.00

All values in µg/m³ except CO in mg/m³

Ambient Noise Levels

83. Ambient noise levels in Delhi is always on high due to various urban activities, transport, generator sets, construction works, social and religious gatherings, etc. Following Figure 11 shows the minimum, maximum and average day-time and night-time ambient noise levels based on the noise level monitoring at 41 locations in Delhi in the year 2008-09. All the values recorded are higher than the day and night time noise standards (55 dBA & 45 dBA).

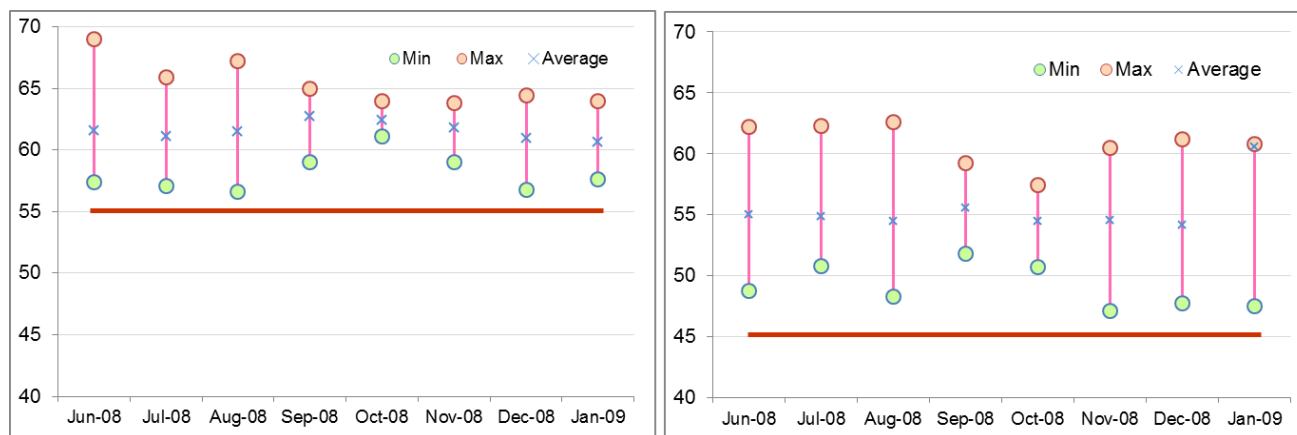


Figure 11: Day & Night-time Noise Levels in Delhi (in dBA)

B. Ecological Resources

84. The vegetation of Delhi is thorny scrub typical of arid and semi-arid zones. The Delhi ridge, extension of Aravali hills, traversing heart of Delhi in northeast to southwest direction, is a most important ecological resource in Delhi. Ridge mostly comprises of tropical forest.

85. As per the India State of Forest Report (ISFR), 2015, the forest and tree cover in Delhi, is 20.22% of total geographical area, which constitute 12.74% of forest cover, and 7.48% of tree cover. This was 20.08% in ISFR 2013 Report. The recorded forest area, that comprise reserved and protected forest is 6.88% of total area. Though the development in Delhi has been significant, the efforts of various agencies, have ensured that green cover is maintained. In fact, there has been significant increase in forest and tree cover over the period. As per the Forest Survey of India, the forest and tree cover increased from 10.20% in 2001 to 20.2% in 2015.79.

86. As per ISFR 2015, New Delhi District has nearly half of its geographic area under forest, followed by south, and central. The subproject districts of west and north west have a forest cover of 5.29% and 3.87% respectively. There are 42 city forests in Delhi, of which 10 are in northwest district, 1 is in west district, 3 are in north district, and 5 are in northeast district. Google map showing the proposed alignment of transmission mains and the existing land use pattern is placed as appendix 15, which shows that there is no need of any forest clearance for the subproject.

87. **Protected areas in Delhi.** Asola Bhatti wildlife sanctuary in South Delhi is the only protected wildlife area in Delhi, spread over 19.6 sq.km in Southern Ridge area. This wildlife sanctuary is unique as the ridge merges into Indo-Gangetic plains, and provides a distinctive habitat. There are trees along the roads and in general in project areas. The common tree species of Delhi include: Amaltas, Saherwa, Kadam, Bakul, Gauva, Peepal, Banyan, Ashoka, Mango, Champa, Mahua, Neem, Anar, Babool, Sisam, Imli etc. Figure 12 shows the ratio of Forest and Tree cover in Delhi.

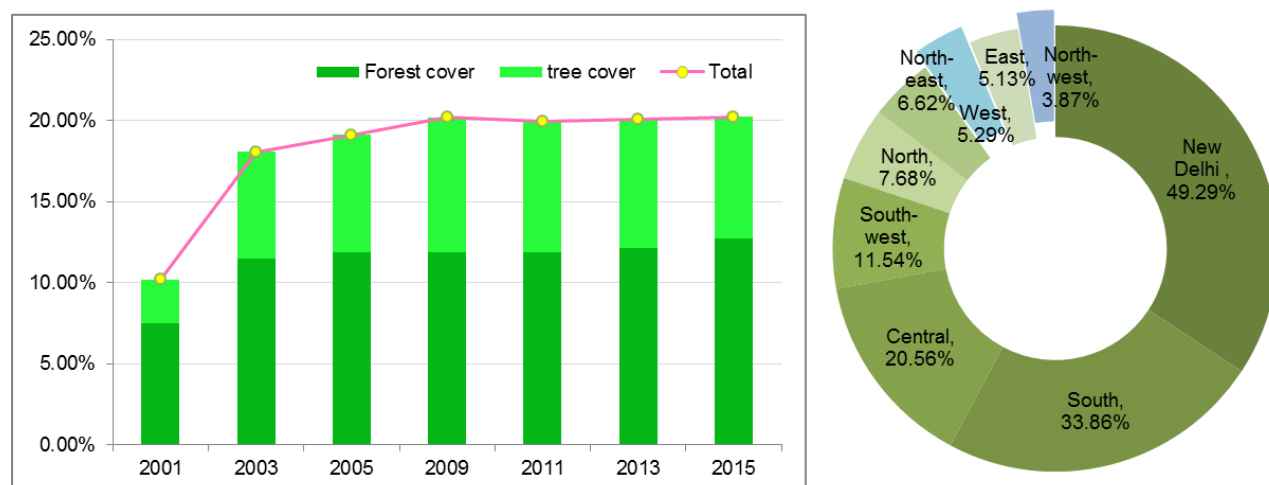


Figure 12: Forest & Tree Cover in Delhi

C. Economic Development

Land Use

88. The total geographical area of Delhi is 1,483 sq. km, of which 47.3% is covered with built up areas comprising of residential, commercial, industrial, institutional, etc., premises, and 13.26% is occupied by natural features like forests, wildlife sanctuary, ridge, Yamuna River and other water bodies (lakes, canals, drains etc.). 20.9% of the land is for (either existing or proposed for future) utilities, metro, and agricultural activities. The remaining land (18.6%) is currently vacant and will be developed into built up areas in future.

Economy, Industry and Agriculture

89. Delhi is a node of political, administrative, commercial and economic centre of India, and there are wide range of industries in Delhi, that have flourished due to good infrastructure, connectivity, and availability of manpower. Delhi plays an important role in the Indian economy. Delhi has been growing at a rate of over 15% annually. The per capital income of Delhi is more than twice of national average. Delhi is the most urbanized state, and the economy is mostly dominated by service sector. The contribution of primary sector (agricultural, farm & forest related and mining) to the overall economy of Delhi is negligible at less than 1% (declined from 1.09% in 2004-05 to 0.65% in 2014-15, constant prices). Secondary sector (industries, manufacturing), contribution is at 9.65% (in 2014-15), which has declined from 18.45% in 2004-05. Prohibition on large, heavy, and hazardous industries in NCR, and also discouragement for medium scale industries in NCT Delhi, lack of suitable land, etc., and at the same time increase in service sector owing to good infrastructure and amenities, have also contributed in decline of manufacturing sector. The tertiary (service sector) contribution has always been high in Delhi, and it has been increasing at a rapid phase. It has increased from 80.46% in 2004-05 to 89.70% in 2014-15.

90. As per the Census 2011, the workforce participation ratio in Delhi was 33.28%, lower than the all India average of 39.79%. As the service sector most dominant, it is the principle employment generator. Primary (cultivators & agricultural workers), and secondary (household industrial workers) workers are 1.31% and 3.25% respectively, while the other workers (mostly service sector) constitute over 95%.

91. As per the Annual Survey of Industries 2011-12, In Delhi there are 2,976 organized industries establishments (factories), engaged in manufacturing of food products, beverages, tobacco, textile, apparels, leather and related, wood and cork products, chemicals, pharmaceuticals, plastic, rubber, metals, plant & machinery, computers, electronics & electrical goods, transport vehicles, equipment, etc. There are four thermal power stations (3 coal based and 1 gas based). There are 190,277 units in unorganized sector, which are mostly small scale and dealing with variety of activities. Units manufacturing wearing apparels, dressing and dying of fur constitute 27.4%, followed by fabricated metal, equipment, machinery (14%) and furniture (10.8%).

92. Industries in Delhi are located mostly in west, south and eastern parts of the city. However, there are several other industries and small units spread over others parts of the city as well in an unorganized manner. Most of the industrial areas are set up in 1970's.

93. **Agriculture.** Given the rapid phase of urbanization and limited land resources, agricultural activities have been declining over a period. Number of villages (rural settlements) have decreased from 214 in 1981 to 112 in 2011, and about 2% of the total land area is under agriculture. Land holding size is very small, and most of the farmers are small and marginal formers (with less than 2 ha of land holding). Predominant crops are Paddy, Jowar and Bajra during Kharif season, and wheat and mustard during Rabi season. Irrigation is by groundwater, canals, and treated wastewater from sewage treatment plants.

Infrastructure

94. **Water Supply.** Water supply and wastewater infrastructure in Delhi is developed and managed by Delhi Jal Board (DJB). DJB is responsible for supply of water to consumers in East, South and North Delhi municipal areas, and it is also responsible for provisional of bulk water supply to New Delhi Municipal Corporation (NDMC) and Delhi Cantonment areas. Main source of water for Delhi is Yamuna River. At present there are 9 water treatment plants, with rated capacity of 925 MGD and operating at 900 MGD. The water distribution system consists of 14,000 km pipelines and 107 underground reservoirs. DJB also has 407 mobile water tankers for supply to various areas as per the demand. At present 900 MGD of water is supplied in Delhi at a rate of 53 gallons per day (gross supply). About 81% of the households are connected with piped water supply system, 14% are dependent on tube wells, hand pumps, public stand posts, tankers and the remaining 5% are dependent on canals, lakes, tanks etc. Water supply is not continuous, and is supplied for few hours every day. Duration of supply and pressure varies widely across the city, and the water supply is unequal. Due to old pipe network in most of the places, leakage and loss of water is considerable.

95. **Sewerage.** Underground sewerage system covers planned colonies, regularized colonies, urban villages, authorized slums (known as JJ clusters) and urban villages. Sewerage system is not provided in rural villages and unauthorized colonies. The total sewerage network is the city is about 7,000 km, and 192 km of trunk sewer network. At present there are 22 sewage treatment plants, with a rated capacity of 614 MGD, but the current utilization is at 394 MGD (64%). Total sewage generation, at the rate of 0.80% of water supply, is about 720 MGD, of which only 394 MGD, which is 54% of total sewage generation, is treated and disposed. The remaining sewage flows directly into River Yamuna, mostly via Najafgarh drain. Though availability of sewage treatment capacity is 85% of generation, due to low utilization of rate of existing plants, most of the sewage flows directly into rivers without treatment. The main reason for low utilization is due to low volumes of sewage reaching the plants, due to lack of proper sewerage collection, pumping transmission infrastructure. As per Delhi master plan 2031 there are many sewerage treatment

plants and sewerage network under implementation and planning to adequately address the gap in sewerage coverage. source: www.aecom.com / projects / **Delhi-sewerage-system-master-plan**. It is proposed under the plan for wastewater management information system for 2,200 unsewered colonies. The 2031 Sewerage Master Plan will ensure that comprehensive, technically and financially viable plans are in place to improve general sanitation conditions and enhance water quality in the Yamuna River

96. **Solid Waste Management.** Municipal solid waste management is the responsibility of urban local bodies in India. In Delhi, in all, there are 5 municipal authorities – North, South, East Delhi Municipal corporations, New Delhi Municipal Corporation, and Delhi Cantonment Board. The total waste generation is nearly 8,500 tons per day, of which nearly 80% of waste is collected and disposed. There are three disposal places – Ghazipur, Okhla, Bhalswa, where the solid waste is dumped. These landfills are however not designed as per the MSWM Rules, and therefore the disposal method is not scientific. Besides there are there are 3 Waste to Energy Plants in Delhi, of which two at Timarpur – Okhla and Haripur are functional and Narela is likely to start operation soon. The Bhalswa solid waste disposal site is in the vicinity of subproject area.

97. **Transportation.** Delhi has the best road and transportation infrastructure in India. Various government agencies – Public Works Department, Municipal Corporations, Delhi Development Authority, etc., are responsible for the construction and maintenance of road infrastructure in Delhi. The public transportation system is managed by Transport Department, while Delhi Metro is management Delhi Metro Rail Corporation. The total road network in Delhi is nearly 29,000 km, and it has highest road density in India. There are five national highways through Delhi: NH1 (GT Karnal Road), NH2 (Kolkata) NH8 (Gurgaon Road), NH 10 (Fazika) and NH24 (Ghaziabad). There are several other important arterial roads – Lal Bahadur Shastri Marg, Aurobindo Marg, Rao Tula Ram Marg, Patel road, Shankar road, Rohtak Road, Loni road, Shahdara road. Mahatma Gandhi Road (Ring Road), Outer Ring road, Noida road- Bund road form the ring roads. These are wide (four lane to six lane) and carry most of the traffic and are the main arterial roads. Public transport system mainly consists of bus, metro, auto and cycle rickshaws. Minor arterial, and collector roads, and most of the roads in old parts of Delhi are very narrow and highly congested with traffic, pedestrian and commercial activities. Construction activities are also considerable.

98. **Power and Gas supply.** Thermal power is the main source of energy in Delhi, there are three coal based, and one gas-based power generation plants. Power is supplied from sub-stations located at various places, via a distribution system consists of overhead cables on pylons along the roads and as well as underground cables in some places. Currently about 4.5 lakh households are connected with piped natural gas (PNG) network in Delhi, and there are 350 compressed natural gas (CNG) filling stations. The gaps pipelines are laid underground along the roads.

D. Socio Cultural Resources

Demography

99. According to the census, the population of NCT Delhi was 16.79 million grew from 13.9 million in 2001, recording a decadal growth rate of 21.2%. of the total population, only 2.5% are rural and the rest 97.5% are classified as urban population. The rural population has been continuously declining in Delhi as the villages are converted into urban areas, that gave rise to urban population. In 2001-11, the rural population of Delhi declined by 55.6% while the urban population increased by 26.8%. Overall population density is 11,320 persons per sq.km. Of the

total population, 16.7% belong to scheduled castes (SC), and there are no scheduled tribes. Sex ratio was 868 (females per 1000 males) increased significantly from 821 in 2001. Overall literacy rate 86.2 percent, comprising 90.9% for males, and 80.8% for females. Main languages spoken are Hindi, Punjabi, Urdu, and English. Demographic details of subproject districts are given in the following Table 10 :

Table 10: Demographic Details 2011

District	Population	Density (/sq km)	Growth rate (2001-11)	Sex Ratio	SC population	Literacy		
						Total	Male	Female
Northwest	3,656,539	8,254	27.80%	865	19.10%	84.40%	89.70%	78.40%
West	2,543,243	19,563	19.50%	875	14.80%	87.00%	91.0%	82.40%
North	887,978	14,557	13.6%	869	18.70%	86.90%	90.90%	82.20%
Northeast	2,241,624	36,155	26.8%	886	16.70%	83.10%	88.80%	76.70%
NCT Delhi	16,787,941	11,320	21.2%	868	16.80%	86.20%	90.90%	80.80%

Source: Census 2011

History, Culture & Tourism

100. Delhi has a long and great history, and it is a longest serving capital city and one of the oldest inhabited in the world. Delhi has been the capital for several empires, kingdoms, and till today, it maintains its status as the capital of India. According to legends, during Mahabharata times, the city was known as Indraprastha, the capital city of *Pandavas*. It is believed that Delhi was site for several different cities between 3000 BC and 17th Century AD, most of which are located in what is called as Delhi Triangle, bounded by Delhi Ridge in south and west, and Yamuna River in east. Dilli as it is referred locally, and the modern Delhi, is said to be derived historical name Dhili. Following are the historical cities with distinct identities and indigenous heritage in Delhi: Qila Rai Pithora, Mehrauli, Siri, Tughlaqabad, Ferozabad, Dinpanah and Shahjahanabad.

101. With its long and gloriouspast, Delhi has rich heritage and culture. There are numerous heritage, religious and archeological structures, sites and living areas like walled city, monuments, historic gardens, institutions, the planned city of New Delhi (popularly known as Luteyn's Delhi) etc., There are 174 monuments identified as nationally important and protected by ASI, and there are 20 monuments under the protection of Department of Archeology, GNCTD. Three sites (Humayun's Tomb, QutbMinar and Red Fort Complex) are notified as World Heritage Sites by UNESCO, Besides there are several hundreds of heritage structures.

102. Delhi is a world famous tourist destination, being a very old city with rich heritage, history there are several points of tourism, and it is also a central connecting point to various tourist destinations in India. As per the 2014 Tourism Statistics Report, Delhi accounted for most foreign tourist arrivals (FTA) in India (30.2%). October to March is considered to be the peak tourist season, although Delhi receives tourists year-long.

103. Subproject area is just located outside the Delhi Triangle, and therefore it is not archeologically very sensitive. Two protected monuments of national importance are located in the subproject area: (i) "Sheesh Mahal" is situated near Shalimar Bagh in H-06 UGR command area. Built in 1653 AD by Shahjahan, this was a resting place for Mughals travelling to northern part of their empire. In 1658, Aurangzeb declared himself as the Emperor at this garden; and (ii)

“Shah Alam Tomb” is located in Wazirabad along the road leading to WTP. The transmission line is likely to fall within the 300 m regulated zone of Shah Alam Tomb, and therefore the alignment needs to be finalized in discussion with the ASI. Prior permission from the National Monument Authority (NMA) is necessary for laying the pipelines. At Shalimar Bagh, the proposed alignment is about 1 km from the monument, therefore permission may not be required. This is to be rechecked during the finalization of alignments, and as far as possible pipelines will be avoided within 300 m regulated zone. Refer Appendix 14 and Appendix 15 for ASI sites under sub-project area.

VI. ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

104. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

105. Screening of potential environmental impacts are categorized into four categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts.

- **Location impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
- **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
- **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site
- **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include impacts include erosion, dust, noise, traffic congestion and waste production. routine management of operational waste streams, and occupational health and safety issues.

106. Screening of environmental impacts has been based on the impact magnitude (negligible/moderate/severe – in the order of increasing degree) and impact duration (temporary/permanent).

107. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project’s area of influence. SEMP to be prepared by the Hybrid DBOC will have details for pipe laying on roads, a road closure, spoil management and traffic diversion plan , occupational Health & Safety (OHS) Plan. For construction, Repair and renovation of civil works UGRs and Pumping Stations - site closure plan.

108. The ADB Rapid Environmental Assessment Checklist, Appendix -3 in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines_002 has been used to screen the project for environmental impacts and to determine the scope of the IEE.

109. In the case of this project (i) most of the individual elements involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements along the public roads (iii) being mostly located in an urban area, will not cause direct impact on biodiversity values. The project will be in properties held by the local government and access to the project location is through public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

A. Pre-Construction Impacts – Design & Location

110. **Design of the Proposed Components.** Technical design of the (i) pumps and (ii) transmission main pipes follows the relevant national planning and design guidelines, focusing on providing a robust system which is easy to operate, sustainable, efficient and economically viable. Subproject design include the following environmental considerations:

- Minimizing water losses from pipelines by perfect jointing and alignments using appropriate techniques
- Designing the entire system to maintain optimal flow and pressure, and optimising the overall energy usage

111. **Energy Efficiency Measures included in the subproject.** Water supply distribution system is designed with utmost consideration to the energy efficiency. As the study area has flat topography, water from WTP will be required to supply under pressure to reach the UGRs. Pumping system is therefore part of the design. High efficiency pumps and motors will be used to reduce the energy loads. According to Manual for the Development of Municipal Energy Efficiency Projects, 2008, energy savings, at minimum, of 25% to 40% is possible with appropriate measures. The following measures will be incorporated into the designs:

- Installation of Energy Efficient Motors
- Efficient Pumping system operation using SCADA
- Installation of Variable Frequency Drives (VFDs)

112. **Contamination of treated water supplies.** There are sewers, surface drains carrying wastewater, and canals in the study area. In appropriate location or inadequate clearance with these utilities may contaminate water supply. Following measures shall be implemented:

- Ensure adequate vertical and horizontal clearance with the sewer, surface water drains, etc., to avoid contamination of treated water supplies:
- No sewer or surface drain or canal cross over a water pipe

113. **Utilities.** Proposed water transmission pipes will be buried along the public roads. Various utilities (telephone lines, electric poles and wires, sewers and gas pipelines etc.) are already located along these roads. These may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of any such utilities, the contractor, in collaboration with DJB shall:

- Identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase

- Conduct detailed site surveys with the construction drawings and discuss with the respective agencies before site clearance and start of excavation work; and
- Instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

114. Replacement of existing transmission mains may disturb the existing water supply services temporarily if not managed well. Advance notice will be given to the consumers about the likely disruptions, and if the disruption extends over a day, then alternative arrangements will be provided. Following measures are to be implemented to minimize the inconvenience:

- provide prior information to public on likely disturbances, and
- make temporary arrangements for water supply in the affected area (for example, through mobile tankers) if the water supply service is disrupted over 24 hours.

115. **Social and Cultural Resources.** Delhi is an historical town, and any work involving ground disturbance can uncover and damage archaeological and historical remains. For this project, excavation will occur in project sites, which are situated in the northern part of the town outside the historic Delhi Triangle. So the risk of the sites containing any archeological and historical remains may be low, but not unlikely. Two protected monuments (Sheesh Mahal & Shah Alam Tomb) are situated in the study area. While Shah Alam Tomb is located along the road leading to Wazirabad WTP, while Sheesh Mahal is surrounded by a large green area in Shalimar Bagh away from the proposed alignment road. There are existing pipelines near Shah Alam Tomb, which are not located on the road adjoining the Tomb, but are placed away from the tomb. The proposed pipeline will also not be laid along the road close to the tomb, but will be aligned parallel to the existing pipelines over a canal. No direct impact / damage thus envisaged on the Tomb. Nevertheless, as it will be within 300 m regulated zone of the monument, it will require prior permission. Appropriate steps should be taken according to the nature of the risk as per the ASI clearance conditions. This should involve:

- Avoid pipeline alignments within the regulated zone (300 m) of the monuments at Wazirabad and Shalimar Bagh
- If unavoidable, obtain permission for laying of pipelines within the regulated zone
- Finalize the proposed construction technology and exact alignment in consultation with the ASI
- Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved. This should involve:
 - Conduct awareness training to contractor & supervision staff prior to start of excavation
 - Stopping work immediately to allow further investigation if any finds are suspected; Calling in the ASI if a find is suspected, and taking any action they require to ensure its removal or protection in situ

116. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Consider sites that will not result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas shall not be considered for setting up camps

to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the forest, water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings. Construction work camps shall be located at least 200 m from residential areas. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains. The subproject is likely to generate soil from excavations, which needs to be disposed safely. Priority should be to minimize the quantity of waste to be disposed by using the excess soil for beneficial uses, and sending the debris (for eg, from road cutting) to the construction waste management facility at Bhawana.

117. Site selection of sources of materials. Significant quantities of coarse aggregate and fine aggregate will be required for construction works. Requirement of gravel is limited. Following measures are to be implemented:

- Contractor should procure these materials only from the quarries permitted/licensed by Mines and Geology Department.
- Contractor should, to the maximum extent possible, procure material from existing quarries, and creation of new quarry areas should be avoid as far as possible.
- It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration.
- Contractor should submit the details of sources and copies of approvals, permissions to PIU, and should start procurement only after the respective source is approved by PIU

B. Construction Impacts

118. Pipeline laying works. Civil works in the project mainly include linear pipe laying works for 37.28 km. As explained previously on all socio-technically convenient/ feasible sites, the pipes will be laid using trenchless technology, and open cut technology 1.60 km will be used in rest of the areas. The contractor such as modern micro tunneling with boring pipe jacking technique will adopt appropriate trenchless technology. Trenchless technology will be adopted at all locations, which are convenient/suitable to use such technology, with a purpose to avoid public inconvenience, ensure safety, traffic disruptions, dust control, and avoid blocking access to properties, business and houses. Open cut trenching method of pipe laying involves excavation for laying pipes along the roads, placing pipes in the trench, jointing and testing, and refilling with the excavated soil. The trenches will be of 0.5 m – 1.5 m wide and 1 to 2.2 m depth. Subsequent to completion of works, the contractor as part of the civil works will undertake road reinstatement. There are different type of roads in the subproject area. Appendix 01 shows list of critical road crossings identified for laying of pipeline through Trenchless technology to minimize the inconvenience to the road users. Extract from Construction and Demolition Management Rules 2016 is shown under Appendix 7.

119. Main transport corridors, with two way main road corridors plus service roads on both sides (Rohtak Road, NH1, MG Road), with metro on the central elevated corridor(Rohtak Road), carry very heavy traffic throughout most of the day. Service roads also carry considerable traffic, as much of the width is used for parking of vehicles. In these roads, pipeline will be laid in the service line, and wherever it is not feasible due to trees, tiled walkways, etc., pipeline will be laid in the edge of the main carriageway.

120. In the next level, there are other main roads providing connectivity, serving as main commercial areas, and also for through traffic to other neighborhoods (Maharaja Nahar Singh Marg, Lawrence Road, outer ring road, Guru Harkishan Marg, Vashisht Kumar Gulla Marg, S Manohar Singh Marg, Maharaja Nahar Singh Marg, Muni Maya Ram Jain Marg, Maharaja Agrasen Marg, Guru Gowalkar Marg, SaiyyadNangloi Marg and Bhao Rao Devars Marg, Santi Swaroop Tyagi Marg, Bawana Road, Libaspur Road). These roads, except Outer ring road, carry very heavy traffic and are congested with activities (commercial establishments are located all along), pedestrians and traffic. In most of the commercial areas, on-road vehicle parking is provided, which occupied a line, and footpaths are provided along the roads. In these roads, pipelines will be laid in the parking lane.

121. Earth work excavation will be undertaken by machine (backhoe excavator) and include danger lighting and using sight rails and barricades. At a time about 100 m stretch of work will be undertaken. A width of strip of 5 m will be barricaded and all the works and equipment, excavated material will be stocked within that area.

122. Pipe laying works will include laying pipes at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness. Sufficient care will be taken while laying so that existing utilities and cables are not damaged and pipes are not thrown into the trenches or dragged, but carefully laid in the trenches. Trenches are a maximum of 3 m, the risk of collapse of trenches or risk to surrounding buildings is assessed by the contractor during the work and necessary precautions, like shoring, will be undertaken. Shoring will also be provided where the trench excavation is to be restricted due to site conditions, shoring will be provided and vertical cut will be provided.

123. Once they are laid, pipes will be joined as per specification and then tested for any cracks or leakages. The minimum working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. About 90% of the excavated soil will be used for refilling the trench after placing the pipe and therefore residual soil after pipe laying and refilling is not significant. This soil shall be used for construction for beneficial purposes such as construction or leveling ground. In case of stone crushes, third party, contractor would be preferred and in such a case, it will be ensured that third party obtains CTE/CTO from the pollution control board, which contractor collects and submits to PIU for approval. And CTE should be obtained prior to start of construction and CTO should be obtained prior to commissioning. CTO renewal should be ensured and undertaken during operation stage.

124. Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project locations in the built-up areas, and public roads of the town where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration. Refer Appendix 2 for tentative list of critical road crossings identified for Trenchless Technology.

125. Appropriate and safe trenchless technology will be adopted by the contractor. Excavation will be required at entry and exit point of micro tunnel, and placing of tunneling equipment. The pipes will be also be laid by adopting trenchless construction method. The exact trenchless technology to be adopted and selection of alignment/locations where it will be adopted once the contractor is appointed. However, the overall adoption of trenchless technology will be M. 1.6 Km.

126. **Preparation of Method Statement.** Contractor will prepare a method statement for laying of pipelines. Approval of method statement by the Engineer is prerequisite for the start of work.

Method statement will be specific to each site/road section as appropriate, and will specify the sections for trenchless technology. The overall work shall be split into individual tasks (per say, site clearance, excavation, pipe laying and up to final road restoration), and each task shall be detailed out in the method statement. The details shall include about the material, machinery, workforce, work process, waste disposal, clearances/approvals, etc. Separate method statement will be prepared for trenchless sections. The method statement shall provide activity-space-time graph, which should clearly show section-wise. All the works shall be conducted as per the documented procedures of Method Statement only.

127. **Sources of Materials.** Significant amount of sand and coarse aggregate will be required for this project. Total quantity of earthwork excavation for the subproject has been estimated as 2,50,000 m³ (approx.). The requirement of construction material is estimated as follows: sand 11066.0 cum, gravel & aggregates 9674.0m³. Construction materials will be sourced from quarries approved by the respective Mines & Geology Departments. Yamuna Nagar in Haryana about 200 km away is a known source for stone aggregate. Ghaghar (180 km) and Haridwar (160 km) are sources for sand. It will be ensured that, material is procured from the approved mines / agencies. In case of stone crushes, third party, contractor would be preferred and in such a case, it will be ensured that third party obtains CTE/CTO from the DPCCC (the pollution control board for the state), which contractor collects and submits to PIU for approval. And CTE should be obtained prior to start of construction and CTO should be obtained prior to commissioning. CTO renewal should be ensured and undertaken during operation stage.

- Procurement of material only after the respective source is approved by PIU/PMU .
- Submit to PIU on a monthly basis documentation of sources of materials.

Impact Classification		
Magnitude / Duration	Permanent	Temporary
Sever		
Moderate		√
Negligible		

128. **Air Quality.** Construction work, coupled with dry and windy working conditions, traffic movement, has high potential to generate dust, especially from earthwork activities. Emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality in the construction sites. Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. Given that in the baseline situation, the particulate matter in the ambient air is very high. Therefore, dust generation from construction activity will further deteriorate the air quality, and may have adverse impacts on people and environment. Refer Appendix 26 to 29 for NGT directives for air quality in Delhi, composite action plan on air quality, seasonal ban on construction and road restoration directive respectively.

Impact Classification		
Magnitude / Duration	Permanent	Temporary
Sever		√
Moderate		
Negligible		

To mitigate the impacts, construction contractors will be required to:

- Employ trenchless technology to the maximum extent as open trenching will produce considerable dust
- Barricade the construction area using hard barricades (of 2 m height) on both sides and provide dust/windscreen (such geo textile fabric) up to 3 m height (1m above the hard barricading), provision for the same has been made as part of project's EMP cost
- Initiate site clearance and excavation work only after barricading of the site is done
- Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to the barricaded area
- Damp down the soil and any stockpiled material on site by water sprinkling;
- Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization
- Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process
- Limit the stocking of excavated material at the site; remove the excess soil from the site immediately to the designated disposal area; contractor will abide to the Construction and demolition management rules 2016, refer Appendix 7
- Cover the soil stocked at the sites with tarpaulins
- Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation
- Undertake the work section wise: 100 – 200 m section should be demarcated and barricaded
- Conduct work sequentially - excavation, pipe laying, backfilling; conduct pipe testing section-wise (for a minimum length as possible) so that backfilling, stabilization of soil can be done.
- Remove the excavated soil of first section to the disposal site; as the work progresses sequentially, by the time second section is excavated, the first section will be ready for back filling, use the freshly excavated soil for back filling, this will avoid stocking of material, and minimize the dust.
- Backfilled trench at any completed section after removal of barricading will be the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately. If there should be time allowance for natural consolidation of backfill, then the backfill shall at least covered by a layer of PCC so that there is no exposed soil surface.
- Ensure that all the construction equipment, machinery are fitted with pollution control devices, which are operating correctly, and have a valid pollution under control (PUC) certificate, refer Appendix 5 for the Vehicular Exhaust emission norms, National Standards;
- Use tarpaulins to cover the loose material (soil, sand, aggregate etc.) when transported by trucks;
- Clean wheels and undercarriage of haul trucks prior to leaving construction site/quarry
- Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area
- Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition
- Abide with state government's Comprehensive Action Plan for reducing air pollution and NGT directives for road restoration, seasonal ban on construction as per Appendix- 27, 28, 29 and 30.

- Ensure to attain most stringent air quality standards as mentioned in Appendix 30 to 32. Air quality national standards and comparative standards of WHO and as per ADB's SRS has been placed as Appendix 6, 31.

129. Immediate road restoration after refilling the trench. Excavation and refilling activities disturb the top soil, and under the influence of wind, traffic, pedestrians, and other activities etc., produces dust. There is large potential to generate significant quantities of dust after refilling the trench, and prior to road relaying. It is a common practice not to restore the road immediately after refilling the trench so as to allow sufficient time for the refilled material to stabilize naturally. Given the dry and windy conditions, and heavy traffic and other activities along the roads, the refilled trenches with loose top soil along the roads will generate maximum dust, and create very unhealthy conditions. Moreover, as the barricades/dust screens will be removed after the trench is refilled, there will be absolutely nothing to control the dust generation. Dust control activities like wetting of top soil will not be effective given the site conditions. It is therefore necessary to restore/relay the road surface immediately or take suitable steps to arrest the dust. Soil consolidation technique shall be used so that road can be restored immediately. Necessary costs towards this have been included in the project cost.

- Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored. Backfilled trench without any road restoration is a major source of dust.

130. **Surface Water Quality.** Run-off from stockpiled materials and chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality of the streams. As the rainfall in the project areas is mostly confined to monsoon, these potential impacts are short-term and temporary. However, to ensure that these are mitigated, construction contractor will be required to:

- All earthworks/tunnelling be conducted during the dry season to prevent the problem of soil run-off during monsoon season
- Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
- Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used;
- Identify construction waste/excess disposal sites prior to start of work
- Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- Dispose any wastes generated by construction activities in designated sites; and Conduct surface quality inspection according to the periodicity mentioned in the Environmental Management Plan (EMP). To ensure compliance of most stringent rules as mentioned in the Appendix 33

Impact Classification		
<i>Magnitude / Duration</i>	Permanent	Temporary
Sever		
Moderate		√
Negligible		

131. **Noise and Vibration Levels.** All the construction works will be conducted in built up areas and the roads in Delhi, where there are houses, schools and hospitals, religious places, industrial and business centers. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by excavation, particularly breaking of cement concrete or bitumen roads, operation of construction equipment like tunnel boring equipment, concrete mixers, and the transportation of equipment, materials, and people. Vibration generated from construction activity, for instance from micro tunneling, from the use of pneumatic drills, will have impact on nearby buildings and monuments. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

- Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance
- Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimise sound impact to surrounding sensitive receptor
- Utilising modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensuring that these are maintained to manufacturers' specifications at all times.
- Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.
- Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity
- Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach. Refer Appendix 30 for the Noise Quality standards

Impact Classification		
<i>Magnitude / Duration</i>	Permanent	Temporary
Sever		
Moderate		√
Negligible		

132. **Landscape & Aesthetics,** Solid wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, oils, fuels and other similar items. Domestic solid wastes may also be generated from the workers' camp. Improper waste management could cause odor and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape. The following mitigation measures to minimize impacts from waste generation shall be implemented by the contractor:

- Stockpiles, lubricants, fuels, and other materials should be located away from slopes and water bodies;

- Prepare and implement a Construction Waste Management Plan (CWMP), including identification of disposal site; work shall be initiated only after approval of CWMP by PIU. Refer Appendix 11 for Sample outline of Soil management plan;
- Avoid stockpiling any excess spoils. Excess excavated soils should be disposed to approved designated areas immediately;
- Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site;
- Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed in disposal sites/recyclers approved by DPCC;
- Do not burn construction / domestic waste;
- Ensure that wastes are not haphazardly dumped within the project site and adjacent areas.
- Restore road immediately after backfilling or provide a PCC layer over the backfilled trench immediately to improve the aesthetics.

Impact Classification		
<i>Magnitude / Duration</i>	Permanent	Temporary
Sever		
Moderate		√
Negligible		

133. **Surface and Groundwater Quality.** Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. In subproject area, groundwater is deeper than the proposed excavation depths (~2 - 3 m), and rains are limited to short duration during monsoon. However, to ensure that water will not pond in pits and voids near project location, the construction contractor will be required to conduct excavation works in non-monsoon season to the maximum extent possible. Protect the material, soil stocks at the site properly so that soil, material do not wash into roads, drains.

Impact Classification		
<i>Magnitude / Duration</i>	Permanent	Temporary
Sever		
Moderate		
Negligible		√

134. **Accessibility & Traffic Disruptions.** Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. Highways and ring road carry very heavy traffic throughout the day. The other main roads providing connectivity, serving as main commercial areas, and also for through traffic to other neighborhoods. carry very heavy traffic and are congested with activities (commercial establishments are located all along), pedestrians and traffic. Transportation is the principal activity that will be impeded by this work, and the impact will be considerable if proper precautions and traffic management is not implemented. The following measures therefore shall be implemented to minimize the disturbance:

Impact Classification		
Magnitude / Duration	Permanent	Temporary
Sever		✓
Moderate		
Negligible		

○ **Type of roads and measures for fine tuning the alignment of pipelines:**

- (i) As far as possible, adopt trenchless technology at all locations where are likely disruptions to traffic
- (ii) Finalize the alignment to have least disturbance to the traffic; in many main roads, one line on each side (either or main carriage way or on service roads) is used for parking; this location may be ideal if the parking is temporarily disallowed for the duration of work. Barricade and confine the work to parking lane. This will avoid any disturbance to traffic movement.
- (iii) In roads where there is a road shoulder, align the pipeline in the shoulder
- (iv) In roads where there is no parking lane or shoulder, pipe will have to be laid on the carriage way. As far as possible, align the pipeline into the edge of the road; if this requires closure of one traffic lane, take precautions to reduce the traffic (by informing people about the work, and alternative routes that can be taken etc.,)

○ **Measures to minimize traffic and accessibility disruptions:**

- (i) As far as possible, adopt trenchless technology at all locations where are likely disruptions to traffic, total 1.6Km length of pipes will be laid by the trenchless technology.
- (ii) Employ trenchless technology to the maximum extent
- (iii) Barricade and confine the work area
- (iv) Minimize the work area / barricaded area along the roads to the minimum possible width; adopt vertical trench cutting, where required, using shoring
- (v) Confine all the activities within in the barricaded area, including material & waste/surplus soil stocking.
- (vi) Avoid material/surplus soil stocking in congested areas – immediately remove from site/ or brought to the site as and when required
- (vii) Transport material, waste etc., during low traffic periods (e.g., before 8 AM)
- (viii) Minimize access disruptions to adjacent properties; vehicle access may be controlled however, pedestrian access should always be available; if necessary, provide temporary pedestrian access (e.g., over the trench) using wooden planks/metal sheets
- (ix) Plan transportation (for material and waste) routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
- (x) Draft Traffic Management Plan (TMP), Refer Appendix 12 for sample Traffic management plan, having a map showing the construction activities, construction schedule, permission from concerned road management authority such as; PWD, MCD, RWA, etc for each of the proposed Traffic Inspector (TI) circle and DCP-Traffic area.
- (xi) Apply for the approval of TMP with the details mentioned on point no (x) from technical team of Deputy Commissioner Police –Traffic (DCP- Traffic).

- (xii) Schedule transport and hauling activities during non-peak hours;
- (xiii) Locate entry and exit points in areas where there is low potential for traffic congestion;
- (xiv) Keep the site free from all unnecessary obstructions;
- (xv) Drive vehicles in a considerate manner;
- (xvi) Coordinate with Traffic Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities cannot be avoided during peak hours
- (xvii) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. Provide information to the public through media –newspapers and local cable television (TV) services
- (xviii) At work site, public information/caution boards shall be provided including contact for public complaints
- (xix) Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored.

135. **Socio-Economic – Income.** The project components will be located in government owned land parcels or public roads and there is no requirement for land acquisition or any resettlement. Some shops and other premises along the roads may lose business income if the access will be impeded by excavation of trenches, the presence of heavy vehicles and machinery, etc. Access disruption to hospitals, socio cultural places etc., will inconvenience public. Implementation of the following best construction measures will avoid the disturbance reduce the inconvenience and disturbance to the public:

Impact Classification		
Magnitude / Duration	Permanent	Temporary
Sever		
Moderate		√
Negligible		

- Adopt trenchless technology to avoid any blockage of access
- Inform all businesses and residents about the nature and duration of any work well in advance so that they can make necessary preparations;
- Employ trenchless technology to the maximum extent in the areas having potential of higher traffic disruption,
- Do not block any access; leave spaces for access between barricades/mounds of excavated soil and other stored materials and machinery, and providing footbridges so that people can crossover open trenches
- Barricade the construction area and regulate movement of people and vehicles in the vicinity, and maintain the surroundings safely with proper direction boards, lighting and security personnel – people should feel safe to move around
- Control dust generation
- Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored. This will also avoid any

business loss due to dust and access inconvenience of construction work.

- Employee best construction practices, including trenchless technology, speed up construction work with better equipment, increase workforce, etc in the areas with predominantly commercial, and with sensitive features like hospitals, and schools;
- Consult businesses and institutions regarding operating hours and factoring this in work schedules; and
- Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

136. Socio-Economic – Employment. Manpower will be required during the 24-months construction stage. This can result in generation of temporary employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

- Employ local labour force, or to the maximum extent possible to increase local employment opportunities temporarily; refer major applicable labour laws as given in the Appendix –8,

137. Occupational Health and Safety. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

Impact Classification		
Magnitude / Duration	Permanent	Temporary
Sever		
Moderate		√
Negligible		

- Comply with all national, state and local labour laws (see Appendix 8);
- Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) identification of potential hazards and safety issues (b) ensuring all workers are provided with and use personal protective equipment; (c) OH&S Training⁷ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site
- Adopt standard and safe practices for micro tunnelling
- Secure all installations from unauthorized intrusion and accident risks
- Provide supplies of potable drinking water

⁷ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

- Provide clean eating areas where workers are not exposed to hazardous or noxious substances
- Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers
- Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions may be present. Ensure also that visitor/s do not enter hazard areas unescorted
- Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas
- Ensure moving equipment is outfitted with audible back-up alarms
- Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
- Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

138. **Community Health and Safety.** Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Potential impact is negative but short-term and reversible by mitigation measures. Another aspect of public health concern is that of degradation of air quality due to construction dust as ambient air in Delhi already has high particulate matter concentration, and any further increase will definitely have incremental impacts on public health, especially vulnerable sections like children, elders, and people suffering from ailments. The construction contractor will be required to:

Impact Classification		
<i>Magnitude / Duration</i>	Permanent	Temporary
Sever		
Moderate		√
Negligible		

- Enforce strict speed limit (20-30 kmph) for playing on unpaved roads, construction tracks
- Night-time driving will be by exception only, as approved by the PIU to minimise driving risk and disturbance to communities
- Temporary traffic control (e.g. flagmen) and signs will be provided where necessary to improve safety and provide directions
- Temporary traffic control measures will be employed at road crossings and to reduce the risk of traffic accidents
- Restrict construction vehicle movements to defined access roads and demarcated working areas (unless in the event of an emergency)
- Where traffic is diverted around crossings, traffic control or careful selection of the exit from the working areas will be provided with the aim of ensuring that vehicles join the road in a safe manner.
- At sensitive locations where particularly where there are schools and markets close to the road, awareness of safety issues will be raised through neighbourhood awareness meeting

- All drivers will undergo safety and training
- Public access to all areas where construction works are on-going will be restricted through the use of barricading and security personnel
- Warning signs, blinkers will be attached to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation
- The period of time when the pipeline trench are left open will be minimized through careful planning
- Control dust pollution – implement dust control measures as suggested under air quality section (Para104)
- Ensure appropriate passage for pedestrians, provide a separate
- Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- Provide road signs and flag persons to warn of on-going trenching activities.

139. **Construction Camps.** Contract may require to set up construction camps – for temporary storage of construction material (pipes, cement, steel, fixtures, fuel, lubricants etc.), and stocking of surplus soil, and may also include separate living areas for migrant workers. The contractor will however be encouraged to engage local workers as much as possible. Operation of work camps can cause temporary air, noise and water pollution, and may become a source of conflicts, and unhealthy environment if not operated properly. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

Impact Classification		
Magnitude / Duration	Permanent	Temporary
Sever		
Moderate		√
Negligible		

- Avoid tree cutting for setting up camp facilities
- Select a camp site away from residential areas (at least 50 m buffer shall be maintained) or locate the camp site within the existing facilities of DJB
- Ensure that a proper compound wall is provided, and erect a wind/dust screen around the site as per the DPCC guidelines (i.e. 3 m or 1/10th of plot length whichever is higher)
- Camp site shall not be located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas
- Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit
- Provide proper temporary accommodation with proper materials, adequate lighting and ventilation, appropriate facilities for winters and summers; ensure conditions of liveability at work camps are maintained at the highest standards possible at all times;
- Provide drinking water, water for other uses, and sanitation facilities for employees
- Provide cooking fuel (cooking gas) to workers and abide to the state and national labour laws details provided in the Appendix -8
- Wastewater shall be disposed into sewer system with DJB prior permission if no sewer systems are available in the area, contractor should be providing a package sewage

treatment plant for treatment and disposal of wastewater generated at the camp site

- Train employees in the storage and handling of materials which can potentially cause soil contamination;
- Recover used oil and lubricants and reuse or remove from the site;
- Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- Confirm to PIU report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

C. Operation and Maintenance Impacts

140. Once the construction is over the operation and maintenance of the improved water supply system will be carried out by contractor/DJB. Prior to supply of water, it will be ensured that the newly laid pipes are properly cleaned and disinfected. In water supply distribution system project, the impacts are primarily due to construction phase activities, and are not generally associated with any significant impacts as a result of activities during operation. During the system design life (15/30 years for mechanical/civil components) it shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

141. Recurrence of pipe bursting and leakage problems can be managed by the leak detection and water auditing surveys. The DJB will be required to ensure that the leak detection and rectification time is minimized.

142. The citizens of the Delhi will be the major beneficiaries of the improved water supply system, as they will be provided with a constant supply of better-quality water, piped into their homes at an appropriate pressure. The project will improve the over-all health condition of the town as water borne diseases will be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health. This should also improve the environment of these areas, should deliver major improvements in individual and community health and well-being.

VII. Public Consultation and Information Disclosure

A. Overview

143. The active participation of stakeholders including local community, NGOs/CBOs, and the media in all stages of project preparation and implementation is essential for successful implementation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

144. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders of the subproject are: residents,

shopkeepers and businesspeople who live and work alongside the roads in which transmission lines will be provided, DJB, Archeological Survey of India, and Delhi Pollution Control Committee. Secondary stakeholder are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, and the ADB.

B. Public Consultation

145. Government regulatory agencies such as Delhi Pollution Control Committee, Archeology Survey of India, etc., were consulted during the project preparation. Discussions were held with DPCC regarding the consent requirements, and the dust control requirements as per the recent court orders. Detailed discussion held with the ASI Delhi Regional office about the clearance requirements for laying water pipelines in the regulated area of protected monuments. It is transpired that the permission will be issued by National Monument Authority (NMA) Delhi based on the site inspection and recommendation by the Regional Office.

146. A socio-economic household survey has been conducted in the study area, covering sample households, to understand the household characteristics, health status, and the infrastructure service levels, and also the demand for infrastructure services. General public and the people residing along the project activity areas were also consulted during visits to the project sites. As part of subproject-level public consultation many public consultations have been conducted during detailed design phase Including Focus group discussions in the neighborhood areas.

147. **Consultation during construction.** Prior to start of construction, DJB / PIU with the assistance of PMC will conduct information dissemination sessions at various places and solicit the help of the local community, leaders/prominent for the project work. At each ward/neighborhood level, focus group meetings will be conducted to discuss and plan construction work with local communities to reduce disturbance and other impacts. Details of the stakeholders consultations and participation list has been placed as Appendix 10.

148. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction phases and also regarding the grievance redress mechanism. PIU and PMC will organize public meetings and will appraise the communities about the progress on the implementation of EMP. Meeting will also be organized at the potential hotspots/sensitive locations before and during the construction.

C. Information Disclosure

149. Executive summary of the IEE will be translated in Hindi and made available at the offices of DJB local office in the subproject area, PIU, DJB head office, etc., and also displayed on their notice boards. Electronic version of the IEE in English and Executive Summary in Hindi will be placed in the official website of the DJB after approval of the IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

150. Public information campaigns to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress and future plans. Prior to start of construction, the PIU will issue Notification on the start date of implementation in local newspapers A board showing the details of the project will be displayed at the construction site for the information of general public. Appendix 3 provides the photographs pertaining to site and public disclosures.

151. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc. The stakeholder's consultation and subsequent release of press notes will help the project information to reach the local people to a greater extent. However, upon disclosing the safeguard documents, the project relevant information shall be better understood by the local.

VIII. Grievance Redressal Mechanism

A. Project Specific Grievance Redress Mechanism

152. A project-specific GRM will be established to receive, evaluate, and facilitate the resolution of AP's concerns, complaints, and grievances about the social and environmental performance of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social & environmental concerns linked to the project.

153. A common GRM will be in place for social, environmental, or any other grievances related to the investment program. The resettlement plans and IEE will follow the GRM described below. The GRM will provide an accessible and trusted platform for receiving and facilitating the resolution of APs' grievances related to the investment program. The multi-tier GRM for the investment program is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.

154. Investment program area-wide public awareness campaigns will ensure that knowledge of the grievance redress procedures is generated. The PIU will, through the PMC and the Community Mobilization and Resettlement Consultant (CMRC) will conduct awareness campaigns to ensure that poor and vulnerable households are made aware of the grievance redress procedures and their entitlements.

155. APs will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes to be installed by DJB or by e-mail, or by on the DJB website or by post, or by writing in a complaint register in the PIU office or at construction site offices. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The PIU will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party.

156. **Exiting Grievance Redress Mechanism.** DJB currently has an established Public GRM and has established 25 complaint receiving cells called Water Emergencies. There is also a central control room for coordination. The concerned DJB engineers/officials contact details are publicized and made available to the public to register complaints. Alternatively, the public can 'call', 'send a message', 'register' a complaint through the DJB website or through GNCTD grievances websites. Complaints are forwarded to concerned engineers for their action. After taking feedback from concerned engineers on redress, an Action Taken Report are posted on the website. If no action is taken in 21 days, then the complaint is taken *Suo moto* by the Public Grievance Commission for hearing. Also, the Facebook page of DJB, Short Message Service to either the water emergencies or any of the concerned officers are the preferred mode of grievance registering by the citizens of the project command area.

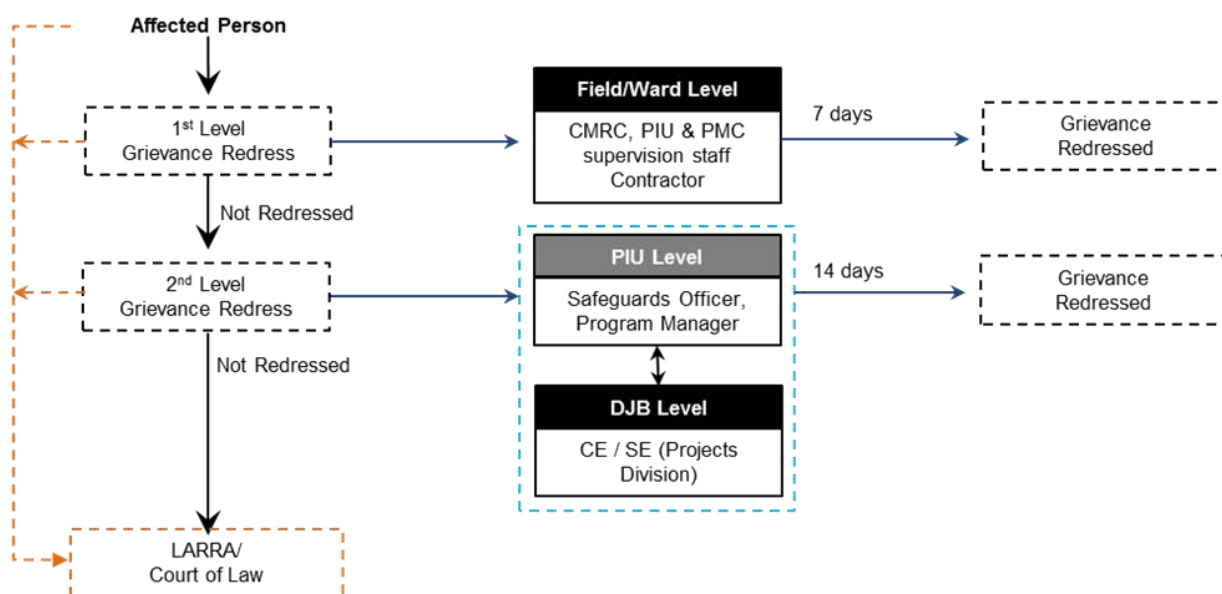
157. **Proposed DWSIIP Grievance Redress Process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel from the PIU and the PMC on-site supervision staff will provide the most easily accessible or first level of contact for the quick resolution of grievances. Contact phone numbers and names of the concerned staff and contractors, will be posted at all construction sites in visible locations.

- **1st level grievance.** The CMRC or on-site Junior Engineer of the PIU will receive and record the complaint at the site. Alternatively, the complaint can be registered by phone call, message, email, or on website. The complaint will be reviewed and, if necessary, forwarded to the contractor and PMC supervision staff for immediate resolution of the issue on-site in consultation with the CMRC will be required to do so within 7 days of receipt of a complaint/grievance.
- **2nd level grievance.** All grievances that cannot be redressed within 7 days at the field/ward level will be brought to the notice of the SO of the PIU, and the PMC Environmental Specialist. The PIU SO will resolve the grievance within 14 days of receipt of a complaint/grievance in discussion with the CMRC and under the direction of the PIU Program Manager. If the grievance is not resolved at Program Manager level, the grievance will be referred internally to the Superintending Engineer, and the Chief Engineer in the project's division of DJB. Notwithstanding the referral to Superintending Engineer/Chief Engineer, the grievance at this 2nd level should be resolved in 14 days of its receipt.

158. The program GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage. This can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. Alternatively, if the grievance is related to land acquisition or resettlement and rehabilitation⁸, the APs can approach the Land Acquisition, Rehabilitation and Resettlement Authority (LARRA). As per the recently implemented Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, 2013, the GNCTD will establish the LARRA to address grievances during implementation.

159. In the event that the established GRM is not in a position to resolve the issue, the APs can also use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer at ADB headquarters or the ADB India Resident Mission. The complaint can be submitted in any of the official languages of ADB's Developing Member Countries. The ADB Accountability Mechanism information will be included in the Project Information Document to be distributed to the affected communities, as part of the project GRM. Institutional structure for grievance redressal of affected person is shown in Figure 13.

⁸ LARRA admits grievances only with reference to the land acquisition and resettlement and rehabilitation issues under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act



CMRC = community mobilization & resettlement consultant, CE = Chief Engineer, DJB = Delhi Jal Board, LARRA = Land Acquisition Rehabilitation and Resettlement Authority, NGO = non-governmental organization, PIU = Program Implementation Unit, PMC = Project Management Consultant, SE = Superintending Engineer

Figure 13: Grievance Redress Process

160. **Integration of the DWSIIP GRM with the Existing DJB GRM.** To facilitate quick and easy redress of grievances, both GRMs will be linked so that the affected persons have the flexibility to approach either of the channels to redress their grievances. Any complaints/ grievances regarding the project activities received at the general DJB GRM will be referred internally to DWSIIP GRM for redress. After redress, the Action Taken Report will be uploaded in the general system as per current procedures. Integration of DJB GRM and project specific GRM is shown in Figure 14.

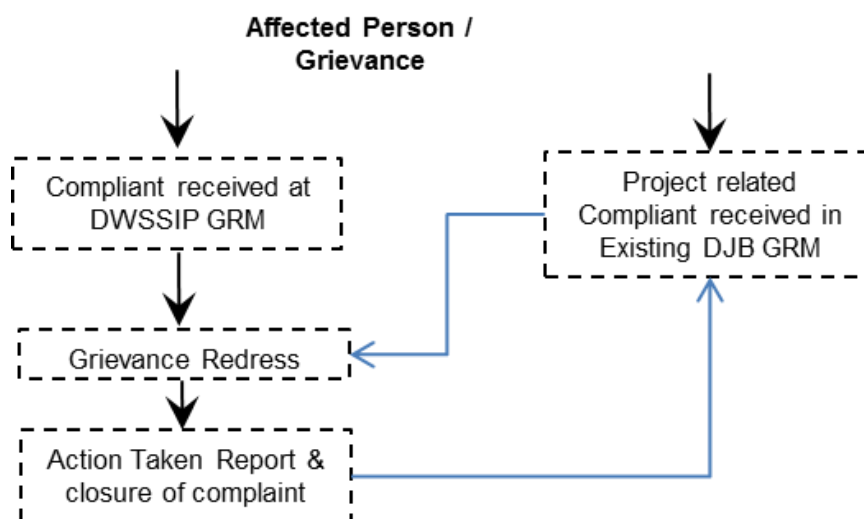


Figure 14: Grievance Redress Process of DJB

161. **Record-keeping.** The PIU will keep records of grievances received, including contact details of the complainant, the date the complaint was received, the nature of the grievance, agreed corrective actions and the date these were affected and the final outcome. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PIU office, and on the DJB website, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.

162. **Periodic review and documentation of lessons learned.** The PMU will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the program's ability to prevent and address grievances.

163. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the PIU.

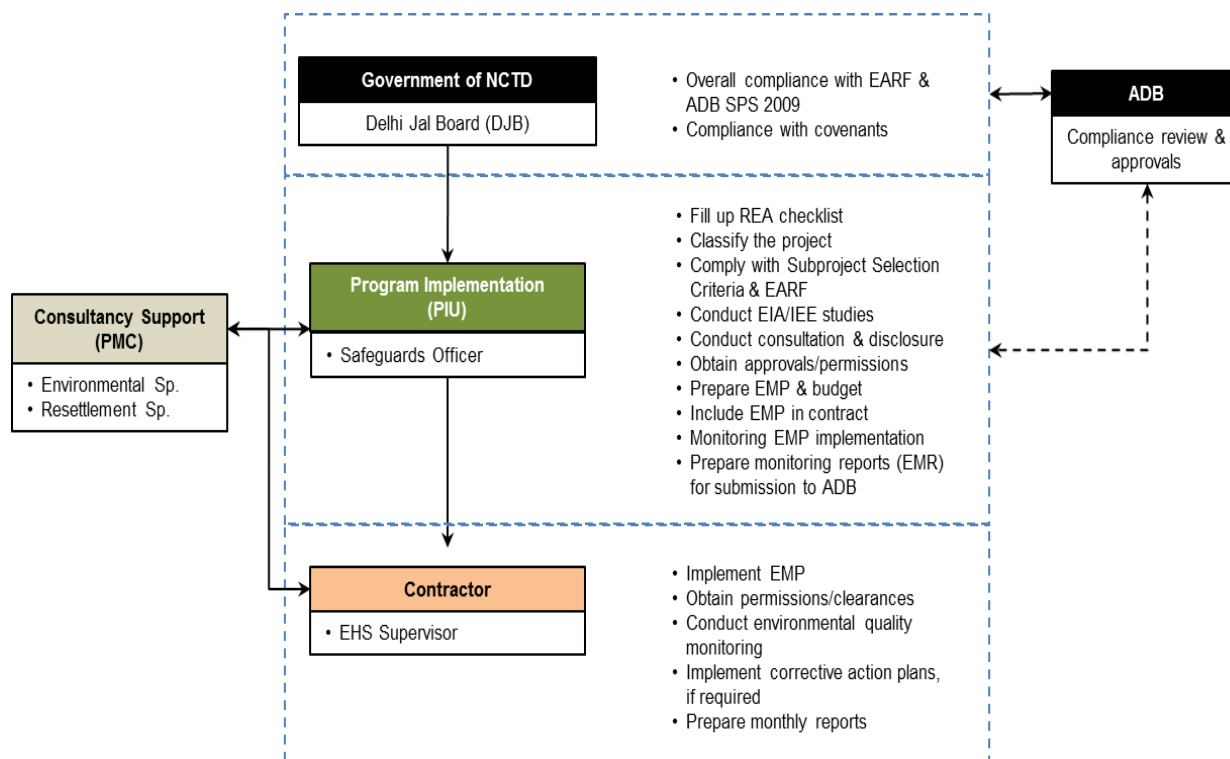
IX. Environmental Management Plan

A. Implementation Arrangements

164. The DWSIIP will be carried out under the supervision of the GNCTD. The DJB has been appointed as the executing agency (EA) and will be responsible for the management, coordination and execution of all the activities funded under the MFF. DJB has established a Project Steering Committee (PSC) headed by Member Water to provide overall guidance and strategic directions to the program. Program Management Unit (PMU), which headed by the Chief Engineer (Water Projects) will oversee program implementation and a Program Implementation Unit (PIU) has been established under the overall management of the PMU as the implementing agency (IA). The Project Manager of the be responsible for the day-to-day management and implementation.

165. The Project Manager will be an Executive Engineer (Civil) rank officer and will be supported by technical, financial, safeguards and administrative staff. The PIU staff will mostly be drawn from DJB, and if required, will also be seconded from the other government departments on deputation. The PIU will be assisted by a PMC in the implementation, management and monitoring of the investment program. The PMC will design the infrastructure, manage the tendering of contracts, supervise the construction process, assure the technical quality of design and construction, and provide advice/assistance on institutional capacity development. The PIU will appoint the contractors to build the infrastructure elements and will manage the construction and commissioning activities. The PIU will also appoint the CMRC to assist in program implementation. Safeguards officer PIU, PMC's safeguards experts will encourage the contractor and CMRC executives to participate in the IEC programs organized by the DJB and ensure sending invitations to the officials from DJB's PR cell in the project specific awareness activities. For mutual learning's and a better working rapport.

166. The PIU staff will include a Safeguard Officer (SO), who will be an Assistant Engineer rank officer, and will be responsible for all environment, health and safety, social, and grievance redress tasks. The SO will be a qualified engineer (preferably an environmental engineer). The SO can also be deputed from other government organizations such as the DPCC. Environmental and Social Safeguard Specialists of the PMC will assist the SO. Figure 15 depicts the Safeguard Implementation Arrangements.



ADB – Asian Development Bank; DJB = Delhi Jal Board; EARF – Environmental Assessment and Review Framework; EHS – Environment, Health & Safety; EIA – Environmental Impact Assessment; EMP – Environmental Management Plan; IA – Implementing Agency; IEE – Initial Environmental Examination; NCT = National Capital Territory; PMC – Project Management Consultant; REA – Rapid Environmental Assessment; SPS – Safeguard Policy Statement, 2009,

Figure 15: Safeguard Implementation Arrangements

B. Environmental Management Plan

167. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. This revised draft IEE, consisting of EMP for the necessary mitigation measures will be reviewed internally as part of ADB procedure thus may require to do necessary corrections as per SPS 2009. Updated IEE draft submitted to ADB for review and disclosure by the PIU/PMU.

168. The EMP will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between PMU, PIU, consultants and contractors. The EMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (i) provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. World Bank Environmental and Social Safeguard norms are provided under Appendix 21 as most stringent Safeguard norms to be referred during implementation phase.

169. The contractor will be required to submit to PIU, for review and approval, a site environmental management plan (SEMP) including (i) proposed sites/locations for construction

work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation. No works are allowed to commence prior to approval of SEMP. This way the revised IEE will be updated /revised/finalized during the implementation phase, based on detailed engineering design as per the site conditions by the DBOC.

170. A copy of the EMP/approved SEMP will be kept on site during the construction period at all times. The EMP included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

171. For civil works, the contractor will be required to (i) carry out all of the mitigation and monitoring measures set forth in the approved SEMP; and (ii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and SEMP. The contractor shall allocate budget for compliance with these SEMP measures, requirements and actions. The SEMP will consist of details of the pipe laying on the roads , a road closure plan, spoil management plan and traffic diversion plan, details of the occupational health and safety (OHS) measures to be undertaken along with details of the construction, repair and renovation of civil works , UGRs and Pumping stations as per the prescribed formats provided with this IEE document.

172. The following tables i.e. Tables 11,12,13,14, 15 and 16 shows the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

Table 11 : Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Design of water supply system	Loss of water from the system	(i) Minimize water losses from pipelines by perfect jointing and alignments using appropriate techniques (DI pipes up to 1000mm dia and MS up to 1500 mm dia) (DI pipe joined by Socket & Spigot with Rubber Ring gasket into cleaned groove of socket; MS pipe through welding joints;) (ii) Design the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage	PMC/PIU	Part of civil works costs
Design of water supply system	Energy use	(i) Install Energy Efficient Motors (ii) Efficient Pumping system operation using SCADA (iii) Install of Variable Frequency Drives (VFDs)	PMC/PIU	Part of civil works costs
Design of water supply system	Contamination of water	(i) Ensure adequate vertical and horizontal clearance with the sewer, surface water drains, etc., to avoid contamination of treated water supplies. o No sewer or surface drain or canal cross over a water pipe o No sewer or surface drain or canal cross over a water pipe (ii) Ensure that newly laid pipes are properly cleaned and disinfected prior to supplying water to consumers	PMC/PIU	Part of civil works costs
Project siting	Loss of tree cover	a. Avoid tree cutting through amending the pipeline alignments, Refer Appendix 13 as Tentative list of Tree to be Cut/pruned list b. Obtain prior permission from Tree Officer, Forest Department, if tree cutting is required c. Plant and maintain 10 trees for each tree that is removed d. Due to the constraints in the availability of land, only feasible alignment is chosen for the subproject from the government owned lands	PMC/PIU	Part of civil works costs
Socio cultural resource	Chance finds	(i) Avoid pipeline alignments within the regulated zone (300 m) of the monuments at Wazirabad and Shalimar Bagh	PMC/PIU	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
		<ul style="list-style-type: none"> (ii) If unavoidable, obtain permission for laying of pipelines within the regulated zone (iii) Finalize the proposed construction technology and exact alignment in consultation with the ASI (iv) Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve: <ul style="list-style-type: none"> o Conduct awareness training to contractor & supervision staff prior to start of excavation o Stopping work immediately to allow further investigation if any finds are suspected; o Calling in the ASI if a find is suspected, and taking any action they require to ensure its removal or protection in situ 		
Easiness in pipe laying and repairs & maintenance	Public inconvenience, traffic disruptions, risk of accidents	<p>Following guidelines may be taken into consideration while finalizing specific alignments on the sites</p> <ul style="list-style-type: none"> (i) As far as possible, adopt trenchless technology at all locations where are likely disruptions to traffic (ii) Finalize the alignment to have least disturbance to the traffic; in many main roads, one line on each side (either or main carriage way or on service roads) is used for parking; this location may be ideal if the parking is temporarily disallowed for the duration of work. Barricade and confine the work to parking lane. This will avoid any disturbance to traffic movement. (iii) In roads where there is a road shoulder, align the pipeline in the shoulder (iv) In roads where there is no parking lane or shoulder, pipe will have to be laid on the carriage way. As far as possible, align the pipeline into the edge of the road; if this requires closure of one traffic lane, take precautions to reduce the traffic (by informing people about the work, and alternative routes that can be taken etc.,) 	PIU in coordination with the Design Built and Operate Contractor (DBOC)	Part of civil works costs

Table 12: Environmental Management Plan of Anticipated Impacts during Pre-Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Utilities	Telephone lines, electric poles and wires, within proposed project area	<ul style="list-style-type: none"> (i) Identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase (ii) Conduct detailed site surveys with the construction drawings and discuss with the respective agencies before site clearance and start of excavation work; and (iii) Instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. 	DBOC) in collaboration with PIU	Part of civil works costs
Construction work camps, stockpile areas, storage areas, and disposal areas.	Conflicts with local community; disruption to traffic flow and sensitive receptors	<ul style="list-style-type: none"> (i) Select a camp site away from residential areas (at least 50 m buffer shall be maintained) or locate the camp site within the existing facilities of DJB (ii) Avoid tree cutting for setting up camp facilities (iii) Ensure that a proper compound wall is provided, and erect a wind/dust screen around the site as per the DPCC guidelines (i.e. 3 m or 1/10th of plot length whichever is higher) (iv) Camp site shall not be located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas (v) Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit 	DBOC)	Part of civil works costs
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	<ul style="list-style-type: none"> (i) Contractor should procure these materials only from the quarries permitted/licensed by Mines and Geology Department. (ii) Contractor should, to the maximum extent possible, procure material from existing quarries, and creation of new quarry areas should be avoid as far as possible. (iii) It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration. (iv) Contractor should submit the details of sources and copies of approvals, permissions to PIU, and should start procurement only after the respective source is approved by PIU 	DBOC	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Cost and Source of Funds
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can resultF to design revisions and/or stoppage of works	(i) Obtain all necessary consents, permits, clearance, NOCs, etc. prior to award of civil works (ii) Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction (iii) Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc. (iv) Include in detailed design drawings and documents all conditions and provisions if necessary	PIU DBOC	Part of project costs
Asbestos Cement Pipes	Health risk due to exposure to asbestos materials	(i) Obtain details from DJB on location of underground AC pipes (ii) Locate the new pipes carefully to avoid encountering AC pipes (iii) Leave the AC pipes undisturbed in the ground.	DBOC in coordination with PMC/PIU	Part of civil works costs

Table 13: Environmental Management Plan of Anticipated Impacts during Construction

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
EMP Implementation Training	Irreversible impact to the environment, workers, and community	(i) Mobilize EHS Supervisor (ii) Project manager and all key workers will be required to undergo training on EMP implementation including spoils/waste management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labor laws, applicable environmental laws, etc. (iii) Prepare Site Environmental Plan based on the EMP measures (iv) Prepare method statement	DBOC (Training to be conducted by PMC)	EHS supervisor costs (24 months x INR 75,000)
Sources of Materials	Extraction of materials can damage environment	(i) Procurement of material only after the respective source is approved by PIU (ii) Submit to PIU on a monthly basis documentation of sources of materials.	DBOC	Part of civil works costs
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in	(i) Employ trenchless technology to the maximum extent as open trenching will produce considerable dust (ii) Barricade the construction area using hard barricades (of 2 m height in Mild Steel (MS) frame and 1 mm MS sheet) on both sides and provide dust/wind screen (such geo textile fabric) up to 3 m height (1m above the hard barricading)	DBOC	Part of civil works costs Additional costs for hard barricading:

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons.	<ul style="list-style-type: none"> (iii) Initiate site clearance and excavation work only after barricading of the site is done (iv) Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to the barricaded area (v) Damp down the soil and any stockpiled material on site by water sprinkling; (vi) Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization (vii) Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process (viii) Limit the stocking of excavated material at the site; remove the excess soil from the site immediately to the designated disposal area (ix) Cover the soil stocked at the sites with tarpaulins (x) Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation (xi) Undertake the work section wise: 100 – 200 m section should be demarcated and barricaded (xii) Conduct work sequentially - excavation, pipe laying, backfilling; conduct pipe testing section-wise (for a minimum length as possible) so that backfilling, stabilization of soil can be done. (xiii) Remove the excavated soil of first section to the disposal site; as the work progresses sequentially, by the time second section is excavated, the first section will be ready for back filling, use the freshly excavated soil for back filling, this will avoid stocking of material, and minimize the dust. (xiv) Backfilled trench at any completed section after removal of barricading will be the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately. If there should be time allowance for natural consolidation of backfill, then the backfill shall at least covered by a layer of PCC so that there is no exposed soil surface. (xv) Ensure that all the construction equipment, machinery are fitted with pollution control devises, which are operating correctly, and have a valid pollution under control (PUC) certificate 		provision for both sides of transmission mains length has been provided.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(xvi) Use tarpaulins to cover the loose material (soil, sand, aggregate etc.,) when transported by trucks; (xvii) Clean wheels and undercarriage of haul trucks prior to leaving construction site/quarry (xviii) Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area (xix) Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition (xx) Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored. Backfilled trench without any road restoration is a major source of dust.		
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels, used batteries and lubricants during installation of pipelines can contaminate nearby surface water quality.	(i) All earthworks be conducted during the dry season to prevent the problem of soil run-off during monsoon season (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used; (iv) Identify construction waste/excess disposal sites prior to start of work (v) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (vi) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (vii) Dispose any wastes generated by construction activities in designated sites; and (viii) Conduct surface quality inspection according to the Environmental Management Plan (EMP). (ix) It has been proposed to use Ni-Cd batteries (IS: 10918- 1984; reaffirmed 2003, i.e. as per the specification for vented type Ni-Cd batteries), in all the pump houses; as existing lead batteries	DBOC	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		were of 30 V output volts and were not found complied to the required output of 110 volt and were not environmentally safe as per the Batteries (Management and Handling) Rules, 2001.		
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	<ul style="list-style-type: none"> (i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance (ii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptors (iii) Utilizing modern vehicles and machinery with the requisite adaptations to limit noise and exhaust emissions, and ensuring that these are maintained to manufacturers' specifications at all times. (iv) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. (v) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity (vi) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach 	DBOC	Part of civil works contract
Landscape, aesthetics and creation of filthy conditions	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, batteries and other similar items.	<ul style="list-style-type: none"> (i) Prepare and implement Construction Waste (spoils) Management Plan (CWMP), including identification of disposal site; work shall be initiated only after approval of CWMP by PIU. (ii) (ii) Stockpiles, lubricants, fuels, and other materials should be located away from slopes and water bodies; (iii) Avoid stockpiling any excess spoils. Excess excavated soils should be disposed to approved designated areas immediately; (iv) Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; (v) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed in disposal sites/recyclers approved by DPCC; (vi) Do not burn construction / domestic waste 	DBOC	Part of civil works contract

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(vii) Ensure that wastes are not haphazardly dumped in and around project areas (viii) Ensure that site is maintained well and tidy (ix) Restore road immediately after backfilling or provide a PCC layer over the backfilled trench immediately to improve the aesthetics.		
Accessibility & traffic disruptions	Traffic problems and conflicts near project locations and haul road	(i) Prepare Traffic Management Plan (TMP) in consultation with the Traffic Police – a generic plan to be prepared, and it shall be made specific to meet the conditions at each section/road taking into consideration diameter of pipe, work area and road width. (Appendix 12 provides a template for TMP) (ii) Draft Traffic management Plan (TMP) having a maps showing the construction activities, construction schedule, permission from concerned road management authority such as; PWD, MCD, RWA, etc for each of the proposed Traffic Inspector (TI) circle and DCP-Traffic area. (iii) Apply for the approval of TMP with the details mentioned on relevant section. Needs to coordinate and consult the technical team of Deputy Commissioner Police –Traffic (DCP- Traffic). Type of roads and measures for fine tuning the alignment of pipelines: (i) As far as possible, adopt trenchless technology at all locations where are likely disruptions to traffic (ii) Finalize the alignment to have least disturbance to the traffic; in many main roads, one line on each side (either or main carriage way or on service roads) is used for parking; this location may be ideal if the parking is temporarily disallowed for the duration of work. Barricade and confine the work to parking lane. This will avoid any disturbance to traffic movement. (iii) In roads where there is a road shoulder, align the pipeline in the shoulder (iv) In roads where there is no parking lane or shoulder, pipe will have to be laid on the carriageway. As far as possible, align the pipeline into the edge of the road; if this requires closure of one	DBOC	Part of civil works contract

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>traffic lane, take precautions to reduce the traffic (by informing people about the work, and alternative routes that can be taken etc.,)</p> <p>Measures to minimize traffic and accessibility disruptions:</p> <ul style="list-style-type: none"> (i) As far as possible, adopt trenchless technology at all locations where are likely disruptions to traffic (ii) Employ trenchless technology to the maximum extent (iii) Barricade and confine the work area (iv) Minimize the work area / barricaded area along the roads to the minimum possible width; adopt vertical trench cutting, where required, using shoring (v) Confine all the activities within in the barricaded area, including material & waste/surplus soil stocking. (vi) Avoid material/surplus soil stocking in congested areas – immediately remove from site/ or brought to the site as and when required (vii) Transport material, waste etc., during low traffic periods (eg, before 8 AM) (viii) Minimize access disruptions to adjacent properties; vehicle access may be controlled however, pedestrian access should always be available; if necessary provide temporary pedestrian access (eg, over the trench) using wooden planks/metal sheets (ix) Plan transportation (for material and waste) routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (x) Schedule transport and hauling activities during non-peak hours; (xi) Locate entry and exit points in areas where there is low potential for traffic congestion; (xii) Keep the site free from all unnecessary obstructions; (xiii) Drive vehicles in a considerate manner; (xiv) Coordinate with Traffic Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities cannot be avoided during peak hours (xv) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. Provide 		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>information to the public through media – newspapers and local cable television (TV) services</p> <p>(xvi) At work site, public information/caution boards shall be provided including contact for public complaints</p> <p>(xvii) Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored.</p>		
Socio-Economic – Income.	Impede the access of residents and customers to nearby shops	<p>(i) Inform all businesses and residents about the nature and duration of any work well in advance so that they can make necessary preparations;</p> <p>(ii) Do not block any access; leave spaces for access between barricades/mounds of excavated soil and other stored materials and machinery, and providing footbridges so that people can crossover open trenches</p> <p>(iii) Adopt trenchless technology to avoid any blockage of access</p> <p>(iv) Barricade the construction area and regulate movement of people and vehicles in the vicinity, and maintain the surroundings safely with proper direction boards, lighting and security personnel – people should feel safe to move around</p> <p>(v) Control dust generation</p> <p>(vi) Immediately consolidate the backfilled soil and restore the road surface; if immediate road restoration is not possible, provide a layer of plain cement concrete (PCC) of suitable mix on the backfilled trench so that dust generation, erosion is arrested and it will also provide a smooth riding surface for the traffic until the road is properly restored. This will also avoid any business loss due to dust and access inconvenience of construction work.</p> <p>(vii) Employee best construction practices, including trenchless technology, speed up construction work with better equipment, increase workforce, etc in the areas with predominantly commercial, and with sensitive features like hospitals, and schools;</p>	DBOC	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(viii) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (ix) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.		
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	(i) Employ local labour force, or to the maximum extent possible to increase local employment opportunities temporarily	DBOC	-
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Comply with all national, state and local labour laws (see Appendix 8) (ii) Develop and implement site-specific occupational health and safety (OH&S) Plan which will include measures such as: (a) identification of potential hazards and safety issues (b) ensuring all workers are provided with and use personal protective equipment; (c) OH&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents (iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site (iv) Secure all installations from unauthorized intrusion and accident risks (v) Provide supplies of potable drinking water (Appendix 9 provided drinking water standards) (vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances (vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers (viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions may be present. Ensure also that visitor/s do not enter hazard areas unescorted (ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas	DBOC	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<ul style="list-style-type: none"> (x) Ensure moving equipment is outfitted with audible back-up alarms (xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xii) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. 		
Asbestos Cement (AC) Materials	Health risks associated with AC pipes	(i) leave AC pipes in-situ untouched	DBOC	-
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	<ul style="list-style-type: none"> (i) Restrict construction vehicle movements to defined access roads and demarcated working areas (unless in the event of an emergency) (ii) Enforce strict speed limit (20-30 kmph) for playing on unpaved roads, construction tracks (iii) Night-time driving will be by exception only, as approved by the PIU to minimize driving risk and disturbance to communities (iv) Adopt standard and safe practices for micro tunneling (v) Temporary traffic control (e.g. flagmen) and signs will be provided where necessary to improve safety and provide directions (vi) Temporary traffic control measures will be employed at road crossings and to reduce the risk of traffic accidents (vii) Where traffic is diverted around crossings, traffic control or careful selection of the exit from the working areas will be provided with the aim of ensuring that vehicles join the road in a safe manner. (viii) At sensitive locations where particularly where there are schools and markets close to the road, awareness of safety issues will be raised through neighborhood awareness meeting (ix) All drivers will undergo safety and training 	DBOC	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<ul style="list-style-type: none"> (x) Public access to all areas where construction works are on-going will be restricted through the use of barricading and security personnel (xi) Warning signs, blinkers will be attached to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation (xii) The period of time when the pipeline trench are left open will be minimized through careful planning (xiii) Control dust pollution – implement dust control measures as suggested under air quality section (Para 104) (xiv) Ensure appropriate passage for pedestrians, provide a separate (xv) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (xvi) Provide road signs and flag persons to warn of on-going trenching activities. 		
Safety of sensitive groups (children, elders etc.) and others pedestrians in narrow streets	Trench excavation in narrow streets will pose high risk to children and elders in the locality	<ul style="list-style-type: none"> (i) Provide prior information to the local people about the nature and duration of work (ii) Conduct awareness program in each neighborhood on safety during the construction work prior to the start of work (iii) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day as far as possible (iv) Provide safety barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches (v) Provide temporary planks over trenches where required to maintain the access 	DBOC	Part of civil works costs
Construction work camps	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, batteries and lubricants	<ul style="list-style-type: none"> (i) Select a camp site away from residential areas (at least 50 m buffer shall be maintained) or locate the camp site within the existing facilities of DJB (ii) Avoid tree cutting for setting up camp facilities (iii) Ensure that a proper compound wall is provided, and erect a wind/dust screen around the site as per the DPCC guidelines (i.e. 3 m or 1/10th of plot length whichever is higher) 	DBOC	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	Unsanitary and poor living conditions for workers	<ul style="list-style-type: none"> (iv) Camp site shall not be located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas (v) Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exits (vi) Provide proper temporary accommodation with proper materials, adequate lighting and ventilation, appropriate facilities for winters and summers; ensure conditions of live ability at work camps are maintained at the highest standards possible at all times (vii) Provide drinking water, water for other uses, and sanitation facilities for employees (viii) Provide cooking fuel (cooking gas) to workers (ix) Wastewater shall be disposed into sewer system with DJB prior permission if no sewer systems are available in the area, contractor should be providing a package sewage treatment plant for treatment and disposal of wastewater generated at the camp site (x) Train employees in the storage and handling of materials which can potentially cause soil contamination; (xi) Recover used oil -lubricants and batteries and reuse or remove from the site as per the standard rules and practices; (xii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (xiii) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (xiv) Environmentally restore the work sites to at least pre-project conditions; PIU to approve in writing that site is restored 		
Submission of EMP implementation report	Unsatisfactory compliance to EMP	<ul style="list-style-type: none"> (i) Mobilization of EHS Supervisor to ensure EMP implementation (ii) Timely submission of monitoring reports including pictures 	DBOC	Part of civil works costs
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	<ul style="list-style-type: none"> (i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored 	DBOC	Part of civil works costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(iv) All affected structures rehabilitated/ compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regressed (vii) The contractor must arrange the cancellation of all temporary services. (viii) Restore the work sites to pre-project conditions; PIU to approve in writing that site is restored (ix) Ensure that newly laid pipes are properly cleaned and disinfected prior to supplying water to consumers		

Table 14: Operation Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Contamination of water supplies	Treated water pollution and impacts on public health	<ul style="list-style-type: none"> Ensure that newly laid pipes are properly cleaned and disinfected prior to supplying water to consumers Conduct regular water quality monitoring tests 	DBOCDJB	as O&M cost
Check for blockage and leakage problems reducing the water losses	Loss of water, increased demand and inconvenience to consumers & general public Water contamination	<ul style="list-style-type: none"> Effective leak detection and water auditing to reduce the water losses 	DBOC/DJB	Operating costs
Increased in sewage generation	Water pollution, and impacts on public health and environment	<ul style="list-style-type: none"> Sanitation facilities needs to be improved at community level and at the town level to meet the increased sewage demand 	DBOC/DJB	To be identified DJB
Occupational health and safety	Health, social and economic impacts on the workers	<ul style="list-style-type: none"> Provide appropriate PPE to workers& training on its proper use 	DBOC/DJB	Operating costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<ul style="list-style-type: none"> Use fall protection equipment when working at heights. Maintain work areas to minimize slipping and tripping hazards. Implement a training program for operators who work with chlorine regarding safe handling practices and emergency response procedures.. 		
Public inconvenience & safety during repair and maintenance works	Traffic disruption, dust, safety risk etc	<ul style="list-style-type: none"> As the work will be similar to laying of pipes, the issues will be similar, but confined to very small area where the repair work is being implemented Implement the measures as suggested in the construction stage EMP 	DBOC/DJB	Operating costs

Table 15: Construction Stage Environmental Monitoring Plan

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety,	All work sites	Implementation of dust control, noise control, traffic management, & safety measures.	Regularly as required during construction; checklist to be filled monthly once	Supervising staff and safeguards specialists of PMC/PIU/PMU	Contractor cost (part of BOQ items)
Ambient air quality	4 locations (to be identified prior to start of work)	<ul style="list-style-type: none"> PM10, PM2.5 NO2, SO2, CO, HC 	Once before start of construction Monthly during construction (42 months construction period considered)	DBOC	Contractor cost (part of BOQ items)
Ambient noise	4 locations (to be identified prior to start of work)	<ul style="list-style-type: none"> Day time and night time noise levels (24 hours) 	Once before start of construction Monthly during construction (42 months	DBOC	Contractor cost (part of BOQ items)

			construction period considered)		
Surface water quality	2locations (locations to be selected prior to start of construction)	<ul style="list-style-type: none"> pH, Oil & grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity 	Once before start of construction& Quarterly once during construction (42)	DBOC	Contractor cost (part of BOQ items)
Note: DBOC has to ensure that CTE/CTO from the DPCC should be obtained prior to the construction and CTO would be obtained prior to the commissioning.					

Table 16: Operation Stage Environmental Monitoring Plan

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of quality of water supplied to consumers	Consumer end-random sampling	Color, odor, taste, pH, Nitrite, Nitrate, Turbidity Total Alkalinity, Total coliform and Feacal coliform	Quarterly once	DJB through DBOC	O&M costs
Note: DBOC has to ensure that CTE/CTO from the DPCC should be obtained prior to the commissioning. CTO renewal should be obtained for the O&M phase also					

C. EMP Compliance Responsibilities

173. **PMU/PIU Responsibilities.** Safeguard Officer will be supported by PMC, which will be staffed with an Environmental Specialist. Key tasks and responsibilities of the PO (Environment) include the following:

Bidding stage:

- (i) Prior to invitation of bids for civil works contract, ensure that
 - a. Permission from ASI is obtained for laying of pipelines in the regulated areas of protected monuments if the pipelines are aligned within 300 m
- (ii) Ensure that EMP is included in bidding documents and civil works contracts
- (iii) Ensure that the bid/contract documents include specific provisions requiring contractors to comply with all applicable labor laws and core labor standards including:
 - a. Labour welfare measures and provision of amenities
 - b. prohibition of child labor as defined in national legislation for construction and maintenance activities;
 - c. equal pay for equal work of equal value regardless of gender, ethnicity, or caste;
 - d. elimination of forced labor;
 - e. the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.
- (iv) Ensure that staff required for implementation of EMP (EHS officer) is included in the bid requirements
- (v) Ensure that EMP cost is included in the project cost
- (vi) In the pre-bid meeting, provide insight into the EMP requirements to the bidders

Construction stage:

- (i) Facilitate and ensure that all necessary environmental clearances/permissions, including that of contractor's are in place prior to start of construction
- (ii) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring, and on taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation.
- (iii) Review and approve updated EMP, SEP prepared by contractor
- (iv) Review and approve method statement, including TMP, CWMP & OHSP, prepared by contractor. Ensure that they are revised and updated as required for each section.
- (v) Guide contractor in finalizing sections for use of trenchless technology considering technical, environmental and social safeguard aspects
- (vi) During the works, ensure that all the construction procedures adopted by Contractor are as per the method statement.
- (vii) Oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations, take necessary action for obtaining rights of way
- (viii) Oversee environmental monitoring by contractors
- (ix) Take corrective actions when necessary to ensure no environmental impacts

- (x) Conduct continuous public consultation and awareness
- (xi) Address any grievances brought about through the grievance redress mechanism in a timely manner as per the EMP
- (xii) Consolidate monthly environmental monitoring reports of contractor and submit semi-annual monitoring reports to ADB
- (xiii) Oversee site closures to ensure that all work / facility sites are restored properly prior to issuing work completion certificate to the contractor
- (xiv) Ensure that the newly laid pipelines are properly cleaned and disinfected prior to supply of water to consumers

Contractor's responsibilities.

Bidding stage:

- (i) Understand the EMP requirements and allocate necessary resources (budget, staff, etc.,)
- (ii) Understand the regulatory compliance requirements related to labour welfare, safety, environment etc.,

Construction stage& Operation and maintenance stage:

- (i) Ensure that all regulatory clearances (both projects related and contractor related) are in place before start of the construction work.
- (ii) Mobilize EHS supervisor prior to start of work
- (iii) Confirm with PIU availability of rights of way at all project sites prior to start of work.
- (iv) Update EMP and prepare SEP
- (v) Prepare Method Statement and get it approved prior to start of work
- (vi) Prepare the following duly incorporating EMP measures, and submit to the PIU:
 - a. Construction waste management (CWM) plan
 - b. Traffic management (TM) plan
 - c. Occupational Health & Safety (OHS) Plan
- (vii) Implement the mitigation measures as per the EMP including CWM & TM Plans
- (viii) Finalize sections for use of trenchless technology considering technical, environmental and social safeguard aspects with the coordination of PIU and PMC
- (ix) Follow the EMP measures/guidelines for establishment of temporary construction camps, construction waste disposal sites, and material borrow areas, etc.,
- (x) Implement EMP and ensure compliance with all the mitigation and enhancement measures
- (xi) Conduct environmental monitoring (air, noise, water etc.,) as per the EMP
- (xii) Undertake immediate action as suggested by PIU / PMU / PMC to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation
- (xiii) Submit monthly Environmental Monitoring Reports on EMP implementation
- (xiv) Act promptly on public complaints and grievances related to construction work and redress in a timely manner in coordination with PIU
- (xv) Comply with applicable government rules and regulations

(xvi) Site clean-up and restoration including clean up and disinfection of pipelines prior to supply

D. Training Activities on EMP Implementation

174. The following Table 17 presents the outline of capacity building program to ensure EMP implementation. The detailed cost and specific modules will be customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the Environmental Specialist of the PMC.

Table 17: Outline Capacity Building Program on EMP Implementation

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation program .	<ul style="list-style-type: none"> - DWSIIP Environmental safeguard requirements - Implementation arrangement -monitoring & reporting -Corrective actions 	½ day orientation workshop - at the start of the program	PMU and PIU/PMC– all senior and mid-level officials and engineers involved in DWSSIP
Training program on EMP implementation & monitoring	<p>Module 1 – Orientation</p> <ul style="list-style-type: none"> - ADB SPS; - Government of India Environmental Laws and Regulations. <p>Module 2 – Environmental Assessment Process.</p> <ul style="list-style-type: none"> - Environmental process, identification of impacts and mitigation measures, formulation of an EMP, implementation, and monitoring requirements; - Review & approval of environmental assessment reports <p>Module 3: EMP Implementation, monitoring & reporting</p> <ul style="list-style-type: none"> - Incorporation of safeguard clauses and EMP in bid and contract documents -Pollution prevention and abatement (IFC EHS Guidelines) -.Monitoring& evaluation - Formulation of corrective action plans (CAP) -Reporting <p>Module 4: Consultation & disclosure</p> <ul style="list-style-type: none"> - Grievance redress mechanism 	2-day training program -. prior to invitation of any bids for civil works under the Program	PIU & PMU staff
Construction stage			
Orientation program	<ul style="list-style-type: none"> - Contractual requirements -Legal & regulatory requirements -EHS requirements 	½ day orientation course to during mobilization	Contractors and PMC, PIU supervising staff

Description	Contents	Schedule	Participants
	-Site Environment Plan (SEP) preparation, EMP implementation and reporting -roles and responsibilities		
Training program/ workshop for contractors and supervisory staff.	- Environmental issues during construction; - Site specific SEP - EMP Implementation - Day to day monitoring - Periodic ambient monitoring - Reporting -Consultation & grievance redress	1-day workshop immediately after mobilization	Contractors and PMC, PIU supervising staff
Periodic refresher training workshop	Same as above	½ day workshop thrice a year	Contractors and PMC, PIU supervising staff
Stakeholder workshop Experience and best practices sharing.	- Experience of EMP implementation – issues and challenges; - Best practices followed.	½ day workshop Once in a year during implementation	PIU, PMU and stakeholder agencies (DPCC, PWD, Municipal Corporation, Delhi Police etc.,)

E. Monitoring and Reporting

175. Prior to commencement of the works, the contractor will submit a compliance report to PIU that all identified pre-construction mitigation measures as detailed in the EMP are undertaken. Contractor should confirm that the EHS supervisor is mobilized. PIU with the assistance of the PMC will review the report and permit commencement of works.

176. During construction, results from internal monitoring by the contractor will be reflected in their monthly EMP implementation reports to the PIU. PIU will review and advise contractors for corrective actions if necessary. A Semi-annual Environmental Monitoring Report summarizing compliance and corrective measures taken, will be prepared by PMC and submitted to PIU. PMU will submit to ADB the semi-annual (6-monthly) EMR. Once concurrence from the ADB is received the report will be disclosed on the DJB website.

177. ADB will review project performance against the DWSIIP commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system

178. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. The costs which are specific to EMP implementation and are not covered elsewhere in the projects needs to be assessed by Contractor. Appendix 22 illustrates the Sample Grievance Registration Form for registering the grievances and reporting as per the decided protocol. Sample Environmental Inspection Form has been placed as Appendix 23 and observations of the same will be compiled in the Quarterly Reporting Format by PIU as per the Appendix 24.

F. Cost of EMP Implementation

179. The cost of the mitigation measures proposed to be undertaken in construction and operation and maintenance phase are placed as Table 18. Being a DBOC mode of contract arrangement as per the bod document of DWSIIP-04 per SEMP there may have some change as per the site conditions.

Table 18 : Cost of EMP Implementation

COST ESTIMATE FOR ENVIRONMENTAL MANAGEMENT PLAN (EMP)							
Sr.No.	Description of Item	Stages	Unit	Total Qty/Number	Rate (INR)	Cost (INR)	Costs Covered By
A.	Implementation staff						
1	EHS Supervisor (Equivalent to AE)	Construction	per month	42.00			Contractor
	Subtotal (A)						
B.	Mitigation Measures						
1	Provision for Tree cutting & compensatory plantation and transplantation measures						
1.1	Details of cost of Cutting Trees to Be Submitted to Department Of Environment Forest & Climate Change. Sheet Enclosed	Construction	Each	204.00			PIU
1.2	Details of cost of compensatory Transplantation under Wazirabad WTP - DWSIIP-03. Sheet Enclosed	Construction	Each	66.00			PIU

1.3	Details of cost of compensatory Plantation under Wazirabad WTP - DWSIIP-03	Estimate Attached					
2	Traffic management at work sites	Construction	Lump sum	-			Contractor
	(Pavement Markings, Channelizing Devices, Arrow Panels, PPE's and Warning Lights)						
3	Barricading	Construction	Per sqm	72737.56			Considered under Pipeline cost
4	Dust screens Providing, erecting, maintaining and removing temporary protective screens made out of specified fabric with all necessary fixing arrangement to ensure that it remains in position for the work duration as required by the Engineer-in-charge.(DSR 2018 item no 26.36)	Construction	Per SQ M	74556.00			Dust screen Provided in both Side as well as cross trench as part of Contractor Scope
5	Dust Suppression (water Sprinkling) Lump Sum	During Construction					Contractor
	DSR 2018 Hire charges Item no 0046						
	Water Tanker 5 to 6 KI Capacity		Day				
	3 No. of Tanker used for a day						
	30 x 3 =90 nos in a month						
	Construction Month = 36 No. of hours = 36 X 90 = 3240		Day	3240.00			
	Subtotal (B)						
C	Plain cement concrete (PCC) layer on the trench immediately after the backfilling (Avg. 1.85m wide & 0.1 m depth for 44.02 KM)	Construction	CUM	8855.18			

	Subtotal (C)						
D.	Monitoring						
1	Air quality (38X4) + (4X1)	Construction	/ sample	156.00			Contractor
2	Noise levels (38X4) + (4X1)	Construction	/ sample	156.00			Contractor
3	Surface water (=38/4)+(2*1)	Construction	/ sample	12.00			Contractor
	Subtotal (D)						
E	Training and Capacity building						
1	Orientation program	Construction	Lump sum	30.00			
2	Training program/ workshop for contractors and supervisory staff.	Construction	Lump sum	30.00			
3	Periodic refresher training workshop	Construction	Lump sum	20.00			
4	Stakeholder workshop Experience and best practices sharing.	Construction	Lump sum	20.00			
T1	Subtotal (E)						
T2	Total (A+B+C+D+E)						
T3	Deducting the Cost of item no.3 on Part B and item no part C as these are part of construction cost of DBO contract.						
T4	Grand Total (T4 = T2-T3)						

X. Conclusion and Recommendations

180. The process described in this document has assessed the environmental impacts of all elements of the proposed Transmission Mains Improvement subproject for 11 UGR command areas located in the northern part of NCT Delhi. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant.

181. Subproject include improvement of transmission mains and pumping systems, mainly focusing on increasing capacity, providing connectivity to reorganized Wazirabad WTP command area, and enhancing overall efficiency and coverage of the system. Subproject do not include any supply side measures (like water source augmentation, treatment etc.) and therefore there are no impacts during operation envisaged. In the IEE the discussion focused mainly on construction phase activities, as water pipelines are not generally associated with any significant impacts during operation.

182. The subproject activities are mainly located in an urban area congested with traffic, pedestrians and activities. Moreover, many of the roads are high traffic roads and are abutted with busy with commercial establishments frequented by people. Measure to align the pipeline to minimize the impacts are suggested. Subproject area is located outside the historic Delhi Triangle; therefore, the archeological potential of the area is low. There are two nationally protected monuments in the subproject area, one of which is located close to the proposed transmission main alignment. No impact envisaged on the monument, however, necessary precautions and prior approval of the competent authority included in the EMP.

183. During the construction phase, impacts mainly arise from the construction dust and noise; from the disturbance of residents, businesses, traffic and important buildings by the construction work, and from the need to dispose of large quantities of waste soil and import of construction material. The social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the roads where pipes will be laid. The baseline ambient air quality of Delhi is poor with high particulate matter and therefore the generation of construction dust will further deteriorate the situation, though temporarily. Appropriate measures are suggested, including the use of documented procedures for construction and immediate restoration of road after the work. Furthermore, adoption of trenchless method will also be considered and about 1.6 KM of the pipelines will be laid by this method. This method will greatly minimize the construction impacts like dust and associated impacts on health, socio economic activities, traffic disruptions, etc.

184. Anticipated impacts of water supply during operation and maintenance will be related to detection and repair of leaks, pipe bursts. These are, however, likely to be minimal, as proper design and selection of good quality pipe material shall mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work.

185. The public participation processes undertaken during project design ensured stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation.

186. The project's grievance redress mechanism will provide the citizens with a platform to redress of their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

187. The EMP will assist the PIU, PMC and the construction contractor in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project.

188. A copy of the EMP/approved SEP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

189. The project will benefit the general public by contributing to the long-term improvement of water supply systems and community livability in the subproject area.

190. Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment. However, to conform to government guidelines, the project requires prior permission of National Monument Authority for laying of pipelines near the protected monument if any. This permission shall be obtained prior to inviting bids for civil works. But this is not applicable as there is no pipe laying works near any protected monument.

191. This IEE shall be implemented during the construction stage by the contractor to reflect any changes, amendments and will be reviewed and approved by ADB.

Appendix 1: REA Checklist

WATER SUPPLY

Instructions:

- ☐ This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- ☐ This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- ☐ This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- ☐ Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title:

IND: Transmission system Improvement and Construction of Clear Water Reservoir and Pumping Stations for Wazirabad WTP Command area including SCADA & Instrumentation (DWSIIP/04 Package)

Sector Division:

SAUW

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the project area...			
▪ Densely populated?	√		Subproject area is located in Delhi, the Capital City of India. Subproject area is densely populated. There are no major negative impacts envisaged, because pipelines will be located in unused government lands alongside the existing roads, and implementation of best construction practices and measures will avoid the impacts
▪ Heavy with development activities?		√	
▪ Adjacent to or within any environmentally sensitive areas?			

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> Cultural heritage site 		√	Sheesh Mahal and Shah Alam Tomb, are two protected monuments, situated within the study area. Proposed pipeline is located close to the Shah Alam Tomb, however its proposed to be laid beyond 400 m from the boundary of the monument. Therefore for proposed works there will be no requirement of prior permission from the concerned competent authority. No impacts on the protected monument are envisaged.
<ul style="list-style-type: none"> Protected Area 		√	
<ul style="list-style-type: none"> Wetland 		√	
<ul style="list-style-type: none"> Mangrove 		√	
<ul style="list-style-type: none"> Estuarine 		√	
<ul style="list-style-type: none"> Buffer zone of protected area 		√	
<ul style="list-style-type: none"> Special area for protecting biodiversity 		√	
<ul style="list-style-type: none"> Bay 		√	
B. Potential Environmental Impacts			
Will the Project cause...			
<ul style="list-style-type: none"> pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? 		√	Subproject deals with improvement of water transmission system. No source augmentation / rehabilitation components are part of the subproject. Water will continues to be supplied from an existing WTP, and the treated water quality meets the drinking water standards
<ul style="list-style-type: none"> Impairment of historical/cultural monuments/areas and loss/damage to these sites? 		√	-
<ul style="list-style-type: none"> hazard of land subsidence caused by excessive ground water pumping? 		√	-
<ul style="list-style-type: none"> social conflicts arising from displacement of communities ? 		√	No displacement of communities envisaged in the project
<ul style="list-style-type: none"> conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? 		√	-
<ul style="list-style-type: none"> unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? 		√	Water is treated prior to supply
<ul style="list-style-type: none"> delivery of unsafe water to distribution system? 		√	Monitoring of treated of water supplies at consumer end will be proposed
<ul style="list-style-type: none"> inadequate protection of intake works or wells, leading to pollution of water supply? 		√	-
<ul style="list-style-type: none"> over pumping of ground water, leading to salinization and ground subsidence? 		√	-
<ul style="list-style-type: none"> excessive algal growth in storage reservoir? 		√	-
<ul style="list-style-type: none"> increase in production of sewage beyond capabilities of community facilities? 	√		Sewerage system needs to be improved to cater to the increased demand

SCREENING QUESTIONS	Yes	No	REMARKS
▪ inadequate disposal of sludge from water treatment plants?		√	Subproject scope is limited to improvement of distribution system
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?		√	Pumping stations are located within the existing WTP compound of DJB. Site has adequate buffer and protected by compound walls
▪ impairments associated with transmission lines and access roads?		√	Subproject scope is limited to improvement of water transmission system
▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.		√	Subproject scope is limited to improvement of transmission system
▪ health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?		√	Subproject scope is limited to improvement of transmission system and construction/ augmentation of UGRs
▪ dislocation or involuntary resettlement of people		√	No dislocation or involuntary resettlement envisaged
▪ social conflicts between construction workers from other areas and community workers?	√		Maximizing the use of local labour, and appropriate location of labour camps will avoid the conflicts
▪ noise and dust from construction activities?	√		Dust and noise control measures will be implemented
▪ increased road traffic due to interference of construction activities?	√		Traffic management plan will be prepared and implemented
▪ continuing soil erosion/silt runoff from construction operations?	√		Erosion control measures will be implemented
▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?		√	-
▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		√	-
▪ accidental leakage of chlorine gas?		√	-
▪ excessive abstraction of water affecting downstream water users?		√	-
▪ competing uses of water?		√	-
▪ increased sewage flow due to increased water supply	√		Sewerage system needs to be improved to cater to the increased demand
▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	√		Sewerage system needs to be improved to cater to the increased demand

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are			

included in this checklist to help identify potential climate and disaster risks.			
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes?	√		Falls in high risk seismic zone; design takes into consideration the seismic zoning
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?		√	Subproject includes mainly improvement in the distribution network system
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	No
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		√	No

Appendix 2: Tentative list Critical Road Crossings Identified for Trenchless Technology for Laying of Pipelines

Road Crossings

At all major road crossings, the pipe line will be laid through trenchless technology. At minor road crossings if pipes are laid in an open cut trench then if required the buried pipeline will be encased in concrete. It is also recommended to encase the pipe in concrete if the depth of overburden is more than 2.0 m and at major road crossings.

S.No.	Details of the site Identified	Proposed Pipe Dia (in mm)	Approx. length (M)
1.	Burari line		
		800	40
		1400	210
2.	Peera Garhi line		
		600	70
		700	60
		800	101
		900	431
		1400	67
		1500	104
3			
a	Sanjay Gandhi Transport Nagar		
		500	71
		400	55
b	CD Park (JahangirPuri)		
		700	120
c	Main SGT Nagar		
		800	192
		900	152
	Sub Total (A)		1406
	Bridges and Railway crossings (B)		209
	Grand Total (A+B)		1615

Cross Drainage Works

At the cross – drainage and in water logged areas, pipes shall be placed on saddle supports and in case higher span, bridge has been proposed.

Appendix 3: Site and Public Disclosure Photographs



Colony road with vehicle parking



Inner colony roads with commercial activities



View of a narrow lane in Lawrence road area



Ashok Vihar Public Disclosure with women



Present alignment of 1500 mm in Lawrence road, slum area stretch



Shah Alam Tomb adjacent to the road Wazirabad WTP area

Appendix 4: National Ambient Air Quality Standards

SL NO:	Pollutants	Time weighted average	Concentration in ambient air		Method of measurement
			Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas	
1	Sulphur Dioxide (SO ₂) µg/m ³	Annual 24 hours	50 80	20 80	Improved West and Geake-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂) µg/m ³	Annual 24 hours	40 80	30 80	Modified Jacob & Hochheiser (Na-Arsenite) Chemiluminescence
3	Particulate Matter (Size less than 10 µm) or PM10 µg/m ³	Annual 24 hours	60 100	60 100	Gravimetric -TOEM -Beta attenuation
4	Particulate Matter (Size less than 2.5 µm) or PM2.5 µg/m ³	Annual 24 hours	40 60	40 60	Gravimetric -TOEM -Beta attenuation
5	Carbon Monoxide (CO) mg/m ³	8 hours 1 hours	02 04	02 04	Non Dispersive Infra Red (NDIR) Spectroscopy

Appendix 5: Vehicle Exhaust Emission Norms – National Standards

1. Passenger Cars

Norms	CO(g/km)	HC+ NOx(g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35 (combined)
Bharat Stage-IV	1.0	0.18 (combined)

2. Heavy Diesel Vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

CO = Carbon Monoxide; g/kmhr = grams per kilometer-hour; HC = Hydrocarbons; NOx = oxides of nitrogen; PM = Particulates Matter

Appendix 6: National Ambient Air Quality Standards in Respect of Noise

Area code	Category of area/zone	Limit in dB (A)	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Appendix 7: Extract from Construction & Demolition Management Rules, 2016

[Published In the Gazette of India, Part-II, Section-3, Sub-section (ii)]
Ministry of Environment, Forest and Climate Change

NOTIFICATION

New Delhi, the 29th March, 2016

G.S.R. 317(E).—Whereas the Municipal Solid Wastes (Management and Handling) Rules, 2000 published vide notification number S.O. 908(E), dated the 25th September, 2000 by the Government of India in the erstwhile Ministry of Environment and Forests, provided a regulatory frame work for management of Municipal Solid Waste generated in the urban area of the country;

And whereas, to make these rules more effective and to improve the collection, segregation, recycling, treatment and disposal of solid waste in an environmentally sound manner, the Central Government reviewed the existing rules and it was considered necessary to revise the existing rules with a emphasis on the roles and accountability of waste generators and various stakeholders, give thrust to segregation, recovery, reuse, recycle at source, address in detail the management of construction and demolition waste.

And whereas, the draft rules, namely, the Solid Waste Management Rules, 2015 with a separate chapter on construction and demolition waste were published by the Central Government in the Ministry of Environment, Forest and Climate Change vide G.S.R. 451 (E), dated the 3rd June, 2015 inviting objections or suggestions from the public within sixty days from the date of publication of the said notification;

And Whereas, the objections or suggestions received within the stipulated period were duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sections 6, 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Municipal Solid Wastes (Management and Handling) Rules, 2000, except as respect things done or omitted to be done before such supersession, the Central Government hereby notifies the following rules for Management of Construction and Demolition Waste –

1. Short title and commencement.—(1) These rules shall be called the Construction and Demolition Waste Management Rules, 2016.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Application.—The rules shall apply to every waste resulting from construction, re-modeling, repair and demolition of any civil structure of individual or organisation or authority who generates construction and demolition waste such as building materials, debris, rubble.

3. Definitions —(1) In these rules, unless the context otherwise requires,–

(a) “ ACT” means the Environment (Protection) Act, 1986 (29 of 1986);

(b) "**construction**" means the process of erecting of building or built facility or other structure, or

building of infrastructure including alteration in these entities,;

- (c) **"construction and demolition waste"** means the waste comprising of building materials, debris and rubble resulting from construction, re-modeling, repair and demolition of any civil structure;
 - (d) **"de-construction"** means a planned selective demolition in which salvage, re-use and recycling of the demolished structure is maximized;
 - (e) **"demolition"** means breaking down or tearing down buildings and other structures either manually or using mechanical force (by various equipment) or by implosion using explosives.
 - (f) **"form"** means a **Form annexed to these rules;**
 - (g) **"local authority"** means an urban local authority with different nomenclature such as municipal corporation, municipality, nagarpalika, nagarnigam, nagarpanchayat, municipal council including notified area committee and not limited to or any other local authority constituted under the relevant statutes such as gram panchayat, where the management of construction and demolition waste is entrusted to such agency;
 - (h) **"schedule"** means a schedule annexed to these rules;
 - (i) **"service provider"** means authorities who provide services like water, sewerage, electricity, telephone, roads, drainage etc. often generate construction and demolition waste during their activities, which includes excavation, demolition and civil work;
 - (j) **"waste generator"** means any person or association of persons or institution, residential and commercial establishments including Indian Railways, Airport, Port and Harbour and Defence establishments who undertakes construction of or demolition of any civil structure which generate construction and demolition waste.
- (2) Words and expressions used but not defined herein shall have the same meaning defined in the ACT.

(4) Duties of the waste generator -

- (1) Every waste generator shall prima-facie be responsible for collection, segregation of concrete, soil and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority in consonance with these rules.
- (2) The generator shall ensure that other waste (such as solid waste) does not get mixed with this waste and is stored and disposed separately.
- (3) Waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar and shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work and keep the concerned

authorities informed regarding the relevant activities from the planning stage to the implementation stage and this should be on project to project basis.

(4) Every waste generator shall keep the construction and demolition waste within the premise or get the waste deposited at collection centre so made by the local body or handover it to the authorised processing facilities of construction and demolition waste; and ensure that there is no littering or deposition of construction and demolition waste so as to prevent obstruction to the traffic or the public or drains.

(5) Every waste generator shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities; Waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month shall have to pay for the processing and disposal of construction and demolition waste generated by them, apart from the payment for storage, collection and transportation. The rate shall be fixed by the concerned local authority or any other authority designated by the State Government.

(5) Duties of service provider and their contractors -

(1) The service providers shall prepare within six months from the date of notification of these rules, a comprehensive waste management plan covering segregation, storage, collection, reuse, recycling, transportation and disposal of construction and demolition waste generated within their jurisdiction.

(2) The service providers shall remove all construction and demolition waste and clean the area every day, if possible, or depending upon the duration of the work, the quantity and type of waste generated, appropriate storage and collection, a reasonable timeframe shall be worked out in consultation with the concerned local authority.

(3) In case of the service providers have no logistics support to carry out the work specified in sub-rules (1) and (2) , they shall tie up with the authorised agencies for removal of construction and demolition waste and pay the relevant charges as notified by the local authority.

(6) Duties of local authority-The local authority shall,-

(1) issue detailed directions with regard to proper management of construction and demolition waste within its jurisdiction in accordance with the provisions of these rules and the local authority shall seek detailed plan or undertaking as applicable, from generator of construction and demolition waste;

(2) chalk out stages, methodology and equipment, material involved in the overall activity and final clean up after completion of the construction and demolition ;

(3c) seek assistance from concerned authorities for safe disposal of construction and demolition waste contaminated with industrial hazardous or toxic material or nuclear waste if any;

(4) shall make arrangements and place appropriate containers for collection of waste and shall remove at regular intervals or when they are filled, either through own resources or by appointing private operators;

- (5) shall get the collected waste transported to appropriate sites for processing and disposal either through own resources or by appointing private operators;
- (6) shall give appropriate incentives to generator for salvaging, processing and or recycling preferably in-situ;
- (7) shall examine and sanction the waste management plan of the generators within a period of one month or from the date of approval of building plan, whichever is earlier from the date of its submission;
- (8) shall keep track of the generation of construction and demolition waste within its jurisdiction and establish a data base and update once in a year;
- (9) shall device appropriate measures in consultation with expert institutions for management of construction and demolition waste generated including processing facility and for using the recycled products in the best possible manner;
- (10) shall create a sustained system of information, education and communication for construction and demolition waste through collaboration with expert institutions and civil societies and also disseminate through their own website;
- (11) shall make provision for giving incentives for use of material made out of construction and demolition waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads.

(7) Criteria for storage, processing or recycling facilities for construction and demolition waste and application of construction and demolition waste and its products-

- (1) The site for storage and processing or recycling facilities for construction and demolition waste shall be selected as per the criteria given in **Schedule I**;
- (2) The operator of the facility as specified in sub- rules (1) shall apply in **Form I** for authorization from State Pollution Control Board or Pollution Control Committee.
- (3) The operator of the facility shall submit the annual report to the State Pollution Control Board in **Form II**.
- (3) Application of materials made from construction and demolition waste in operation of sanitary landfill shall be as per the criteria given in **Schedule II**.

(8) Duties of State Pollution Control Board or Pollution Control Committee-

- (1) State Pollution Control Board or Pollution Control Committee shall monitor the implementation of these rules by the concerned local bodies and the competent authorities and the annual report shall be sent to the Central Pollution Control Board and the State Government or Union Territory or any other State level nodal agency identified by the State Government or Union Territory administration for generating State level comprehensive data. Such reports shall also contain the comments and suggestions of the State Pollution Control Board or Pollution Control Committee with respect to any comments or changes required;

(2) State Pollution Control Board or Pollution Control Committee shall grant authorization to construction and demolition waste processing facility in **Form-III** as specified under these rules after examining the application received in **Form I**;

(3) State Pollution Control Board or Pollution Control Committee shall prepare annual report in **Form IV** with special emphasis on the implementation status of compliance of these rules and forward report to Central Pollution Control Board before the 31st July for each financial year.

(9) Duties of State Government or Union Territory Administration-

(1) The Secretary in-charge of development in the State Government or Union territory administration shall prepare their policy document with respect to management of construction and demolition of waste in accordance with the provisions of these rules within one year from date of final notification of these rules.

(2) The concerned department in the State Government dealing with land shall be responsible for providing suitable sites for setting up of the storage, processing and recycling facilities for construction and demolition waste.

(3) The Town and Country planning Department shall incorporate the site in the approved land use plan so that there is no disturbance to the processing facility on a long term basis.

(4) Procurement of materials made from construction and demolition waste shall be made mandatory to a certain percentage (say 10-20%) in municipal and Government contracts subject to strict quality control.

(10) Duties of the Central Pollution Control Board - (1) The Central Pollution Control Board shall,-

(a) prepare operational guidelines related to environmental management of construction and demolition waste management;

(b) analyze and collate the data received from the State Pollution Control Boards or Pollution Control Committee to review these rules from time to time;

(c) coordinate with all the State Pollution Control Board and Pollution Control Committees for any matter related to development of environmental standards;

(d) forward annual compliance report to Central Government before the 30th August for each financial year based on reports given by State Pollution Control Boards of Pollution Control Committees.

(11) Duties of Bureau of Indian Standards and Indian Roads Congress -The Bureau of Indian Standards and Indian Roads Congress shall be responsible for preparation of code of practices and standards for use of recycled materials and products of construction and demolition waste in respect of construction activities and the role of Indian Road Congress shall be specific to the standards and practices pertaining to construction of roads.

Schedule III
Timeframe for Planning and Implementation
[See Rule 13]

Sl. No.	Compliance Criteria	Cities with population of 01 million and above	Cities with population of 0.5-01 million	Cities with population of less than 0.5 million
1	Formulation of policy by State Government	12 months	12 months	12 months
2	Identification of sites for collection and processing facility	18 months	18 months	18 months
3	Commissioning and implementation of the facility	18 months	24 months	36 months
4	Monitoring by SPCBs	3 times a year – once in 4 months	2 times a year – once in 6 months	2 times a year – once in 6 months

**The time Schedule is effective from the date of notification of these rules.*

FORM – I
See [Rule 7 (2)]

Application for obtaining authorisation

To,
The Member Secretary

_____ Name of the local authority or Name of the agency :
appointed by the municipal authority

Correspondence address Telephone No. Fax No.	
Nodal Officer and designation (Officer authorized by the competent authority or agency responsible for operation of processing or recycling or disposal facility)	
Authorisation applied for (Please tick mark)	Setting up of processing or recycling facility of construction and demolition waste
Detailed proposal of construction and demolition waste processing or recycling facility to include the following Location of site approved and allotted by the Competent Authority. Average quantity (in tons per day) and composition of construction and demolition waste to be handled	

Appendix 8: Salient Feature of Major Labor Laws Applicable

- (i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.
- (iv) Maternity Benefit Act, 1951 - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (v) Contract Labour (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.
- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.
- (vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (viii) Equal Remuneration Act, 1979 - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.
- (x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

(xi) Industrial Employment (Standing Orders) Act, 1946 - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.

(xii) Trade Unions Act, 1926 - The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(xiii) Child Labor (Prohibition and Regulation) Act, 1986 - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labor is prohibited in Building and Construction Industry.

(xiv) Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc

(xv) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 - All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

Appendix 9: Drinking Water Standards – National Standards

S.No.	Substance or characteristic	Indian Standards				WHO Guideline
		Requirement Desirable limit	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate Source	Remarks	
	Essential Characteristics					
1.	Color Hazen Units, Max	5	Above 5, consumer acceptance decreases	25	Extended to 25 only if toxic Substance are not suspect in absence of alternate sources	
2.	Odour	Unobjectionable	-	-	a) test cold and when heated b) test are several dilutions	
3.	Taste	Agreeable	-	-	Test to be conducted only after safety has been established	
4.	Turbidity (NTU) Max	5	Above 5, consumer acceptance decreases	10	-	1 NTU
5.	pH value	6.5 to 8.5	Beyond this range the water will affect the mucous membrane and/or water supply system	No relaxation	-	6.5 – 8.5
6.	Total Hardness (mg/L) CaCO ₃	300	Encrustation in water supply structure and adverse effects on domestic use	600	-	200 mg/l
7.	Iron (mg/L, Fe) Max	0.3	Beyond this limit taste/appearance are affected; has adverse effects on domestic uses and water supply structure and promotes iron bacteria	1.0	-	0.3 mg/l
8.	Chlorides 250 (mg/L, Cl) Max	250	Beyond this limit taste, corrosion and	1000	-	

S.No.	Substance or characteristic	Indian Standards				WHO Guideline
		Requirement Desirable limit	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate Source	Remarks	
			palatability are affected.			
9.	Residual free Chlorine (mg/L), Max	0.2	-	-	To be applicable only when water is chlorinated. Tested at customer end. When protection against viral infection is required, it should be min. 0.5 mg/L.	0.2 mg/l
	Desirable Characteristics					
10.	Dissolved solids mg/L. Max	500	Beyond this, palatability decreases and may cause gastrointestinal irritation.	2000	-	
11.	Calcium (mg/L, Ca) Max.	75	Encrustation in water supply structure and adverse effects on domestic use.	200	-	
12.	Magnesium (mg/L, Mg) Max	30	Encrustation in water supply structure and adverse effects on domestic use.	100	-	
13.	Copper (mg/L, Cu) Max	0.05	Astringent taste discoloration and corrosion of pipes fittings and utensils will be caused beyond this.	1.5	-	
14.	Manganese (mg/L, Mn) Max	0.1	Beyond this limit taste/appearance are affected, has adverse effect on domestic use and water supply structure	0.3	-	0.1 mg/l

S.No.	Substance or characteristic	Indian Standards				WHO Guideline
		Requirement Desirable limit	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate Source	Remarks	
15.	Sulphate (mg/L, SO ₄) Max.	200	Beyond this causes gastro intestinal irritation when magnesium or sodium are present	400	May be extended up to 400 provided magnesium (as Mg) does not exceed 30	250 mg/l
16.	Nitrate (mg/L, NO ₃) Max.	45	Beyond this methaemoglobinemia takes place.	100	-	50 mg/l
17.	Fluoride (mg/L, F) Max.	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis.	1.5	-	1.5 mg/l
18.	Phenolic Compounds (mg/L C ₆ H ₅ OH) Max.	0.001	Beyond this, it may cause objectionable taste and odour	0.002	-	
19.	Mercury (mg/L Hg) Max	0.001	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected	0.006 mg/l
20	Cadmium (mg/L, Cd) Max	0.003	Beyond this the water becomes toxic	No Relaxation.	To be tested when pollution is suspected	0.003 mg/l
21.	Selenium (mg/L, Se) Max	0.01	Beyond this the water becomes toxic.	No Relaxation.	To be tested when pollution is suspected	0.04 mg/l
22.	Arsenic (mg/L, As) Max.	0.01	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected	0.01 mg/l
23.	Cyanide	0.05	Beyond this the water becomes toxic	No Relaxation	To be tested when pollution is suspected	
24.	Lead (mg/L Pb) Max.	0.01	Beyond this the water becomes toxic	No Relaxation	To be tested when	0.01 mg/l

S.No.	Substance or characteristic	Indian Standards				WHO Guideline
		Requirement Desirable limit	Undesirable effect outside the desirable limit	Permissible limit in the absence of alternate Source	Remarks	
					pollution is suspected	
25.	Zinc (mg/L, Zn) Max.	5	Beyond this limit it can cause astringent taste and an opalescence in water	15	To be tested when pollution is suspected	4 mg/l
26.	Anionic detergents (mg/L, MBAS) Max	0.2	Beyond this limit it can cause a light froth in water	1.0	To be tested when pollution is suspected	
27.	Chromium (mg/L, Cr6+)	0.05	May be carcinogenic above this limit	-	-	0.05 mg/l
28.	Polynuclear Aromatic Hydrocarbons (mg/l, PAH) Max	-	May be carcinogenic	-	-	
29.	Mineral oil (mg/L)	0.01	Beyond this limit, undesirable taste and odour after chlorination takes place	0.03	To be tested when pollution is suspected	
30.	Pesticides (mg/L) max	Absent	Toxic	0.001	-	
	Radioactive materials					
31.	Alpha emitters Bq/L Max	-	-	0.1	-	
32.	Beta emitters Pci/L Max	-	-	1.0	-	
33.	Alkalinity (mg/L,) Max	200	Beyond this limit, taste becomes unpleasant	600	-	
34.	Aluminum (mg/L, Al) Max	0.03	Cumulative effect is reported to cause dementia	0.2		
35.	Boron (mg/L) Max	1.0	-	5.0	-	2.4 mg/l

Appendix 10: Stakeholder Consultations and Participant's List



FGD with Youth in Punjabi bagh



Community level FGD in a slum dwelling

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

Date:	1.2.18	Venue:	Sheesh Mahal, Shalimar Bagh
S.No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
	District Park D Block Shalimar Bagh	Saini Sahib	
	S. C. Khaduri	Man Singh	SL
	Env Specialist PMC-PWSII	Ram Bahadur	
		Sheesh Mahal is a	
		ASI protected monument	
		in about 0.3 hectare land	
		properly fenced by wall	
		with steel fencing.	
		and outer area is	
		well fenced as is	
		a MC & maintained	
		park in about 20	
		hectare area.	
		The park is named	
		as District Park	
		D Block Shalimar Bagh.	

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

ate: 26.2.18 Venue: Sewa Basti, Subhash Chandra Laxmanee

No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
1	Shibu Thakur		<i>Shibu Thakur</i>
2	Raghvender		<i>राघवेंद्र</i>
3	Anura Devi		<i>(Signature)</i>
4	Chandamathi		<i>(Signature)</i>
	Anurag		<i>Anurag</i>
	Apt Kumar		<i>अपत कुमार</i>
	Aaksh		<i>Aaksh</i>
	Arun		<i>Arjun officer</i>
	Harsh		<i>harsh</i>
	Nitesh		<i>(Signature)</i>
	Subhash		<i>Subhash</i>
	Raj Ram		

S. C. Khundor
Env. Specialist

(Signature)

Lead
near
Dada
Derta
Shir
Mandir

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

Date: 26.2.18 Venue: Sewa Basti, Subhash Chandra Lonsane

S.No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
1	Shibu Thakur	① There is water crisis in the area as piped water supply ^{got} interrupted since last two months.	<i>Shibu Thakur</i>
2	Raghuender	② Colony have 03 India Mark-2 hand pumps as alternative to W/S	<i>Raghuender</i>
3	Anara Devi	③ Proposed W/S ^{aligned from this area} seems unfeasible as there are habitation above the pipe line and no open space available in the area.	<i>(Signature)</i>
4	Chandawati	④ Informed community about proposed and possible in convenience.	<i>(Signature)</i>
5	Anusag	⑤ W/S from the work unsatisfactory as per the users interaction during public consultation	<i>Anusag</i>
6	Ajit Kumar	⑥ Community resides in the area for last 03 decades.	<i>Ajit Kumar</i>
7	Aaksh	⑦ Having ^{type} in packet and semi packet with G.I.	<i>Aaksh</i>
8	Arun	⑧ For an improved water supply community assured to provide all possible support for construction work.	<i>Arun</i>
9	Harsh		<i>harsh</i>
10	Nitesh		<i>(Signature)</i>
11	Subhash		<i>Subhash</i>
12	Rajaram		

⑬ S.C. Khanduori
Env. Specialist P.M.C

⑭ Dr. K. Singh
Social Safeguards

⑮ Nibash

(Signature)
(Signature)

Appendix 11: Sample Outline Spoils (Construction waste) Management Plan

1. The Spoil Management Plan should be site specific and be part of the monthly Construction Management Plan.
2. The contractor, in consultation with the PIU, has to find out appropriate location/s for the disposal of the excess soil generated. The spoils should be deposited only at these sites.
3. Further precautions need to be taken in case of the contaminated spoils
4. The vehicle carrying the spoil should be covered properly.
5. The spoils generating from each site should be removed on the same day or immediately after the work is complete. The site / road should be restored to the original condition.

I. Spoils information

The spoil information contains the details like a) The type / material, b) Potential contamination by that type, c) Expected volume (site / component specific), d) Spoil Classification etc.

II. Spoils management

The Spoil Management section gives the details of a) Transportation of spoil b) disposal site details c) Precautions taken d) Volume of contaminated spoil, if present, d) Suggested reuse of disposal of the spoil

III. Documentation

The volume of spoil generated (site specific, date wise), site disposed, reuse / disposal details should be documented properly.

Appendix 12: Sample Outline Traffic Management Plan

A. Principles for TMP around the Water Pipes Construction Sites

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

- (i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
- (ii) protection of work crews from hazards associated with moving traffic;
- (iii) mitigation of the adverse impact on road capacity and delays to the road users;
- (iv) maintenance of access to adjoining properties; and
- (v) addressing issues that may delay the project.

B. Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

- (i) Make traffic safety and temporary traffic control an integral and high-priority element of project from planning through design, construction, and maintenance.
- (ii) Inhibit traffic movement as little as possible.
- (iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
- (iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
- (v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
- (vi) Train all persons that select, place, and maintain temporary traffic control devices.
- (vii) Keep the public well informed.
- (viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

3. **Figure A2 to Figure A12** illustrates the operating policy for TMP for the construction of water pipes and the sewers along various types of roads.

C. Analyze the impact due to street closure

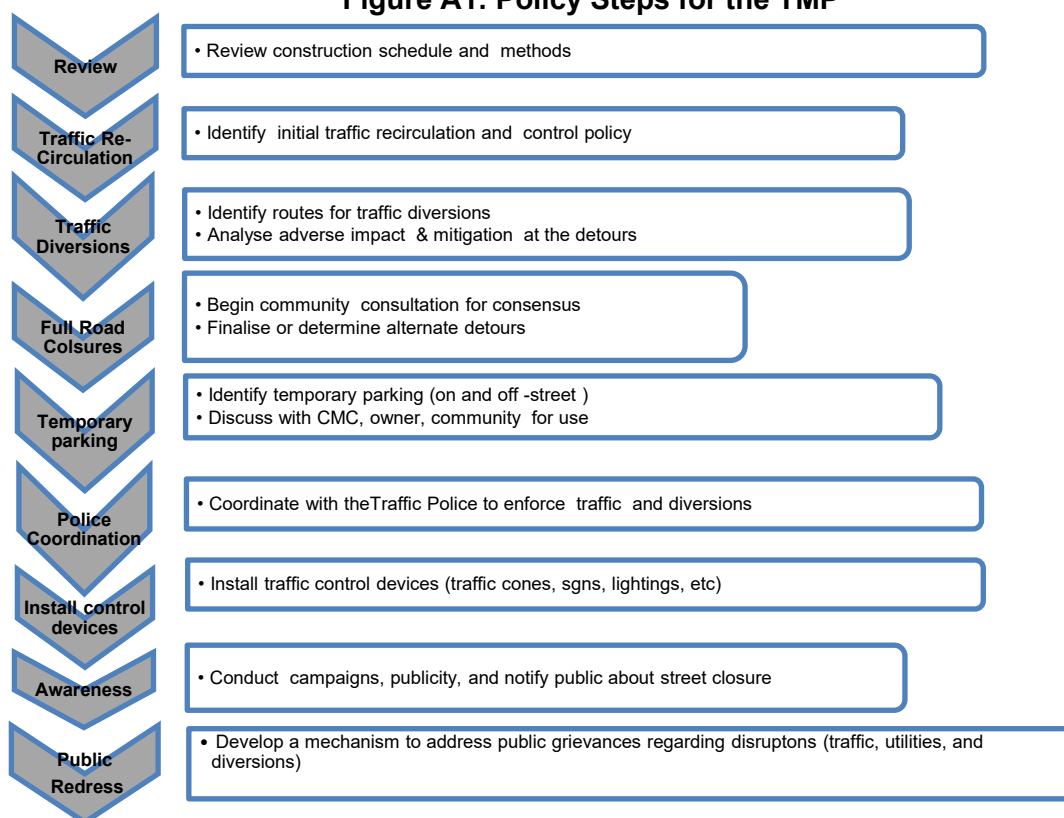
4. Apart from the capacity analysis, a final decision to close a particular street and divert the traffic should involve the following steps:

- (i) approval from the ULB/Public Works Department (PWD) to use the local streets as detours;
- (ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
- (iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;

- (iv) determining if additional traffic control or temporary improvements are needed along the detour route;
- (v) considering how access will be provided to the worksite;
- (vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and
- (vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

5. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the detour street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Figure A1: Policy Steps for the TMP



D. Public awareness and notifications

6. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The PIU will also conduct an awareness campaign to educate the public about the following issues:

- (i) traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
- (ii) defensive driving behaviour along the work zones; and
- (iii) reduced speeds enforced at the work zones and traffic diversions.

8. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

9. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centres. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

- (i) explain why the brochure was prepared, along with a brief description of the project;
- (ii) advise the public to expect the unexpected;
- (iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
- (iv) educate the public about the safe road user behaviour to emulate at the work zones;
- (v) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
- (vi) indicate the office hours of relevant offices.

E. Install traffic control devices at the work zones and traffic diversion routes

10. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

- Signs
- Pavement Markings
- Channelizing Devices
- Arrow Panels
- Warning Lights

11. Procedures for installing traffic control devices at any work zone vary, depending on road configuration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such, the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs (temporary “STOP” and “GO”).

12. **Figure A2 to Figure A6** illustrates a typical set-up for installing traffic control devices at the work zone of the area, depending on the location of work on the road way, and road geometrics:

- Work on shoulder or parking lane
- Shoulder or parking lane closed on divided road
- Work in Travel lane
- Lane closure on road with low volume
- Street closure with detour

13. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required for delineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporary STOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

14. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should be equipped with reflective jackets at all times and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

16. In addition to the delineation devices, all the construction workers should wear fluorescent safety vests and helmets in order to be visible to the motorists at all times. There should be provision for lighting beacons and illumination for night constructions.

Figure A2 & A3: Work on shoulder or parking lane & Shoulder or parking lane closed on divided road

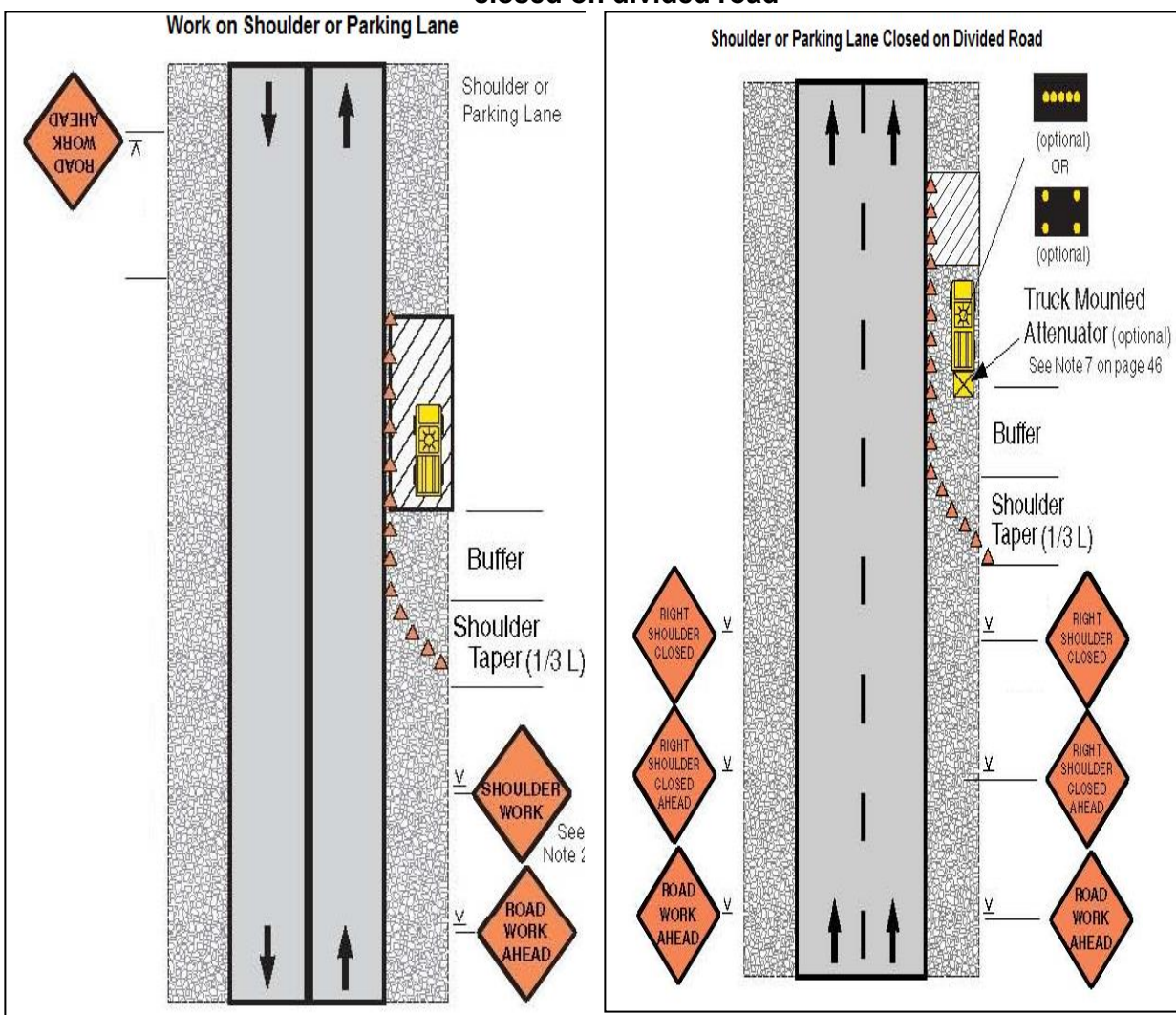


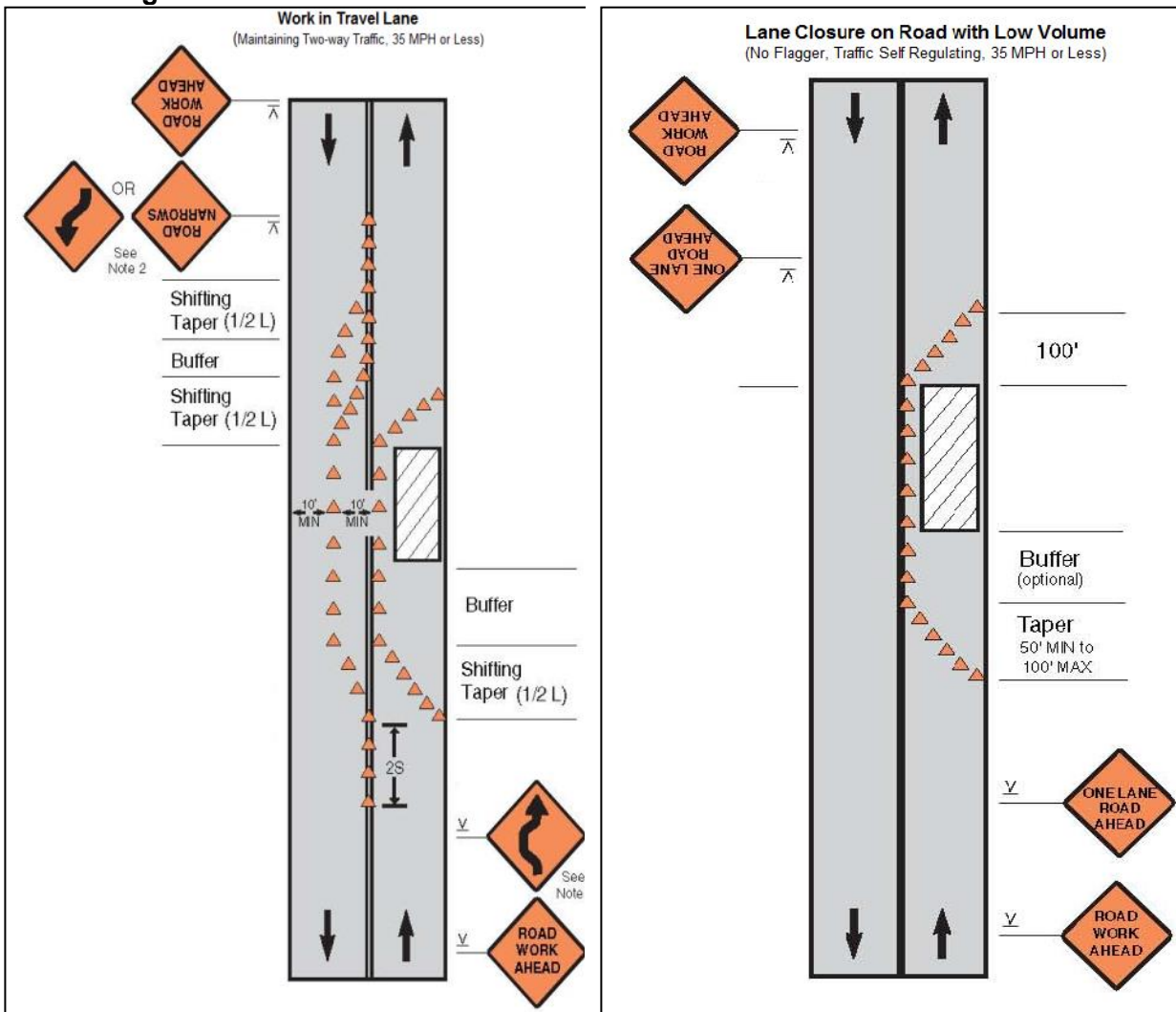
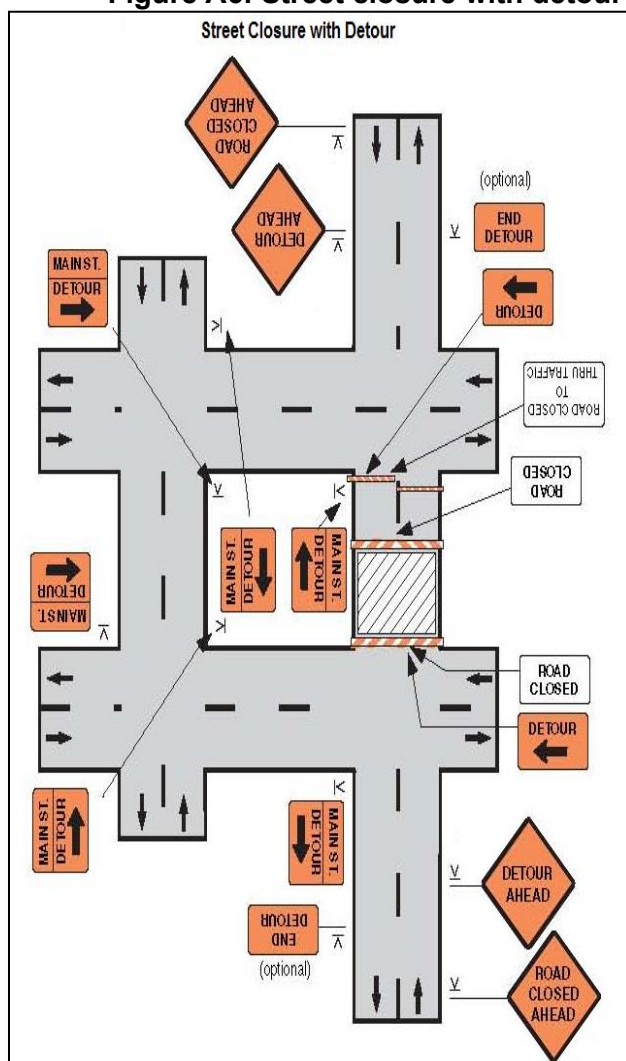
Figure A4 & A5: Work in Travel lane & Lane closure on road with low volume

Figure A6: Street closure with detour

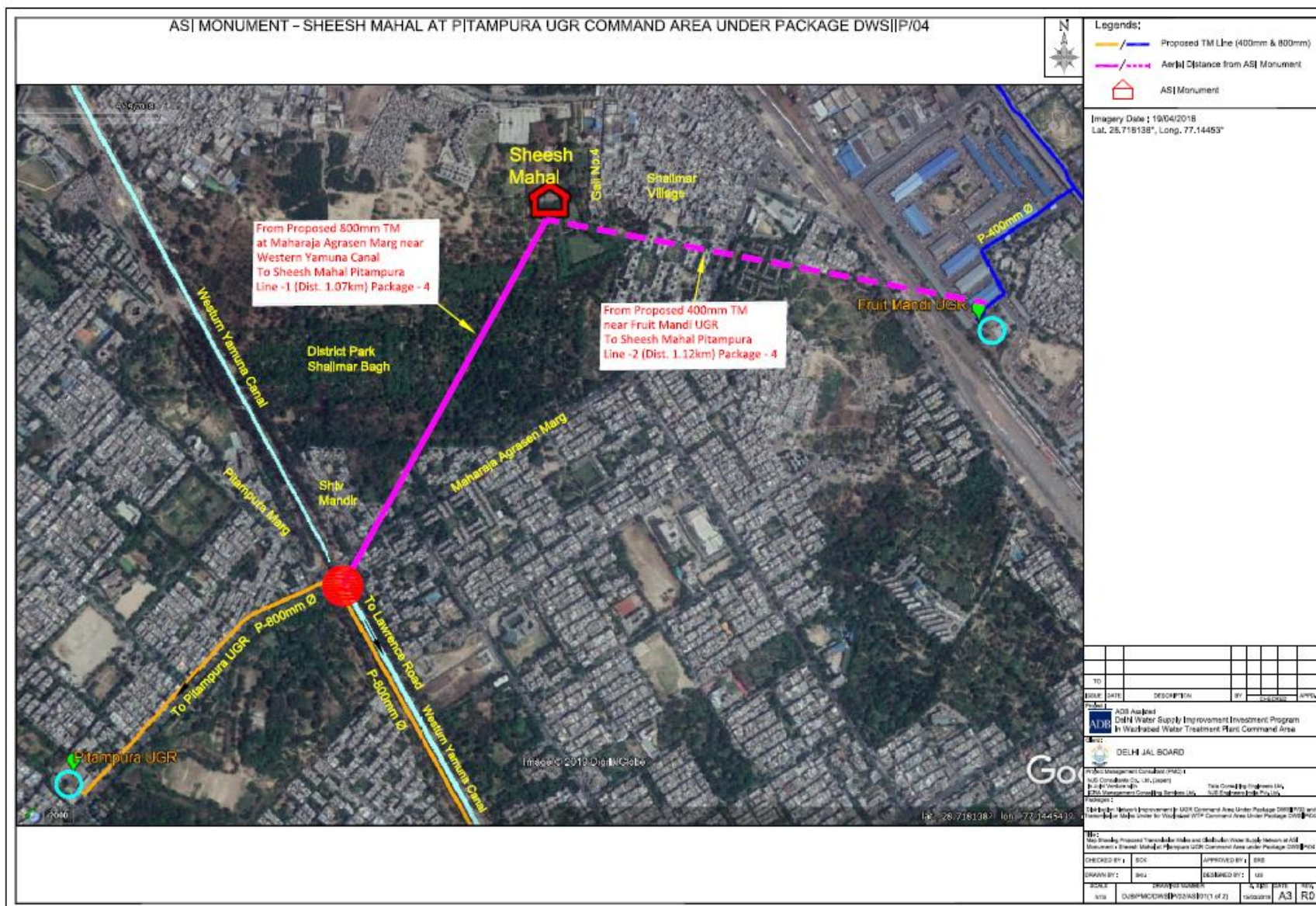


Appendix 13: Details of Trees

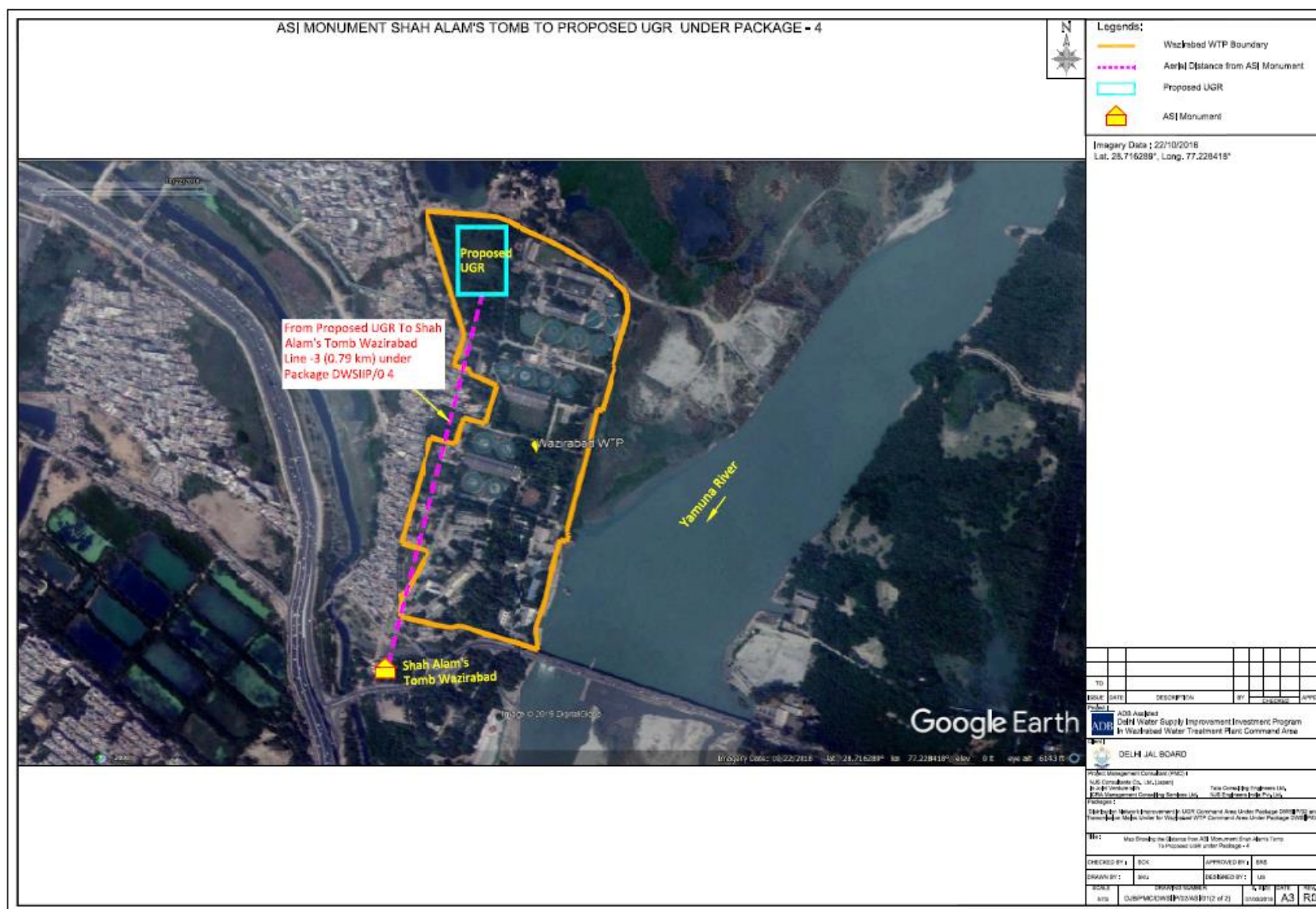
Details of Trees along the proposed alignment						
S. No	Details of the area	DPR Drawing number	Details of Trees (Number- width wise)			
			30 to 60 Cm	61 to 90 Cm	91 to 120 Cm	121 Cm and above
1	Proposed Transmission mains line 1500-700 mm (from Area near Gopalpur drain steel bridge to Peera Garhi UGR via Punjabi Bagh UGR	10-A	13	2	6	4
2	Proposed Transmission main line (1400mm to 800 mm) WTP Wazirabad to Burari-A UGR	10- B	14	24	12	0
3	Proposed Transmission main line (500 mm) existing transmission main line 1100 mm Avtar Marg to Mukherjee Nagar UGR	10- C	0	0	0	0
4	Proposed Transmission main line (600 mm) from 1500 mm transmission main line 1100 mm from Azad Pur Flyover to Model town UGR	10 -D	0	0	0	0
5	Proposed Transmission main line (400 mm) from existing 900 mm transmission main line near metro pillar no 106 on GT Karnal road to fruit mandi Azadpur UGR	10- E	0	0	0	0

Details of Trees along the proposed alignment						
S. No	Details of the area	DPR Drawing number	Details of Trees (Number- width wise)			
			30 to 60 Cm	61 to 90 Cm	91 to 120 Cm	121 Cm and above
6	Proposed Transmission main line (700 mm) from 700 mm transmission main Jhangirpuri Metro station to CD park Jhangirpuri UGR	10-F	1	1	0	0
7	Proposed Transmission main line (800 mm) from transmission main Jhangirpuri Metro station to Sanjay Gandhi Transport Nagar UGR	10 -G	1	1	0	1
8	Proposed Transmission main line (800 mm) from transmission main Prembari bridge to Pitampura UGR	10-H	11	8	6	4
9	Proposed Transmission main line (900 mm) from transmission main Prembari bridge to Lawrnce road UGR	10-I	0	6	3	0
11	Proposed Transmission main line (900 mm) from transmission main Azadpur underpass to site near Jhangirpuri metro station	10- k	0	3	0	0
12	UGR sites		20	24	13	26
Total			60	69	40	35
Grand Total			204			

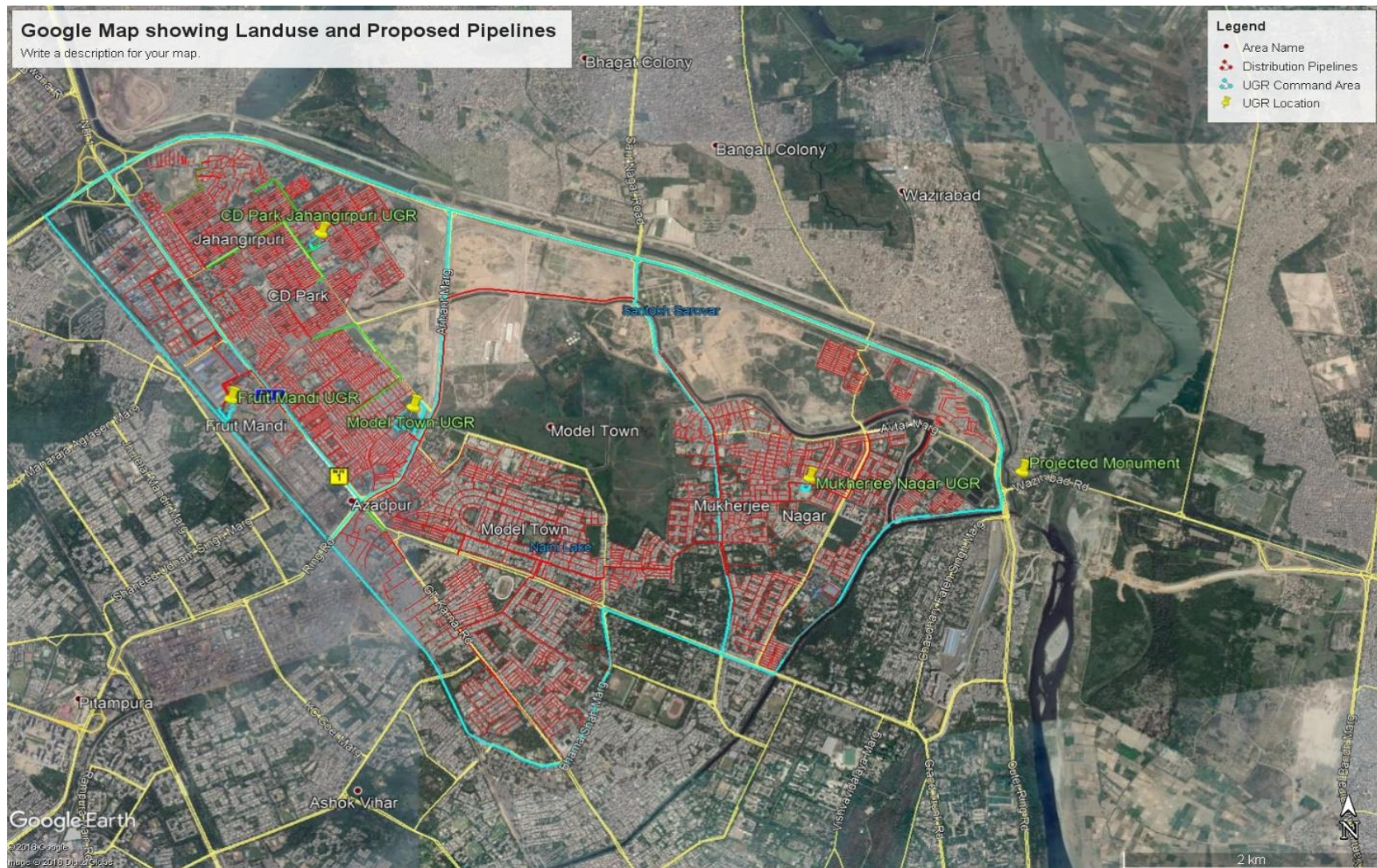
Appendix 14: Archeological Survey of India sites under Sub Project



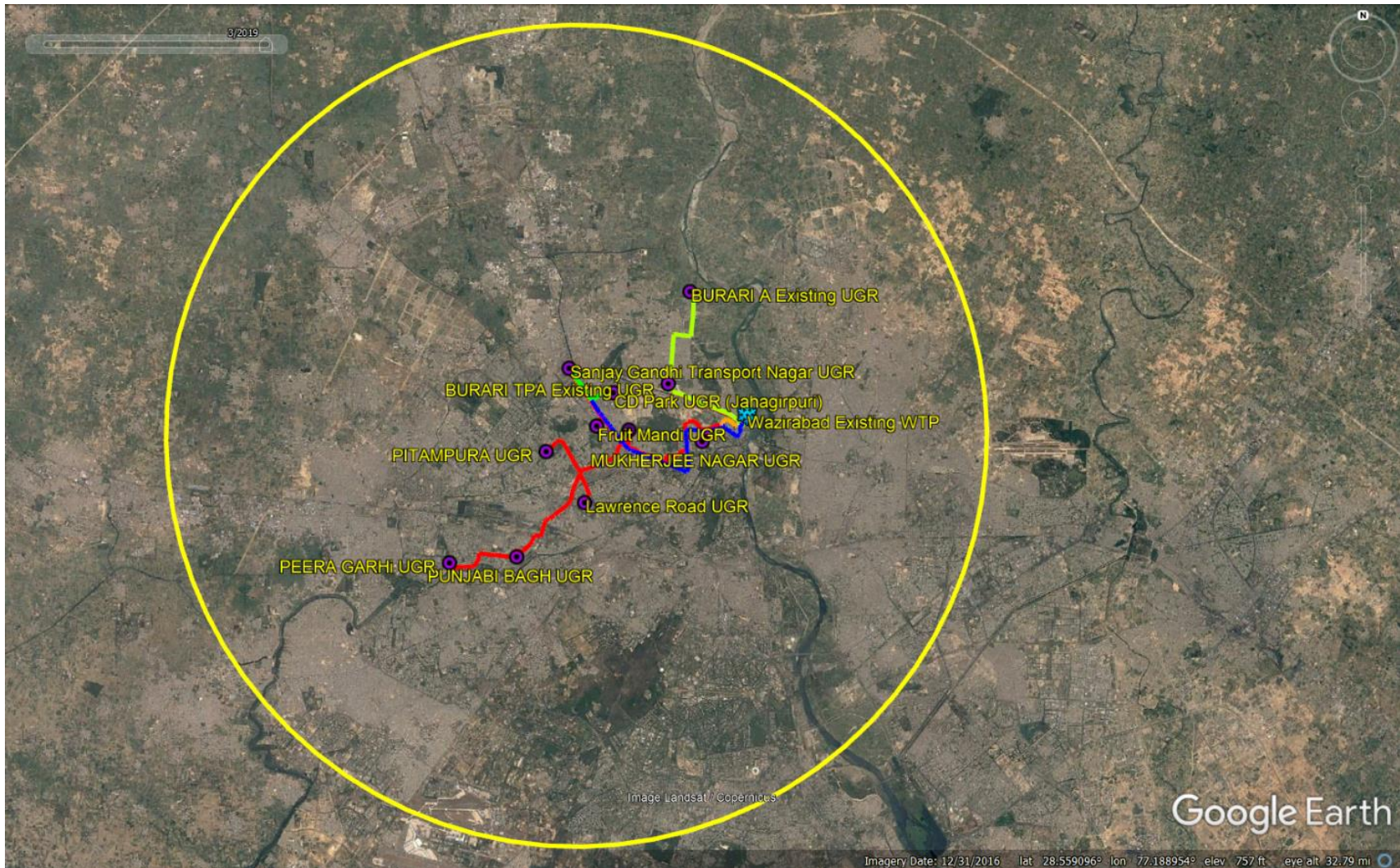
Appendix 15: Archeological Survey of India Site Shah Alam Tomb from Project Location



Appendix 16: Google map showing the proposed alignment and land use pattern



Appendix 17: Sub Project Area on Googel Map



Appendix 18: Details of Public Consultation

Details of Consultations held along the proposed alignment of Transmission mains						
S. No	Details of the Area	Site of Consultation	Date of Pubic Consultation	Type of Locality	Major Queries Raised	Reponses of the Program Authorities
1	Proposed Transmission mains line 1500-700 mm (from Area near Gopalpur drain steel bridge to Peeragadhi UGR via Punjabi bagh UGR	Near Wazirabad WTP, Central market Punjabi Bagh	28.02.2018, 5.3.2018, 01.03.2018	Medium income grade and low income grade community	1. Low water pressure and limited supply hours 2. Blockage of narrow roads and traffic congestion issues	1. After installation of new transmission line there will be adequate pressure in the distribution lines 2. Provision of trenchless technology on major road crossing and TMP to minimize the impacts
2	Proposed Transmission main line (1400mm to 800 mm) WTP Wazirabad to Buradi-A UGR	WTP wazirabad	06.04.2019	Medium income grade and low income grade community	3. Season variation in Water quality as per ocular observation	3. Provision of adequate water testing by the DBOC aster commissioning of the scheme
3	Proposed Transmission main line (500 mm) existing transmission main line 1100 mm Avatar Marg to Mukherjee Nagar UGR	Sant Srikrishna govind Nagar, Mukereree Nagar	04.02.2019	Medium income grade and low income grade community	4. Prolonged construction activities causing many inconveniences	4. As it's an ADB funded project so there will be no delay in the construction due to adequate funds and supervision staffing provision
4	Proposed Transmission main line (600 mm) from 1500 mm transmission main line 1100 mm from Azardpur Flyover to Model town UGR	DDA Colony, DDA colony Azadpur market	06.04.2019, 22.02.2018	Medium income grade and low income grade community	5. No information about the closure of roads /lanes/disruption in transport facility	5. An agency will be deployed for regular consultations and registering as well as redressal of any of the grievances by the

Details of Consultations held along the proposed alignment of Transmission mains						
S. No	Details of the Area	Site of Consultation	Date of Public Consultation	Type of Locality	Major Queries Raised	Responses of the Program Authorities
5	Proposed Transmission main line (400 mm) from existing 900 mm transmission main line near metro pillar no 106 on GT karnal road to fruit Mandy Azadpur UGR	Near Azadpur Fruit Mandy	07.12.2018	Medium income grade and low income grade community	<p>6. Problem of noise and spread of dust particles during construction works may cause health problems to children and aged population</p> <p>7. What is the scope of work under the program and the construction package.</p> <p>8. Enquired about the implementation arrangements of the projects</p>	<p>community, the three level of GRM process explained to the community</p> <p>6. Provision of dust screens/water sprinkling and periodic monitoring of Air quality will ensure that Air quality is not getting deteriorated due the construction activities</p> <p>7. Explained the objective of DWSIIP and various activities like laying of transmission mains, distribution mains, construction of UGRs, installation of new pumps and machine, SCADA system and DMA approach to the potential consumers along with tentative timeline of program activities</p> <p>8. Explained about the PIU/PMU/PMC/D BOC and GoDNCR</p>

Details of Consultations held along the proposed alignment of Transmission mains						
S. No	Details of the Area	Site of Consultation	Date of Pubic Consultation	Type of Locality	Major Queries Raised	Reponses of the Program Authorities
					<p>9. Possibilities of getting water connections in the slum community</p> <p>10. Problem of water quality in the supplied water</p> <p>11. Enquiry about the increase in tariff and water bills</p> <p>12. Role of community in O&M operations</p>	<p>9. Explained the procedure s per DJB rules and informed that DWSIIP have kept the target of 100% metered connections to all households</p> <p>10. Clarified that as per EMP which is the integral part of project the water from the HSC and other CWR/distributio n points will be regularly analyzed to ensure that users get water supply as per IS10500</p> <p>11. Clarified that all the HSC will be made metered under DWSIIP so that all can access water to fulfill their requirement and the tariff will be corresponding to water consumption as per DJB tariff policy</p> <p>12. It was explained that for effective service delivery user community should come forward to take water connections,</p>

Details of Consultations held along the proposed alignment of Transmission mains						
S. No	Details of the Area	Site of Consultation	Date of Pubic Consultation	Type of Locality	Major Queries Raised	Reponses of the Program Authorities
					<p>13. Provision about community awareness program area</p> <p>14. Subproject duration</p> <p>15. Adoption of new technology under the project to improve the efficiency and to reduce the carbon foot prints</p> <p>16. Requirements of sullage drains/UGD facility due to additional/improved level of services and requirements of SLWM</p>	<p>pay tariff regularly, and inform about the service breakdowns timely</p> <p>13. An agency named CMRC will be mobilized under the project to oversee the community outreach of project. Conducting community consultations, facilitate in GRM system etc,</p> <p>14. The project duration will be of 48 months followed with 120 months operation phase</p> <p>15. DMA approach, SCADA system, 100% metered connections, trenchless technology for laying of pipelines are few forward</p> <p>16. Explained that basically SLWM/drainage facilities are not part of the scope of DWSIIP, but through outreach consultant</p>

Details of Consultations held along the proposed alignment of Transmission mains						
S. No	Details of the Area	Site of Consultation	Date of Pubic Consultation	Type of Locality	Major Queries Raised	Reponses of the Program Authorities
						attempts will be made to facilitate linking of needy consultant to governmental programs like SBM and Prime minister housing scheme for housing for poor people
6	Proposed Transmission main line (700 mm) from 700 mm transmission main Jhangirpuri Metro station to CD park Jhangirpuri UGR	Near Azadpur Fruit Mandy	07.12.2018	Medium income grade and low income grade community		
7	Proposed Transmission main line (800 mm) from transmission main Jhangirpuri Metro station to Sanjay Gandhi Transport Nagar UGR	Near WTP Wazirabad	05.03.2019	Medium income grade and low income grade community		
8	Proposed Transmission main line (800 mm) from transmission main Prembari bridge to Pitampura UGR	Near Azadpur Fruit Mandy	07.12.2018	Medium income grade and low income grade community		

Details of Consultations held along the proposed alignment of Transmission mains						
S. No	Details of the Area	Site of Consultation	Date of Public Consultation	Type of Locality	Major Queries Raised	Responses of the Program Authorities
9	Proposed Transmission main line (900 mm) from transmission main Prembari bridge to Lawrence road UGR	Lawrence Road, Gufa mahaadev Shiv mandir, Lawrence road seva basti-Subhash Chandra Bose, near dada Devta Shiv Mandir	05.03.2018, 22.06.2018, 28.02.2018	Medium income grade and low income grade community		
10	Proposed Transmission main line (800 mm to 250 mm) from transmission main baba colony gate to Burari B UGR	WTP Wazirabad area	05.03.2019	Medium income grade and low income grade community		
11	Proposed Transmission main line (900 mm) from transmission main Azadpur underpass to site near Jhangirpuri metro station	Colony near azadpur underpass	23.05.2019	Medium income grade and low income grade community		

Appendix 19: NOC for the laying of the pipelines on road sides



DELHI JAL BOARD : GOVT. OF NCT OF DELHI
 OFFICE OF THE EXECUTIVE ENGINEER (E&M)II
 WAZIRABAD WATER WORKS, TIMAR PUR DELHI 110054
 Phone No. 9650286020 ,Email : djbeeemii@gmail.com



NO: F-87/DJB/EE(E&M)II/2019/643

Dated: 18.06.2019

To, ✓
 NJS Consultant Co., Ltd.
 Project office:
 Gyan Awanue, 12, Pragati Market,
 Ashtok Vihar-II, Delhi 110052

Sub: Package DWSIIP/04: Regarding No Objection Certificate from PWD /
 MCD & Package DWSIIP/03/04: Request for Land Ownership Certificate
 for DDR.

Sir,

This is in reference to your letter no. PMC ADB DWSIIP/DJB /01.02/2019/776, 777 and 775 dated 18.06.2019. All construction works are initiated by the Civil Division. After completion of structure etc., E&M machineries are installed therein. Hence, all the NOCs from road owning agencies like PWD/MCD etc. are to be obtained by EE (Dwarka) WTP.

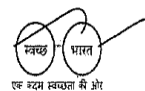
Further, as regards land ownership certificate is concerned, the Estate manager can take responsibility of ownership of the land within the WTP premises only. This applies to Package-3 and Package-4 both.

Executive Engineer(E&M)-II

Appendix 20: DJB's Certificate regarding Landownership



DELHI JAL BOARD:GOVT OF NCT OF DELHI
OFFICE OF THE EXECUTIVE ENGINEER(E&M)II
WAZIRABAD WATER WORKS,TIMARPUR, DELHI-110054



No:87/-DJB/EE(E&M)-II/WZD/2019/

Dated: 12.09.2019

TO WHOM IT MAY CONCERN

This is to certify that all new facilities (Clear Water Reservoir-CWR) and rehabilitation of existing facilities to be undertaken within the premises of Wazirabad WTP under ADB Assisted Delhi Water Supply Improvement Investment Program (DWSIIP) – Package DWSIIP/04 are within Delhi Jal Board land ownership.

Executive Engineer (E&M)-II

Appendix 21: World Bank Environmental and Social Safeguards

OP/BP	Safeguard	Policy objectives	Applicability to the Project
4.01	Environmental Assessment*	Help ensure the environmental and social soundness and sustainability of investment projects. Support integration of environmental and social aspects of projects in the decision-making process.	IEE is done as per project Scope of work
4.04	Natural Habitats*	Promote environmentally sustainable development by supporting the protection, conservation, maintenance, and rehabilitation of natural habitats and their functions.	Not Applicable
4.09	Pest Management	Minimize and manage the environmental and health risks associated with pesticide use and promote and support safe, effective, and environmentally sound pest management.	Not Applicable
4.11	Physical Cultural Resources (PCR)*	Assist in preserving PCR and in avoiding their destruction or damage. PCR includes resources of archeological, paleontological, historical, architectural, religious (including graveyards and burial sites), aesthetic, or other cultural significance.	Relevant national Laws shall be complied
4.12	Involuntary Resettlement*	Avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.	Shall be followed as per the Draft DDRs of the projects
4.20	Indigenous Peoples*	Design and implement projects in a way that fosters full respect for indigenous peoples' dignity, human rights, and cultural uniqueness and so that they (1) receive culturally compatible social and economic benefits, and (2) do not suffer adverse effects during the development process.	Not Applicable
4.36	Forests*	Realize the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests.	Not Applicable
4.37	Safety of Dams	Ensure quality and safety in the design and construction of new dams and the rehabilitation of existing dams, and in carrying out activities that may be affected by an existing dam.	Not Applicable for the sub-project
7.50	Projects on International Waterways	Ensure that the international aspects of a project on an international waterway are dealt with at the earliest possible opportunity and that riparians are notified of the proposed project and its details.	Not Applicable for the sub-project
7.60	Projects in Disputed Areas	Ensure that other claimants to the disputed area have no objection to the project, or that the special circumstances of the case warrant the Bank's support of the project notwithstanding any objection or lack of approval by the other claimants.	Not Applicable for the sub-project

Appendix 22: Sample Grievance Registration Form

(To be available in Hindi and English)

The _____ Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing ***(CONFIDENTIAL)*** above your name. Thank you.

Date	Place of registration	Project Town			
		Project:			
Contact information/personal details					
Name		Gender	* Male * Female	Age	
Home address					
Place					
Phone no.					
E-mail					
Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

For Official Use Only

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	

Appendix 23: Sample Environmental Site Inspection Report

Project Name
Contract
Number

NAME: _____ **DATE:** _____ **TITLE:** _____ **DMA:** _____

LOCATION: _____ **GROUP:** _____

WEATHER:

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Monitoring Items	Compliance
Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, schedule, equipment etc.,) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as and when required only	
Tarpaulins used to cover sand and other loose material when transported by vehicles	
After unloading, wheels and undercarriage of vehicles cleaned prior to leaving the site	
No AC pipes disturbed/removed during excavation	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying and backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided and public informed, information board provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	
Children safety measures (barricades, security) in place at works in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc)	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard and safe construction practices	

Monitoring Items	Compliance
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Toilet facility provided at the site	
Separate rate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet and bath facilities provided	
Contractor employed local workers as far as possible	
Workers camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work	
No blasting activity conducted	
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings	

Signature

Sign off

Name Position

Name Position

Appendix 24: Quarterly Reporting Format For PIU

1) Introduction

- Description of sub-project implemented by PIU
- Environmental category of the sub-project
- Details of site personnel and/or consultants responsible for environmental monitoring
- Sub-project status

No.	Sub-Project Name	Subproject status	List of Works	Progress of Works
		Design <input type="checkbox"/> Pre-Construction <input type="checkbox"/> Construction <input type="checkbox"/> Operational Phase <input type="checkbox"/>		

2) Compliance status with National/ State/ Local statutory environmental requirements

No.	Sub-Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

3) Compliance status with environmental loan covenants, if any

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

4) Compliance status with the environmental management and monitoring plan

- i. Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- ii. There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection needs to note and record the following:
 - a. What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries;
 - b. If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads;
 - c. adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intact following heavy rain;
 - d. Are their designated areas for concrete works, and refueling;
 - e. Are their spill kits on site and if there are site procedure for handling emergencies;

- f. Is there any chemical stored on site and what is the storage condition?
- g. Is there any dewatering activities if yes, where is the water being discharged;
- h. How are the stockpiles being managed;
- i. How is solid and liquid waste being handled onsite;
- j. Review of the complaint management system;
- k. Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with EMP

No.	Sub- Project Name	EMP Part of Contract Documents (Y/N)	EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

5) Approach and methodology for environmental monitoring of the project

Brief description on the approach and methodology used for environmental monitoring of each sub-project

- 6) Monitoring of environmental impacts on project surroundings (ambient air, water quality and noise levels)
 - i. Brief discussion on the basis for monitoring
 - ii. Indicate type and location of environmental parameters to be monitored
 - iii. Indicate the method of monitoring and equipment to be used
 - iv. Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m ³	SO2 µg/m ³	NO2 µg/m ³

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m ³	SO2 µg/m ³	NO2 µg/m ³

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq(dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LAeq(dBA) (Monitoring Results)	
			Day Time	Night Time

7) Summary of key issues and remedial actions

- i. Summary of follow up time-bound actions to be taken within a set time frame.

8) Appendixes

- i. Photos
- ii. Summary of consultations conducted, if any
- iii. Copies of environmental clearances and permits
- iv. Sample of environmental site inspection report
- v. Other

Appendix 25 : Public Information Notice Template

Public Announcement
Providing Water Supply System DELHI

Under this project, works are being conducted by xxxx Contractor to provide Water Supply System network in Town

As part of this, works for laying pipeline will be taken up in ----- road----/ street/ lane
Fromto (provide dates).

We request you to kindly co-operate for smooth implementation of the works. We also request you to drive vehicles / pedestrians to walk carefully Inconvenience caused is regretted.

PIU - Contact No. Contractor – Contact no.

Appendix 26 : NGT's Directives on Air Quality in Delhi



The Delhi is experiencing 'severe' air quality under a blanket of thick haze, as pollution levels have breached the permissible standards by multiple times. Photo: Reuters

Delhi pollution: NGT bans construction, industrial activities till 14 November

3 min read . Updated: 09 Nov 2017, 07:22 PM IST PTI

The green tribunal bans construction, industrial activities and entry of trucks, while lambasting the Delhi government, civic bodies over the worsening air quality in Delhi and neighbouring states

Topics

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New Delhi: With deadly smog blanketing Delhi and the neighbouring states for the third day, the National Green Tribunal (NGT) on Thursday banned construction and industrial activities and entry of trucks, as it rapped the Delhi government and civic bodies over the situation.

The state governments of Uttar Pradesh, Punjab, Rajasthan and Haryana were also directed to ensure that no crop residue is burnt and incentives are provided to farmers.

“No construction activity will be carried out on structures until further orders... all industrial activities in Delhi-NCR which are causing emissions will also not be allowed to carry on their functioning" till 14 November, a bench headed by NGT chairperson Justice Swatanter Kumar said. It, however, clarified that at places where only finishing work was involved barring the use of construction material like cement and sand, the activity can be carried on during this period.

The bench said the labourers working at the construction sites would be paid their daily wages and would not be affected by the NGT's orders.

An irked green panel also imposed a ban on the entry of diesel trucks more than ten years old and said that no vehicle from outside or within Delhi will be permitted to transport any construction material.



Commuters wear masks as they walk along a road amid heavy smog in Delhi on 9 November 2017.
Photo: AFP

Noting flagrant violation of the prescribed limits of PM (particulate matter) 10 and PM 2.5, it banned construction and industrial activities causing emissions till 14 November. The NGT also directed the authorities and the civic bodies to sprinkle water where PM 10 is found to be in excess of 600 micrograms per cubic metre.

The tribunal told the authorities that holding meetings, writing letters and shifting responsibility from one to the other for non-performance can hardly be made an excuse for meeting “such a bad environmental emergency”.

“You’ve made a mess of Delhi. You have done what you had to, now we will decide what you have to do. You (officials) go to the hospital and see what kind of trouble people are facing. You kept playing with people’s life. “Right to life has been infringed with impunity by the authorities and other stakeholders who have been mere spectators to such crisis,” the bench said.

The tribunal said its orders passed on 10 November last year postulating steps to be taken to deal with such severe air pollution remained unimplemented and “we find no plausible explanation” why even a single direction was followed.



The NGT also directed the authorities and the civic bodies to sprinkle water where PM 10 is found to be in excess of 600 micrograms per cubic metre. Photo: PTI

It rapped the pollution monitoring bodies for not testing other components of pollution and said it was surprising that the Central Pollution Control Board (CPCB) and Delhi Pollution Control Committee (DPCC) have not even bothered to test serious pollutants like sulphur dioxide and carbon monoxide.

“There should be regular cleaning of roads preferably through vacuum cleaners so that particulate matter does not rise in the air,” the NGT said.

It asked the NCT Delhi and other authorities to ensure that diesel vehicles more than ten years old and petrol vehicles which are 15 years are not allowed to ply. “No trucks from outside stations or within NCT Delhi will be permitted to transport any construction material particularly sand, cement or bajri till the next date of hearing,” the bench said.

The green body ordered the civic bodies to set up teams to ensure there is no burning of waste in Delhi-NCR and asked them to inspect places where construction material were lying in the open uncovered and take appropriate action including levy of environment compensation.

The bench asked the Delhi and NCR states to submit their action plans in relation to these orders two weeks and sought analysis reports of the prevailing ambient air quality. It said it would consider vacating its orders on banning construction and industrial activity on the 14 November, the next date of hearing.

The national capital is experiencing 'severe' air quality under a blanket of thick haze, as pollution levels have breached the permissible standards by multiple times.

Appendix 27 : Comprehensive Action Plan on Air Quality by NGT

**BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI**

Original Application No. 681 of 2018

IN THE MATTER OF:

**News Item Published In 'The Times of India' Authored by Shri. Vishwa Mohan
Titled
"NCAP with Multiple Timelines to Clear Air in 102 Cities to be released around
August 15"**

**CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE DR. JUSTICE JAWAD RAHIM, JUDICIAL MEMBER
HON'BLE MR. JUSTICE S.P. WANGDI, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER**

Dated: 08th October, 2018.

ORDER

1. Proceedings in this matter have been initiated on the basis of a newspaper item dated 03.08.2018 in the Times of India under the heading "*NCAP with multiple timelines to clean air in 102 cities to be released around August 15*"¹. According to the news item, the National Clean Air Programme (NCAP) proposes to reduce pollution in 102 cities where standards of air pollution are in excess in the next 10 years- 35% in next 3 years, 50% in next 5 years and 70-80% in next 10 years.
2. The question that arises for consideration is whether the timeline of 10 years for bringing down pollution levels is in accordance with the mandate of law requiring pollution free environment especially when there is imminent threat to human health as a result of such pollution. According to a survey, 15,000 persons died prematurely in Delhi in the year 2016. Delhi was ranked as third in the list of cities reporting most deaths due to air pollution. Premature deaths in

¹ <https://timesofindia.indiatimes.com/india/ncap-with-multiple-timelines-to-clean-air-in-102-cities-to-be-released-around-august-15/articleshow/65254122.cms>

Mumbai, Kolkata, Bangalore and Chennai are reported to be between 5,000-10,000 in 2016.²

3. 102 cities have been identified as 'Non-attainment cities'. Non-attainment city is the one which does not meet the National Ambient Air Quality Standards (NAAQS). The said standards are prescribed under Section 16 (2) (h) of Air (Prevention and Control of Pollution) Act, 1981, (Air Act, 1981) vide Notification dated 18.11.2009 by the Central Pollution Control Board (CPCB).
4. Serious concerns have been expressed in the last four decades about the need to restore the standards of the air quality, in view of the adverse effect of air pollution on public health. Section 20 of the Air Act, 1981 provides for directions for ensuring standards for emission from automobiles by the State Pollution Control Boards. Section 21 of the Air Act, 1981 requires Consent to Establish (CTE) or operate an industrial plant in air pollution control areas. Conditions for such grant include installation of equipments for control of air pollution, use of specified chimneys and such other conditions as may be necessary. Section 22 provides for control of industrial pollution. State Boards can also seek injunction against air pollution from any source under Section 21-A. Section 31-A empowers a Pollution Board to give directions to close an industrial activity on the ground of pollution. It is, however, well known that the statutory mechanism under the Air Act, 1981 has not been successful in controlling air pollution. The result is that air pollution has been subject matter of consideration by the Hon'ble Supreme Court and other Courts as well as this Tribunal.

²<https://www.ndtv.com/delhi-news/delhis-air-pollution-has-caused-of-death-of-15-000-people-study-1883022>.

5. Directions have been issued by the Hon'ble Supreme Court for control of vehicular pollution³, industrial and construction sector pollution⁴, power sector pollution⁵ and agricultural sector pollution⁶. This Tribunal also dealt with some of such issues.⁷ CPCB has also issued directions under Section 18(1)(b) of the Air Act, 1981 vide letter dated 29.12.2015 regarding prevention, control or abatement of air pollution and improvement of ambient air quality⁸.
6. A Comprehensive Action Plan (CAP) for air pollution control for NCR was prepared in pursuance of order of the Hon'ble Supreme Court dated 06.2.2017 by the Environment Pollution (Prevention and Control) Authority (EPCA) in consultation with the CPCB and DPCC on 05.04.2017.⁹ The said plan also provides for enforcement of Graded Response Action Plan (GRAP) notified by the MoEF&CC on 12.01.2017¹⁰. The GRAP envisages specific steps for different levels of air quality such as improvement in emission and fuel quality and other measures for vehicles, strategies to reduce vehicle numbers, non-motorised transport network, parking policy, traffic management, closure of polluting power plants and industries including brick kilns,

³ M.C. Mehta v. Union of India (1985)2 SCC 431, M.C. Mehta v. Union of India (2001) 3 SCC 756, M.C. Mehta v. Union of India (1998) 6 SCC 63, M.C. Mehta v. Union of India (2002) 3 SCC 356, M.C. Mehta v. Union of India (1998) 6 SCC 60

⁴ M.C. Mehta v. Union of India (1997) 2 SCC 353, M.C. Mehta v. Union of India and Shriram Foods and Fertilizer Industries and Anr. (1986) 2 SCC 235, Rural Litigation and Entitlement Kendra, Dehradun v. State of U.P. (1985) 2SCC 431, Mohd. Haroon Ansari v. District Collector (1998) 6 SCC 60, Union of India v. Union Carbide Co. (1989) 1 SCC 674, M.C. Mehta v. Union of India (1992) 4 SCC 256, Sterlite Industries (India) Ltd. etc. v. Union of India & Ors.(2013) 4SCC 575 , M.C. Mehta v. Union of India (2004) 6 SCC 588, M.C. Mehta v. Kamal Nath (2000)6 SCC 213

⁵ Consumer Education and Research Centre v. Union of India (1995)3 SCC 42, Dahanu Taluka Environment Protection group and Ors. v. Bombay Suburban Electricity Supply Company Ltd. and Ors (1991) 2SCC 539

⁶ Arjun Gopal and Ors v. Union of India and Ors (2017) 16 SCC 280, Dr. B.L Wadhwa v. Union of India and Ors (1996) 2 SCC 594

⁷ Vardhman Kaushik v. Union of India and Ors. O.A no. 21 of 2014, Vikrant Kumar Tongad v. Environment Pollution (Prevention and Control) Authority and Ors, O.A No. 118 of 2013, Satish Kumar v. Union of India and Ors, O.A. No. 56 (T_{HC}) OF 2013, Smt. Ganga Lalwani V. Union of India and Ors. O.A No. 451 of 2018

⁸ p. 38, <http://envfor.nic.in/sites/default/files/NCAP%20with%20annex-ilovepdf-compressed.pdf>

⁹ Report No.71, EPCA-R/2-17/L-21, Comprehensive Action Plan for air pollution control with the objective to meet ambient air quality standards in the National Capital Territory of Delhi and National Capital Region, including states of Haryana, Rajasthan and Uttar Pradesh.

¹⁰ S.O.118(E), Notification, Ministry of Environment, Forest and Climate Change

control of generator sets, open burning, open eateries, road dust, construction dust, etc.

7. The GRAP categorises levels of pollution as severe plus, severe, very poor, moderate to poor. The action to be taken in such situations includes stopping entry of trucks, stopping construction activities, odd and even scheme of private vehicles, shutting of schools, closing of brick kilns, stone crushers, hot mix plants, power plants, intensifying public transport services, mechanised cleaning of road, and sprinkling of water, stopping the use of diesel generator sets, enhancing parking fees, etc. Implementation of prescribed norms in the light of legal provisions and court directions remains a challenge. The consequence is that India is being ranked high in terms of level of pollution compared to many other countries with enormous adverse impact on public health. Most victims are children, senior citizens and the poor.¹¹

8. A chamber meeting was held in this Tribunal on 05.09.2018 to review the situation. The same was attended by all the Members of the Tribunal, representatives of CPCB, Ministry of Road Transport and Highways (MoRTH), Ministry of Petroleum and Natural Gas, Ministry of Environment, Forest and Climate Change (MoEF&CC), Ministry of Agriculture, Cooperation and Farmers Welfare, Ministry of Heavy Industries, States of Haryana, Punjab, Uttar Pradesh and Rajasthan, NCT of Delhi, IIT Delhi, IIT Kanpur and NEERI. In the said meeting, presentation was given by CPCB to the effect that 102 cities have been declared as “non-attainment” cities based on study of data from 2011-2015 and directions were issued by the CPCB to concerned States to

¹¹ <https://www.thehindu.com/sci-tech/energy-and-environment/india-ranks-177-out-of-180-in-environmental-performance-index/article22513016.ece>
<https://www.ndtv.com/delhi-news/delhis-air-pollution-has-caused-death-of-15-000-people-study-1883022>

frame city specific action plans. 73 such plans were received. 36 were finalized. 37 are pending. 29 are yet to be submitted.

9. Under the National Ambient Air Quality Monitoring Programme (NAAQM) of the CPCB, renamed as National Air Quality Monitoring Programme (NAMP), air quality data is compiled with reference to notified air standards. Four air pollutants viz. Sulphur Dioxide (SO₂), Oxides of Nitrogen as NO₂, Suspended Particulate Matter (PM₁₀) and fine Particulate Matter (PM_{2.5}) have been identified for regular monitoring at all the locations.¹² In addition to this, there are hundred and one (101) real-time Continuous Ambient Air Quality Monitoring stations (CAAQMS) in 57 cities monitoring 08 pollutants viz. PM₁₀, PM_{2.5}, SO₂, NO_x, Ammonia (NH₃), Carbon Monoxide (CO), Ozone (O₃) and Benzene. PM₁₀ are inhalable coarse particles, which are particles with a diameter between PM_{2.5} and 10 micrometers (µm) and PM_{2.5} are fine particles with a diameter of 2.5 µm or less. Particulates are the deadliest form of air pollutant due to their ability to penetrate deep into the lungs and blood streams unfiltered. The smaller PM_{2.5} are particularly deadly as they can penetrate deeper into the lungs.
10. As already noted, there are 102 non-attainment cities where the air quality is worse than National Ambient Air Quality Standards consecutively in the last five years. The number of cities has increased from 94 identified earlier under the National Air Quality Monitoring Programme (2011-15). The highest number of cities are in Maharashtra (17) followed by Uttar Pradesh (15), Punjab (9), Himachal Pradesh (7), Odisha and Madhya Pradesh (6 each), Assam, Andhra Pradesh and Rajasthan (5 each), Karnataka (4), Bihar, Chhattisgarh and Telangana (3 each), Gujarat, Jammu and Kashmir, Nagaland and Uttarakhand (2 each) and Jharkhand, Delhi, Chandigarh, Meghalaya, Tamil Nadu and West Bengal (1 each).

¹² <http://envfor.nic.in/sites/default/files/NCAP%20with%20annex-ilovepdf-compressed.pdf>

11. The list of 102 cities identified by CPCB with status of parameters exceeded and major sources of pollution are as follows:

State Sl. No	State	Cities Sl. No	Cities	Status	Major Sources of Pollution
1	Andhra Pradesh	1	Guntur	PM10	i. Vehicular Emissions. ii. Road Dust/Re-suspension of dust and other fugitive emission. iii. Air Pollution from Bio-Mass Burning iv. Industrial Air Pollution. v. Air Pollution from Construction and Demolition Activities. vi. DG sets vii. LPG instead of coal in restaurants/ dhabas/ road side eateries.
		2	Kurnool	PM10	
		3	Nellore	PM10	
		4	Vijaywada	PM10	
		5	Vishakhapatnam	PM10	
		6	Guwahati	PM10	
		7	Nagaon	PM10	
2	Assam	8	Nalbari	PM10	
		9	Sibsagar	PM10	
		10	Silchar	PM10	
	Bihar	11	Gaya	N.A	vii. LPG instead of coal in restaurants/ dhabas/ road side eateries.
		12	Patna	N.A	
		13	Muzzafarpur	N.A	
3	Chandigarh	14	Chandigarh	PM10	
4	Chhattisgarh	15	Bhillai	PM10	
		16	Korba	PM10	
		17	Raipur	N.A	
		18	Delhi	PM10, NO2	
5	Delhi	19	Surat	PM10	
		20	Amedabad	N.A	
		21	Baddi	PM10	
		22	Damtal	PM10	
		23	Kala Amb	PM10	
6	Gujarat	24	Nalagarh	PM10	vii. LPG instead of coal in restaurants/ dhabas/ road side eateries.
		25	Paonta-Sahib	PM10	
		26	Parwanoo	PM10	
		27	Sunder Nagar	PM10	
7	Himachal Pradesh	28	Jammu	PM10	
		29	Srinagar	N.A	
8	Jharkhand	30	Dhanbad	PM10	
9	Karnataka	31	Bangalore	PM10	
		32	Devanagere	PM10	
		33	Gulburga	PM10	
		34	Hubli-Dharwad	PM10	
		35	Bhopal	PM10	
		36	Dewas	PM10	

State Sl. No	State	Cities Sl. No	Cities	Status	Major Sources of Pollution
11	Madhya Pradesh	37	Indore	PM10	i. Vehicular Emissions. ii. Road Dust/Re-suspension of dust and other fugitive emission. iii. Air Pollution from Bio-Mass Burning iv. Industrial Air Pollution. v. Air Pollution from Construction and Demolition Activities. vi. DG sets. vii. LPG instead of coal in restaurants/dhabas/ road side eateries.
		38	Sagar	PM10	
		39	Ujjain	PM10	
		40	Gwalior	N.A	
		41	Akola	PM10	
		42	Amravati	PM10	
		43	Aurangabad	PM10	
		44	Badlapur	PM10, NO2	
		45	Chandrapur	PM10	
		46	Jalgaon	PM10	
		47	Jalna	PM10	
12	Maharashtra	48	Kolhapur	PM10	
		49	Latur	PM10	
		50	Mumbai	PM10	
		51	Nagpur	PM10	
		52	Nashik	PM10	
		53	Navi Mumbai	PM10	
		54	Pune	PM10, NO2	
		55	Sangli	PM10	
		56	Solapur	PM10	
13	Meghalaya	57	Ulhasnagar	PM10, NO2	
		58	Byrnihat	PM10	
14	Nagaland	59	Dimapur	PM10	
		60	Kohima	PM10	
15	Orissa	61	Angul	PM10	
		62	Balasore	PM10	
		63	Bhubneshwar	PM10	
		64	Cuttack	PM10	
		65	Rourkela	PM10	
		66	Talcher	PM10	
		67	Amritsar	N.A	
		68	DeraBassi	PM10	
		69	Gobindgarh	PM10	
		70	Jalandhar	PM10	

State Sl. No	State	Cities Sl. No	Cities	Status	Major Sources of Pollution
16	Punjab	71	Khanna	PM10	i. Vehicular Emissions.
		72	Ludhiana	PM10	ii. Road Dust/Re-suspension of dust and other fugitive emission.
		73	NayaNangal	PM10	
		74	Pathankot/Dera Baba	PM10	iii. Air Pollution from Bio-Mass Burning
		75	Patiala	PM10	
		76	Alwar	PM10	iv. Industrial Air Pollution.
		77	Jaipur	PM10	v. Air Pollution from Construction and Demolition Activities.
17	Rajasthan	78	Jodhpur	PM10	
		79	Kota	PM10	
		80	Udaipur	PM10	vi. DG sets.
18	Tamil Nadu	81	Tuticorin	PM10	vii. LPG instead of coal in restaurants/ dhabas/ road side eateries.
19	Telangana	82	Hydrabad	PM10	
		83	Nalgonda	PM10	
		84	Patencheru	PM10	
		85	Agra	PM10	
		86	Allahabad	PM10	
		87	Anpara	PM10	
		88	Bareilly	PM10	
		89	Firozabad	PM10	
		90	Gajraula	PM10	
20	Uttar Pradesh	91	Ghaziabad	PM10	
		92	Jhansi	PM10	
		93	Kanpur	PM10	
		94	Khurja	PM10	
		95	Lucknow	PM10	
		96	Muradabad	PM10	
		97	Noida	PM10	
		98	Raebareli	PM10	
		99	Varanasi	PM10	
21	Uttarakhand	100	Kashipur	PM10	
		101	Rishikesh	PM10	
22	West Bengal	102	Kolkata	PM10, NO2	

12. The above chart shows that major violation of standard is of “PM₁₀” and identified sources are vehicular, industrial, biomass burning, road dust, construction and demolition, DG sets and road side eateries. The action plan proposed by the CPCB¹³ with the timeline is as follows:

Action Plan:				
	Action	Implementati on period (Short/ Mid /Long-term)	Time target for Implement ation	Responsible agency (ies)
Source group	1. Restriction on plying and phasing out of 15 years old commercial diesel driven vehicles.	Mid	Dec. 18	Transport Department
Vehicles	2. Introduction of cleaner fuels (CNG/LPG) for vehicles.	Mid	June, 18	Transport Department & Oil companies
	3. Regular checking of vehicular emission and issue of Pollution under Control Certificate (PUC).	Short	March, 18	Transport Department & Traffic Police
	4. Good traffic management including re-direction of traffic movement to avoid.	Mid	July, 18	Traffic Police
	5. Ban on registration of Diesel driven auto-rickshaw /Tempo.	Short	April, 18	Transport Department
	6. Promotion and operationalization of E-rickshaw.	Mid	June, 18	Transport Department
	7. Development of Multi-layer parking.	Long	Dec. 18,	MC, UD&HD & District Adm
	8. Retrofitting of particulate filters in diesel driven vehicle.	Mid	Dec. 18	Transport Department
	9. Checking of fuel adulteration	Short	April, 18	District Adm & Oil Company
	10. Monitoring on vehicle fitness.	Short	April, 18	Transport Department & Traffic Police
	11. Periodic calibration test of vehicular emission monitoring instrument	Short	April, 18	SPCB & Transport Department
Road Dust	1. Regular cleaning of road dust.	Short	April, 18	MC

¹³presented by CPCB in chamber meeting at NGT on 05.09.2018

	2. Water spraying on road through tankers	Mid	April, 18	MC
	3. Construction of pucca pavement along the roads.	Long	Dec. 18	MC and Road Construction Department
	4. Tree plantation along the roads.	Long	Aug. 19	Department of Environment and Forest
	5. Development of green belt in open areas, gardens, parks/ community places, schools & housing societies.	Long	Aug. 19	Department of Environment and Forest
	6. Introduction of water fountains at major traffic intersection/ Golambar/circle.	Long	Aug. 19	MC
Construction activities	1. Covering of construction site.	Short	April, 18	Building Construction Department and MC.
	2. Transportation of construction materials like sand, soil, stone chips etc. in covered system.	Short	April, 18	Transport Department District Adm. & Traffic Police.
	3. Restriction on storage of construction materials along the road.	Short	April, 18	MC
Biomass and garbage burning	1. Restriction on open burning of municipal solid waste, Biomass, plastic horticulture waste etc.	Short	March, 18	MC
	2. Immediate lifting of solid wastes generated from de-silting and cleaning of municipal drains for its disposal.	Short	April, 18	MC
	3. Transportation of municipal solid wastes, construction materials and debris in covered system.	Short	April, 18	MC
	4. Ensuring promotion & use of cleaner fuel for commercial purposes like local Dhaba/eateries	Long	Dec. 19	District Adm. & Oil Company
Industries	1. Ensuring installation and operation of air pollution control devices in industries	short	April, 18	SPCB
	2. Ensuring emission standards in industries	short	April, 18	SPCB

	3.Adoption of cleaner technology in brick kilns at five blocks of City Name Viz. city Name Sadar, Danapur, Phulwarisharif, Maner and Fatuha by 31.08.2018	Mid	Aug. 18	SPCB
	4. Shifting of polluting industries,	Long	Dec. 19	SPCB & Industry Department
	5. ban on polluting industries	Short	April, 18	SPCB & Industry Department
Strengthening of AAQ monitoring	1.Installation of four CAAQMS at City Name A. Two CAAQMS stations under CSR funds of CPSU through Central Pollution Control Board at Eco-Park and IGIMS, City Name premise. b. Two CAAQM stations under State Govt. financial assistance	Mid	Aug.18	SPCB
	2. Source appointment study	Mid	Dec. 18	SPCB
Public Awareness	1.Issue of advisory to public for prevention and control of air pollution	Short	April, 18	SPCB & SDMA
	2.Involvement of school and other academic institution in awareness program	Mid	Aug. 18	SPCB
Others	1. Compliance of guidelines on D.G. sets and action against violation	Short	April, 18	SPCB & MC
	2. Help line to oversee non compliances on aforesaid issues.	Short	April, 18	SPCB & MC

13. The data of non-attainment cities is a matter of concern. Though, the MoEF&CC has announced NCAP, as noted earlier, the timeline for bringing down the pollution by 70-80% in next 10 years does not meet the mandate of law. The time line has to be revised. As per some studies, India ranks 177 out of 180 countries in Environmental Performance Index.¹⁴

¹⁴ <https://www.thehindu.com/sci-tech/energy-and-environment/india-ranks-177-out-of-180-in-environmental-performance-index/article22513016.ece>

14. We are thus of the view that emergent measures are required to check sources of air pollution. Once the standards have been laid down in the statutory provisions of the Air Act, 1981, all the authorities as well as citizens are statutorily bound to follow the said standards.
15. Accordingly, we consider it appropriate to take cognizance of the alarming situation and issue directions as follows:
- i. All the States and Union Territories with non-attainment cities must prepare appropriate action plans within two months aimed at bringing the standards of air quality within the prescribed norms within six months from date of finalization of the action plans.
 - ii. The Action Plans may be prepared by six-member committee comprising of Directors of Environment, Transport, Industries, Urban Development, Agriculture and Member Secretary, State Pollution Control Board or Committee of the concerned State. The Committee may be called Air Quality Monitoring Committee (AQMC). The AQMC will function under the overall supervision and coordination of Principal Secretary, Environment of the concerned State/Union Territory. This may be further supervised by the Chief Secretaries concerned or their counterparts in Union Territories by ensuring intra-sectoral co-ordination.
 - iii. The Action Plans may take into account the GRAP, the CAP and the action plan prepared by CPCB as well as all other relevant factors. The Action Plans may be forwarded to the CPCB by 31.12.2018. The same may be placed before the Committee as directed in direction no. vi. The Action Plan will include components like identification of source and its apportionment considering sectors like vehicular pollution, industrial pollution, dust pollution, construction activities, garbage burning, agricultural pollution including pollution caused by burning of crop residue, residential and indoor pollution etc. The action plan

shall also consider measures for strengthening of Ambient Air Quality (AAQ) monitoring and steps for public awareness including issuing of advisory to public for prevention and control of air pollution and involvement of schools, colleges and other academic institutions and awareness programmes.

- iv. The Action Plan will indicate steps to be taken to check different sources of pollution having speedy, definite and specific timelines for execution.
- v. The Action Plan should be consistent with the carrying capacity assessment of the non-attainment cities in terms of vehicular pollution, industrial emissions and population density, extent of construction and construction activities etc. The carrying capacity assessment shall also lay emphasis on agricultural and indoor pollution in rural areas. Depending upon assessed carrying capacity and source apportionment, the authorities may consider the need for regulating number of vehicles and their parking and plying, population density, extent of construction and construction activities etc. Guidelines may accordingly be framed to regulate vehicles and industries in non-attainment cities in terms of carrying capacity assessment and source apportionment.
- vi. The Committee comprising of (a) Shri. Prashant Gargava, Member Secretary, CPCB, (b) Dr. Mukesh Khare, Professor, IIT Delhi, and (c) Dr. Mukesh Sharma, Professor, IIT Kanpur shall examine the Action Plans and on the recommendations of the said Committee, the Chairman, CPCB shall approve the same by 31.01.2019.
- vii. The Chief Secretaries of the State and Administrators/ Advisors to Administrators of the Union Territories will be personally accountable for failure to formulate Action Plans, as directed.
- viii. The CPCB, SPCBs and State Pollution Control Committees shall develop a public grievance redressal portal for redressal of public

complaints on air pollution along with a supervisory mechanism for its disposal in a time bound manner. Any visible air pollution can be reported at such portal by email/SMS.

- ix. The CPCB and all the State Pollution Control Boards and Pollution Control Committees shall collectively workout and design a robust nationwide ambient air quality monitoring programme in a revised format by strengthening the existing monitoring network with respect to coverage of more cities/towns. The scope of monitoring should be expanded to include all twelve (12) notified parameters as per Notification No B-29016/20/90/PCI-L dated 18th November, 2009 of CPCB. The continuous Ambient Air Quality Monitoring Stations (AAQMS) should be preferred in comparison to manual monitoring stations. The CPCB and States shall file a composite action plan with timelines for its execution which shall not be more than three months. It is expected that all such AAQMS shall be connected to central server of CPCB for reporting analysis of results in a form of Air Quality Bulletin for general public at regular intervals atleast on weekly basis and ambient air quality on continuous basis on e-portal. MoEF&CC will provide requisite funds for the purpose. MoEF&CC in consultation with Ministry of Housing and Urban Affairs, MoRTH, Ministry of Petroleum and Natural Gas, Ministry of Agriculture, Cooperation and Farmers Welfare or any other Ministry to lay down such guidelines as may be considered necessary for improvement of air quality in the country.

16. A copy of this be sent by e-mail to all the concerned i.e. Ministries of Environment, Forest & Climate Change, Housing and Urban Affairs, Road Transport and Highway, Agriculture, Petroleum and the Chief Secretaries of all the States and Union Territories for compliance.

17. We understand that some of the Zonal Benches of the National Green Tribunal have also passed directions on the subject of Ambient Air Quality and the States in those Zones are in the process of implementation of such directions. Specific reference may be made in this regard to judgement dated 11.08.2016 in O.A No. 33/2018/EZ in the matter of *Subhas Datta v. State of West Bengal & Ors.* We make it clear that this order shall not be considered as an impediment to those actions but as an addition or supplement thereto for achieving the object of this order at the macro level and of the said order at the micro level in the concerned cities.
18. Needless to say, that order of National Green Tribunal is binding as a decree of Court and non-compliance is actionable by way of punitive action including prosecution, in terms of the National Green Tribunal Act, 2010.
19. The CPCB may compile the data and furnish the same to this Tribunal by email at filing.ngt@gmail.com on or before 15.2.2019.
20. Put up for consideration in the last week of February, 2019.

....., CP
(Adarsh Kumar Goel)

....., JM
(Dr. Jawad Rahim)

....., JM
(S.P. Wangdi)

....., EM
(Dr. Nagin Nanda)

New Delhi
October, 08, 2018

Appendix 28 : Seasonal Ban on Construction by NGT

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 176/2015
(M.A. No. 1332/2015)

&

Original Application No. 59/2012
(M.A. No. 34/2016 & M.A. No. 190/2016)

&

Original Application No. 108/2013
(M.A. No. 489/2015)

&

Original Application No. 179/2013
(M.A. No. 866/2014 & M.A. NO. 644/2015)

&

Appeal No. 67/2015
(M.A. No. 652/2015)

And

Original Application No. 484/2015
(M.A. No. 155/2017, M.A. No. 567/2017
& M.A. No. 927/2017)

And

Original Application No. 327/2018
(M. A. No. 1282/2018)

And

Original Application No. 115/2017
(M.A. No. 442/2017)

And

Original Application No. 411 of 2018

And

Original Application No. 613/2017

And

Original Application No. 614/2017

Shailesh Singh

Versus

Respondent(s)

Hotel Holiday Regency, Moradabad & Ors.
With

Applicant(s)

Legal Aid, National Green Tribunal Bar Association

Applicant(s)

Versus

NCT of Delhi & Ors.
With
Raj Hans Bansal

Respondent(s)

Applicant(s)

Versus

Ministry of Water Resources & Ors.
With

Respondent(s)

Apex Chambers of Commerce and
Industries of N.C.T. of Delhi & Ors.

Applicant(s)

Versus

Govt. of NCT Delhi & Ors.
With
Vikrant Tongad

Respondent(s)

Applicant(s)

Versus

Union of India & Ors.

Respondent(s)

With
Shailesh Singh

Applicant(s)

Versus

Hotel The Oberoi Amarvilas & Ors.

Respondent(s)

With
Shailesh Singh

Applicant(s)

Versus

Panchsheel Buildtech Pvt. Ltd. & Ors.

Respondent(s)

With
Shailesh Singh

Applicant(s)

Versus

Central Ground Water Board & Ors.

Respondent(s)

With
M/s A-One Mineral Water Industry

Applicant(s)

Versus

Central Ground Water Authority & Ors.

Respondent(s)

With
Mohd. Javed Asghar

Applicant(s)

Versus

M/s Upper Ganges Sugar and Industries Ltd.
(Distillery Unit) & Ors.

Respondent(s)

With
Mohd. Javed Asghar

Applicant(s)

Versus

State of U.P. & Ors.

Respondent(s)

Hearing concluded on: 18.12.2018

Order uploaded on: 03.01.2019

CORAM:

HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE MR. JUSTICE S.P. WANGDI, JUDICIAL MEMBER
HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER

For Applicant(s):

Mr. Raj Pajwani, Senior Advocate and Mr.
Rahul Choudhary, Advocate (In O.A. Nos.
59/2012 & 108/2013)
Ms. Preeti Singh, Mr. S. Porwal, Mr. Shivam
Jaiswal, Advocates (In O.A. Nos. 176/2015,
484/2015, 327/2018 & 115/2017)
Mr. Amrendra Kumar Dubey, Advocate (O.A.
No. 411/2018)

For Respondent (s):

Ms. Sakshi Popli, Advocate for DJB (O.A. No.
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Mr. Sumeet Pushkarna, Mr. Devanshu,
Advocates with Mr. Sudhir Chauhan, E.E.,
Delhi Jal Board (O.A. No. 108/2013)
Mr. Ajay Jain, Advocate for GNCTD
Mr. Ardhendumauli Kumar Prasad, Mr.
Shashank Saxena, Ms. Diksha Gera, Mr.
Amritesh Raj, Advocates for CGWA
Mr. Pradeep Mishra, Mr. Daleep Dhyani,
Advocates for UPPCB
Ms. Sakshi Popli, Advocate for NDMC
Mr. Amit Tiwari, Mr. Rohit Pratap Singh,
Advocates for State of UP

Dr. Sandeep Singh, Mr. Vinay Pal, Advocates
for State of UP (O.A. No. 327/2017
Mr. Sumeer Sodhi, Advocate
Mr. Rahul Khurana Advocate for Mr. Anil
Grover, Advocate
Mr. Arvind Kr. Pandey, Proxy Counsel for Ms.
Anushuya Salwan, Advocate for DSIIDC (O.A.
No. 179/2013)
Mr. Arvind Kr. Pandey, Proxy Counsel for Mr.
Moni Cinmoy, Advocate for DSIIDC (O.A.
No. 65/2015)
Mr. Narender Pal Singh, Advocate with Mr.
Dinesh Jinda, Law Officer, DPCC
Ms. Ranjana Roy Gawai, Advocate for TPDDL
Ms. Deep Shikha Bharati, Advocate for State
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Mr. Pawan Upadhyay, Mr. Ankit Vij,
Advocates
Mr. Anil Kaur, Ms. Kapil Kaur, Ms. Diksha,
Advocates for Raddisson Blue
Mr. L.K. Bhushan, Ms. Adity, Advocates
Mrs. Sharmila Upadhyay, Mr. Krishna,
Advocates for CPCB (O.A. No. 327/2018)
Mr. Rohit Singh with Jasvinder Kaur, Mr.
Vishal Mittal, Advocates
Mr. Rajkumar, Advocate for CPCB
Mr. Satish Kumar, Mr. V. Senthil Kumar, Mr.
Theerthe Gowda N.M., V. Elangovan,
Advocates for CPCB (O.A. No. 613/2017
Priyadarsni Gopal, Advocate
Ms. Antima Bazaz, Dr. Yashpal Singh,
Advocates
Ms. Shalini Sati Prasad, Advocate
Ms. Priyanka Swami, Ch. Nounihal Singh,
Advocates for GNN
Mr. Bipin Kumar, Advocate
Mr. Rachit Mittal, Ms. Tanvi Aggarwal,
Advocates for GDA
Mr. Ravinder Kumar, Advocate
Mr. R. Chandrachud, Mr. Nitin Thukra,
Mr. Karan Sharma, Advocates for Noticee No.
1
Mr. Manish Sharma, Ms. Jigyasa, Deepti
Rajpal, Mr. Ninad Dogra, Advocates for
Noticee No. 2
Mr. Ranvir Singh, Advocate for Noticee No. 3
Mr. Alok Sangwan, Mr. Ram Bhardwaj, Mr.
Sunny Kadiyan, Advocates for Noticee No. 4
Mr. Pinaki Mishra, Senior Advocate with Mr.
Sanjeet, Mr. Utkarsh, Advocates for DLF
Mr. Arjun Nanda, Adv. for Noticee No. 6
Mr. Himanshu Tyagi, Mr. Gautam Sharma,
Advocates for Noticee No. 9
Mr. Dabesh Panda, Mr. Anshuman Ray,
Advocates for Noticee No. 10
M. Salim, Advocate for Noticee No. 11
Mr. Ameya Vikram Mishra, Advocate for
Noticee No. 12
Mr. Raghav Pandey, Advocate for Noticee No.
21
Mr. Karan Chandhiok, Ms. Swati Seth,
Advocates and Mr. Debojyoti Sengupta, for
Noticee No. 23
Mr. Ashish S. Kulshrestha, Advocate for
UPSIDC



ORDER

1. Ground water conservation which is the issue for consideration in this case, has attained significance on account of fast depletion of ground water in recent years. Fast depletion of ground water is acknowledged in studies.¹ Ground water depletion is serious cause of concern for human well being.
2. As per publication of NITI Ayog, India is placed at 120th amongst 122 countries in water quality index. Most states have achieved less than 50% of the total score in augmentation of groundwater resources, highlighting a growing national crisis. 54% of India’s ground water wells are decreasing in levels and 21 major cities across the country are expected to run out of ground water by 2020. Almost none of the States have built the infrastructure required to recharge groundwater in over exploited and critical areas. Several States such as U.P., Bihar, Rajasthan etc. have not put in place any regulatory framework for managing the groundwater. These states produce 20-30% of India’s agricultural output and groundwater accounts for 63% of all irrigation water. Therefore, unsustainable extraction in these states also poses a significant food security risk for the country.²
3. About 60% of the irrigation needs, 85% of rural drinking water needs and 50% of urban water needs are met through ground water. The CGWB has categorised the areas into the following on the basis of availability of ground water resources:

Safe	(<=90%, No decline in water levels)
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¹https://www.researchgate.net/publication/26736936_Satellite_Based_Estimates_of_Groundwater_Depletion_in_India

² Composite Water Management Index: A Tool for Water Management, June 2018, Niti Aayog in association with Ministry of Water Resources, Ministry of Drinking Water and Sanitation and Ministry of Rural Development

Critical	(>70% and <=100%, decline in water levels)
Semi-critical	(<100%, decline in water levels)
Over-exploited	(>100%, decline in water levels)

4. As per another survey, India extracts most ground water. Globally, 25% of total annual global annual water is extracted in India. The extraction level is going up continuously³.
5. Depletion of ground water not only creates crisis for drinking water in absence of inadequate surface water being available in certain areas where there may be drought conditions, but also affects e-flow in rivers and can also increase salinity in soil.
6. The grievance of the applicants in the present applications is that there is fast depletion of ground water in NOIDA and Greater NOIDA, District Gautam Budh Nagar, U.P. There is large scale extraction of groundwater by various construction companies. Directions relating to the water harvesting are not complied with. No measures are properly adopted to stop the fast depleting ground water levels.
7. The Hon'ble Supreme Court considered the issue of ground water conservation and regulation vide the judgement in *M.C Mehta v. Union of India and Ors (1997) 11 SCC 312*. Direction was issued for constitution of Central Ground Water Authority (CGWA) to regulate the subject of conservation of underground water. The said regulatory body was to exercise powers under Section 5 of the Environment (Protection) Act, 1986 to regulate, control and manage drawal of ground water in the country. The main object for the constitution of the Board as an authority was to regulate the indiscriminate boring and withdrawal of

³<https://www.thehindu.com/news/cities/mumbai/the-alarming-levels-of-indias-groundwater/article19253949.ece>

underground water in the country which was needed urgently. The mandate of the authority was to issue necessary regulatory directions with a view to preserve and protect the underground water resources.

8. Based on survey by CGWA, certain areas have been declared as over exploited, critical and semi-critical areas (OCS). According to the applicants, the Central Ground Water Authority constituted in pursuance of the order of the Hon'ble Supreme Court failed to check the unregulated extraction of ground water for commercial purposes including packaging water, use of ground water by builders and hotels for swimming pool etc.

9. The fact that recharge is not taking place is acknowledged by categorization of OCS areas. In OCS areas, unregulated extraction of ground water further adds to the problem. There is nothing to show improvement in water tables in OCS areas on account of efforts or policies of the CGWA calling for review to achieve the goal of ground water conservation. There is a dire need for strict regulatory regime in OCS areas and not to permit use of ground water except for drinking water purposes where supply of drinking water is not otherwise available. Mere making of provision for recharge, without recharge actually happening will not justify grant of any permission for extraction of ground water on such impractical conditions.

10. This Tribunal considered the matter in the last six years on various occasions. It was noted in the order dated 23.04.2015 that ground water level has gone down in NOIDA by 15 mtrs. between 2007-2014. On 26.07.2018, it was noted that even apart from NOIDA, Greater NOIDA, Delhi and NCR, the

situation in OCS region calls for stringent regulation for ground water extraction.

11. Reference was made to order dated 28.08.2018 in O.A No. 176/2015, *Shailesh Singh v. Hotel Holiday, Regency Moradabad & Ors.*, directing the Ministry of Water Resource (MoWR), Government of India, in consultation with the Ministry of Environment, Forest and Climate Change (MoEF&CC) and Ministry of Agriculture (MoA), to review the existing mechanism for effective conservation of ground water resources in OCS. It was directed that the policy framework must include monitoring mechanism by way of provision for coercive measures, consistent with the mandate in the judgement of the Hon'ble Supreme Court of India in *M.C Mehta (supra)*.

12. In the said order the Tribunal noted that:

"11. Availability of groundwater resources as on 31.03.2009 is on CGWA website. 802 over-exploited units, 169 critical units, 523 semi-critical units have been notified for regulation. Authorized officers have been nominated. The guidelines provide that permission to extract groundwater is not given in such areas for any purpose other than the drinking water. The permission is given only if Water Supply Department is not able to supply such water. The NOC is granted subject to conditions laid down in the guidelines. In non-notified areas, NOC is granted for new industries or for expansion, subject to the conditions relating to recycle/re-use.

12. It is further pointed out that as per order of this Tribunal dated 15.04.2015 in the case of 'Krishan Kant Singh Vs. Union of India', this Tribunal issued directions for fresh guidelines and draft of such guidelines is issued w.e.f. 16.11.2015. As per para 8 of the guidelines, all existing industries who have not obtained NOC would apply to CGWA. In the said guidelines, it is mentioned that 162 areas have been notified for regulation but more areas can be

notified periodically. There are 1071 over-exploited units, 217 critical units and 697 semi-critical units. NOC is to be granted for drinking and domestic purposes only in the notified area. In non-notified areas, it is granted for industries, for infrastructure and mining.”

13. It was noted that the Environment (Protection) Act, 1986 had an overriding effect as held in *M.C Mehta (supra)* and no State Legislation could override the Environment (Protection) Act, 1986. Thus, the mandate of CGWA was to override any State regulatory framework. Doing so was the right of CGWA coupled with the duty for achieving the object of the Environment (Protection) Act, 1986.

14. On 12.11.2018, the matter was further considered. After making reference to the 2012 Guidelines issued by the CGWA and draft guidelines dated 16.11.2015, the Tribunal noted following points:

- i. CGWA was repeatedly disowning its responsibility on the plea that regulation of ground water was a State subject, contrary to the mandate in the judgement of the Hon'ble Supreme Court in *M.C Mehta (Supra)*.
- ii. CGWA was failing to regulate drawal of ground water in OCS on the ground that it had not issued a notification except for some areas, and without such notification, there was no need for regulating extraction of ground water even in OCS.
- iii. Extraction of ground water for commercial purposes was being allowed in OCS just by a mechanical condition that the ground water will be recharged, without ensuring compliance of such condition.
- iv. Underground water was being allowed to be extracted for illegal constructions, bottling plants, swimming pools etc. without any

impact study or effective steps for rain water harvesting for recharge of the ground water.

- v. CGWA was repeatedly taking the plea that charges were being collected for permitting drawal of underground water for commercial purposes in OCS against the Precautionary Principle, Sustainable Development as well as Inter-generational Equity Principles.
- vi. Difficulties of agriculturists needed to be addressed in a phased manner by persuading the agriculturists to switch over to less water consuming crops and to consider use of treated sewage water instead of extraction of fresh underground water, wherever viable.
- vii. Untreated effluents are not to be discharged in the water.

15. Affidavit of Member CGWA, Ministry of Water Resources, has been filed before this Tribunal on 14.12.2018 in compliance of the earlier orders. The affidavit refers to orders dated 22.10.2018, 29.08.2018, 12.11.2018 in O.A.No. 59 of 2012 in *Vikrant Kumar Tongad vs. Union of India & Ors.*, order dated 28.8.2018 and 28.08.2018 in O.A No. 176/2015, *Shailesh Singh v. Hotel Holiday, Regency Moradabad & Ors.* It further states that utilizable water in India is 1137 BCM which comprises of 690 BCM of surface water and 447 BCM of replenishable ground water resources. In the year 2009, about 2700 BCM of ground water was available in deeper aquifers, below the zone of water level fluctuations. Thus, ground water over exploitation is recommended to be restricted to sustainability of ground water by annual replenishment in order to facilitate long term sustainability of ground water. It is further stated that per year extraction is 253 BCM which is 25% of the global ground water extraction. Out of total 6,584

assessment units, 1,034 fall in over-exploited category (where extraction is more than 100% of recharge), 253 fall in critical category (where extraction is 90-100% of the recharge), 681 fall under semi-critical category (where extraction is 70-100% of the recharge) and 4,520 are under safe category (where extraction is 90% of the recharge). About 90% extraction is for agricultural purposes, 10% for drinking, domestic and industrial purposes. Industrial use is 5%. Model building bye-laws 2016 include the provision of rain water harvesting in all new buildings on plots of 100 sq. mtrs. and above. Entire storm water is to be captured for water harvesting through suitable structures in all public and open spaces of more than 500 sq. mtrs. Buildings having minimum discharge of 10,000 liters and above are required to have waste water recycling system for horticulture purposes. 'Mission Water Conservation' has been introduced by the Ministry of Agriculture, Government of India. Inter-Ministerial Committee has been constituted under the chairmanship of the Secretary, Ministry of Water Resources, Government of India. The Ministry is also carrying out training programme and Information, Education & Communication (IEC) activities for awareness. The Department of Land Resources is implementing water-shed development projects. Certain States have taken initiatives including Punjab Preservation of Subsoil Water Act, 2009 which ban early sowing of paddy nursery and transplantation of saplings. Maharashtra Groundwater (Development and Management) Act, 2009 prohibits drilling of deep wells within for agriculture or industrial usage, pumping of ground water for deep well of depth of 60 mtrs. or more. The CGWA has issued advisories and it requires taking of NOC for ground water withdrawal but the agriculture section is not subjected to ground water regulation on account of socio-

economic implications. The steps taken by the CGWA include directions for rooftop rain water harvesting systems, ground water recharge measures along the National highways, State national highways, railway tracks, etc., artificial recharge in over-exploited areas, large and medium industries using ground water to take up the ground water conservation measures. CGWA imposes condition while granting NOC for withdrawal of ground water in States/UTs which do not have functional ground water authorities. NOCs are granted online in a user-friendly manner. Industries in safe category are exempted from NOC but in OCS areas, condition for grant of NOC is rain water harvesting/ground water recharge measures and NOCs are denied in over-exploited areas. Non-water intensive industries drawing ground water up to 100 m³/day are exempted from NOC in critical areas, non-water intensive industries drawing up to 50 m³/day are exempted from NOC. (In over-exploited areas, non-water intensive industries are exempted which are drawing ground water up to 25 m³/day. Permitted water extraction is restricted to 60% of the proposed recharge. Ground water extraction should not be exceed 1,500m³/day for each unit. In semi-critical areas, ground water extraction is restricted to 200% and 100% of proposed recharge for non-water intensive and water intensive industries respectively. In critical areas, ground water extraction is permitted up to 100% and 50% of proposed recharge for non-water intensive and water intensive industries respectively. In over-exploited areas, ground water extraction is permitted up to 50% of the proposed recharge). Till 2015, existing industries were not required to seek any NOC. In compliance of order of the Tribunal dated 15.04.2015, existing industries were brought within the purview of NOC with effect from 16.11.2015.

16. We may now refer to the Notification dated 12.12.2018, issued by the Ministry of Water Resources, River Development and Ganga Rejuvenation under Section 3(3) of the Environment (Protection) Act, 1986. Some of the striking salient features of the notification are as follows:

- i. Exemption of individual households to draw ground water from single dug well/bore well/tube well through delivery pipe of upto 1" diameter and certain other categories, even if there is an existing supply of drinking water.
- i. Beyond the said exemption, ground water withdrawal can be permitted on the basis of NOC where water supply is not adequate subject to certain conditions.
- ii. Infrastructural projects including water supply agencies can be allowed to get NOC and the said industries are in Annexure-VI i.e.:

Indicative List of Infrastructure projects

<i>Residential apartment</i>
<i>Residential township</i>
<i>Office building</i>
<i>School</i>
<i>College</i>
<i>University</i>
<i>Industrial Area (Drinking use)</i>
<i>SEZ (Drinking use)</i>
<i>Metro Station</i>
<i>Railway Station</i>
<i>Bus Depot</i>
<i>Airport</i>
<i>Seaport</i>
<i>Highway infrastructure</i>
<i>Fire station</i>
<i>Warehouse</i>
<i>Business Plaza</i>
<i>Malls & Multiplex</i>
<i>Hospitals</i>
<i>Nursing Homes</i>
<i>Water Park/ Theme Park/ Amusement Park</i>
<i>Resort</i>
<i>Hotel/ Restaurant/ Food Plaza</i>
<i>Holiday home/ Guest house</i>
<i>Banquet Hall/ Marriage Gardens</i>
<i>IT Complex</i>
<i>Logistics & Cargo</i>
<i>Clubs</i>
<i>Trade Centre</i>

- iii. Other industries can be granted NOC through energized means including industrial mining/infrastructure projects, industries mining projects and infrastructure projects requiring dewatering or use of ground water for construction.

17. Relevant provisions in the impugned notification are quoted for ready reference:-

“2.1 Exemption

1. The following categories of users shall be exempted from obtaining NOC for ground water abstraction:

- (i) All users drawing/proposing to draw ground water through non-energized means (bucket & rope, hand pump, mhote etc.)
- (ii) Individual households drawing/proposing to draw ground water from a single dug well/ bore well/ tube well through delivery pipe of upto 1” diameter.

xx.....xx.....xx

2.2.1 Individual households:

Individual houses drawing/proposing to draw ground water through more than one functional bore well/ tube well / dug well or drawing ground water through delivery pipe of more than 1” diameter from a single ground water abstraction structure shall be required to seek NOC for ground water withdrawal under this category.

xx.....xx.....xx

2.2.2 Infrastructure projects /industries/ mining projects / public water supply agencies / others requiring water only for drinking & domestic use

An indicative list of infrastructure projects to be considered under this category is given in Annexure VI. NOC for ground water withdrawal for drinking and domestic purpose only for infrastructure projects/ industry/ mining projects/ water supply agencies / others.

xx.....xx.....xx

2.3 Industrial /Mining/ Infrastructure projects

All industries / mining / infrastructure projects, whether existing / new/ under expansion and drawing/ proposing to draw ground water through energized means shall need to obtain NOC for ground water withdrawal from Central Ground Water Authority.

xx.....xx.....xx

2.3.1 Industries

NOC to industries shall be granted only for such cases where government agencies are not able to supply the desired quantity of water.
XX.....XX.....XX

2.3.2 Mining Projects

All existing as well as new mining projects need to obtain NOC for mine dewatering and / or ground water withdrawal through wells, if any, from Central Ground Water Authority.
XX.....XX.....XX

2.3.3 Infrastructure projects requiring dewatering or use of ground water for construction

New infrastructure projects/ residential buildings may require dewatering during construction activity and/or use ground water for construction. In both cases, applicants shall seek NOC from CGWA before commencement of work.
XX.....XX.....XX

2.4 Agricultural Sector

Agriculture sector is the backbone of the Indian economy. Since livelihood of farmers is dependent on agriculture, they shall be exempted from obtaining NOC for ground water withdrawal from the CGWA. Concerned State Departments (Agriculture / Irrigation / Water Resources) shall be required to undertake suitable demand and supply side measures to ensure sustainability of ground water sources.
XX.....XX.....XX

2.5 Abstraction of Saline/ contaminated ground water

Abstraction of saline/ contaminated ground water for use by industries dewatering by infrastructure / mining projects including those located in over-exploited areas would be encouraged.
XX.....XX.....XX

2.6 Water Conservation Fee (WCF)

.....all ground users would have to pay WCF based on quantum of ground water extraction as per details given below.
XX.....XX.....XX

- I. Drinking & Domestic use
 - II. Packaged drinking water units drawing more than 50 m³ per day/ soft drinks/ breweries/ distilleries
 - III. Packaged Drinking Water units (drawing less than 50 m³ per day) and other industries
 - IV. Mining / infrastructure dewatering projects
- XX.....XX.....XX

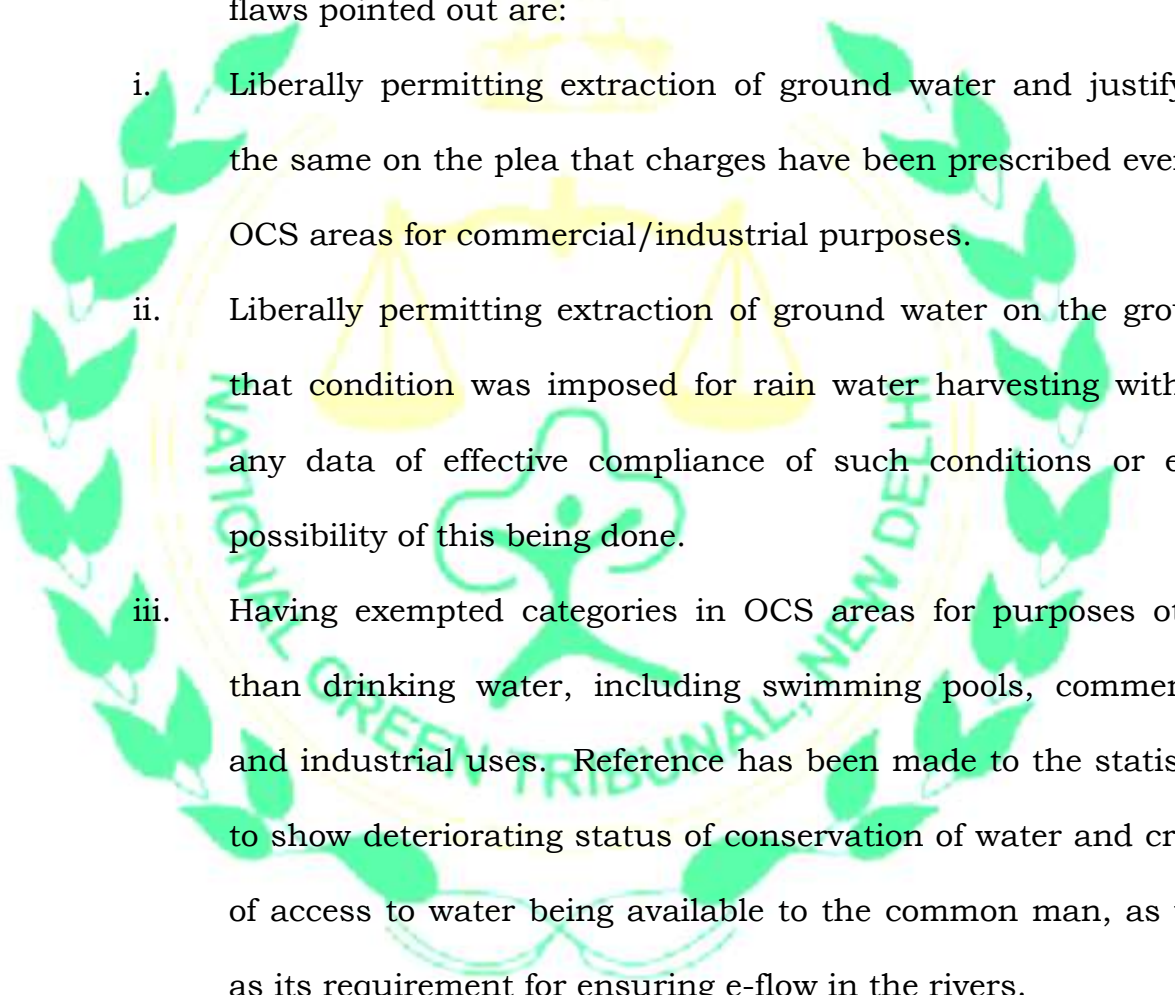
5. Delegation of powers to monitor compliance of NOC Conditions

Central Ground Water Authority has appointed the District Magistrate/ District Collector / Sub Divisional Magistrates of each Revenue District and Regional Directors of CGWB through Public Notice as Authorized officers, who have been delegated the power to monitor compliance, check violations and seal illegal wells, launch prosecution against offenders etc. including grievance redressal related to ground water. In cases of violation such as illegal ground water withdrawal, the District Magistrate/ District Collector/ Sub Divisional Magistrate, subject to his/her satisfaction, shall ensure discontinuation of the same by the seizure of drilling rig, sealing of tube well/ bore well if so constructed and also disconnection of electricity supply to the energised well.”

18. We have heard the learned Counsel for the parties.

19. Mr. Panjwani, learned Senior Counsel, appearing for some of the applicants, submitted that the MoWR has clearly acted contrary to the mandate of the judgement of the Hon'ble Supreme Court in *M.C Mehta (Supra)* as well as orders of this Tribunal requiring regulation of ground water, particularly for the OCS areas. The CGWA cannot surrender its responsibility on the ground that the States which had their own regulation need not be regulated by CGWA. In, the revised guidelines, the situation has been made worst by liberalizing the regime of control against extraction of ground water in OCS areas even for commercial/industrial purposes. There is no study undertaken of the likely impact for such liberalization on the ground water resources and there is no projected estimation as to how the revised policy will result in better conservation of ground water which is necessary for compliance of the Precautionary Principle, Sustainable Development Principle as well as Inter-generational Equity Principles. It seems that the revised policy is a sort of knee jerk reaction in response to observations of this Tribunal. It appears that MoWR has not undertaken any strength, weakness, opportunities and threats (SWOT) analysis to ascertain the weaknesses of old policy and

the threat scenarios it offers. It is silent on robust institutional mechanism on surveillance and monitoring of its ground implementation. It rather abdicates its authority in form of delegation to field units without any checks and balances to regulate ground water extraction, on scientific lines and environmentally sustainable manner. Despite stating that the guidelines shall be applicable Pan-India, the notification does not cover the States of Kerala, Karnataka, Andhra Pradesh, Telangana, West Bengal, Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir and the UT of Delhi. The serious flaws pointed out are:

- 
- i. Liberally permitting extraction of ground water and justifying the same on the plea that charges have been prescribed even in OCS areas for commercial/industrial purposes.
 - ii. Liberally permitting extraction of ground water on the ground that condition was imposed for rain water harvesting without any data of effective compliance of such conditions or even possibility of this being done.
 - iii. Having exempted categories in OCS areas for purposes other than drinking water, including swimming pools, commercial and industrial uses. Reference has been made to the statistics to show deteriorating status of conservation of water and crises of access to water being available to the common man, as well as its requirement for ensuring e-flow in the rivers.

20. It is clear from the above that, rather than laying down stricter norms for extraction of ground water for commercial purposes and putting in place a robust institutional mechanism for surveillance and monitoring, extraction of ground water has been liberalized adding to the crisis unmindful of the ground situation and likely impact it will have on environment. No data

has been furnished to justify the policy reversal by way of uncontrolled liberalized drawal of groundwater in OCS areas.

21. The provisions of the impugned notification show that drawal of ground water has been, for all practical purposes, made unregulated in all areas, including the OCS areas.

22. The so called regulation is illusory. The so called conditions are incapable of meaningful monitoring, as shown by past experience also.

23. The water conservation fee virtually gives licence to harness ground water to any extent even in OCS areas.

24. There is no institutional mechanism to monitor removal and replenishment of ground water.

25. Delegation provision is virtual abdication of authority.

26. There is no check on injection of pollutants in the ground water in the impugned notification. There is no provision with regard to check on water quality and its remediation, if there is contamination.

27. We are satisfied that the Notification dated 12.12.2018 tested on the Precautionary Principle, Sustainable Development as well as Inter-generational Equity Principles is unsustainable in law and instead of conservation of ground water which is necessary for providing access to drinking water in OCS areas, as well also other needs of environment, including sustenance of rivers and other water bodies, it will result in fast depletion of ground water and damage to water bodies and will be destructive of the fundamental right to life under Article 21 of the Constitution of India.

28. Accordingly, the impugned Notification may not be given effect to in view of serious shortcomings as pointed above so that an

appropriate mechanism can be introduced consistent with the needs of environment.

29. The MoEF&CC is directed to constitute an Expert Committee by including representatives from IIT Delhi, IIT Roorkee, IIM Ahmedabad, CPCB, NITI Ayog and any other concerned agency or department to examine the issue of appropriate policy for conservation of ground water with a robust institutional mechanism for surveillance and monitoring with a view to enhance access to ground water for drinking purposes in OCS areas by way of appropriate replenishment practices which can be properly accounted and measured for as well as to sustain the floodplains of rivers in terms of e-flows and other water bodies. The MoEF & CC and MoWR may finalize the issue of subject remain *inter-se* with regard to ground water reserve and its quality.

30. The Committee may be constituted in two weeks and report of the Committee may be furnished to the MoEF &CC and this Tribunal in two months by e-mail at ngt.filing@gmail.com.

31. The Committee may also indicate the projection of its impact study in light of projected data for the next 50 years (in phased manner with action plan for each decade). Thereafter, fresh guidelines be issued by the concerned Ministry and the report furnished to the Tribunal on or before 30.04.2019.

32. The CPCB may constitute a mechanism to deal with individual cases of violations of norms, as existed prior to Notification of 12.12.2018, to determine the environment compensation to be recovered or other coercive measures to be taken, including prosecution, for past illegal extraction of ground water, as per

law. All the matters relating to illegal extraction of ground water by individuals are disposed of with these directions.

33. The Expert Committee report, the new policy and challenge to orders of authorities, if any, will be considered on the next date.

The matter be put up for above consideration in the first week of May, 2019.

Adarsh Kumar Goel, CP

S.P. Wangdi, JM

K. Ramakrishnan, JM

Dr. Nagin Nanda, EM

January 03, 2019
Original Application No. 176/2015
(M.A. No. 1332/2015) and other connected matters
AK



Appendix 29 : Road Restoration Guidelines as per NGT' Directives



दिल्ली सरकार

प्रमुख अभियंता, लो०नि०वि०,

12वां तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली- 110002

23317926, 23724561, 23317520, फैक्स 23766924

Toll Free Complaint No. 1800 11 0093

वेबसाइट: <http://pwd.delhigovt.nic.in>

ई-मेल: pwdhqdelhi@gmail.com/dppwdhqdelhi@gmail.com



सं०: (जीसीसी)/लो०नि०वि०/निदेशक(कार्य एवम् स्था.)/2018/158CX(h)

दिनांक. 12.03.2018

सेवा में

1. मुख्य अभियंता(उत्तर), लो.नि.वि, 5वां तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।
2. मुख्य अभियंता(दक्षिण), लो.नि.वि, 7वां तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।
3. मुख्य अभियंता(पूर्व), लो.नि.वि, तीसरा तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।
4. मुख्य अभियंता(स्वास्थ्य) अनुरक्षण, लो.नि.वि, दूसरा तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।
5. मुख्य अभियंता(शिक्षा) अनुरक्षण, लो.नि.वि, पहला तल, बहु-मंजिला भवन, नई दिल्ली-02।
6. मुख्य परियोजना प्रबंधक (एफ-1), लो.नि.वि, मुकरबा चौक, जी.टी.करनाल रोड, दिल्ली-33।
7. मुख्य परियोजना प्रबंधक (एफ-2), लो.नि.वि, सराय काले खां, रिंग रोड, दिल्ली-13।
8. मुख्य परियोजना प्रबंधक (एफ-5), लो.नि.वि, भैरों रोड, टी जंकशन, प्रगति पावर स्टेशन, नई दिल्ली-02।
9. मुख्य परियोजना प्रबंधक (स्वास्थ्य), लो.नि.वि, 6वां तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।
10. मुख्य परियोजना प्रबंधक (गृह), लो.नि.वि, 13वां तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।
11. मुख्य परियोजना प्रबंधक (शिक्षा), लो.नि.वि, दूसरा तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।
12. मुख्य परियोजना प्रबंधक (अन्य), लो.नि.वि, 13वां तल, बहु-मंजिला भवन, इंदरप्रस्थ संपदा, नई दिल्ली-02।

विषय: Air Pollution-Covering of construction material-Minutes of the meeting of the Pr. Secretaries/Secretaries/HODs Chaired by Chief Secretary on Friday, 16.02.2018 at 2.30 PM.

संदर्भ: महानिदेशालय के०लो०नि०वि० का ओएम सं० डीजी/एसई/सीएम/कोन/विविध/02 दिनांक 16.03.2016.

A letter was issued by this office vide even letter dt. 25.11.2016 to incorporate above referred draft Special conditions for NIT to comply directives of Hon'ble National Green Tribunal dt. 04.12.2014 & 10.04.2015 and EIA Guidance Manual issued in February 2010 the special conditions in the contract document to curb dust pollution at construction site. The above referred OM issued by DG, CPWD as Draft Special conditions for NIT to comply directives of Hon'ble National Green Tribunal dt. 04.12.2014 & 10.04.2015 and EIA Guidance Manual issued in February 2010 is again enclosed to incorporate the same as special conditions in the contract document for works in PWD, GNCTD to curb dust pollution at construction site in view of subject matter.

This issues with the approval of Engineer-in-Chief, PWD.

संलग्न:- उपरोक्तानुसार

(संजीव शर्मागी)

निदेशक(कार्य एवम् स्थापना)

प्रतिलिपि:-

1. प्रधान मुख्य अभियंता (अनुरक्षण), लोनिवि, 12वां तल, एम.एस.ओ.भवन, नई दिल्ली।
2. प्रधान मुख्य अभियंता (परियोजनाए), लोनिवि, 9वां तल, एम.एस.ओ.भवन, नई दिल्ली।

(संजीव शर्मागी)

निदेशक(कार्य एवम् स्थापना)



CENTRAL PUBLIC WORKS DEPARTMENT

OFFICE MEMORANDUM

No. DG/SE/CM/CON/Misc./02

ISSUED BY AUTHORITY OF DIRECTOR GENERAL, CPWD

NIRMAN BHAWAN, NEW DELHI

DATED: 16.03.2016

Sub: Draft Special Conditions for NIT to comply directives of Hon'ble National Green Tribunal dt. 04.12.2014 & 10.04.2015 and EIA Guidance Manual issued in February 2010

The guidelines have been issued by SE(TLC), CPWD vide OMs dt. 23.12.2014 and 01.06.2015 on the subject matter is pursuance of orders passed by Hon'ble National Green Tribunal. The Director(Tech & PR) has also issued directives on Air Pollution from construction and demolition activity. These guidelines should be made part of NIT as special conditions and agreement items. The same are summarized as under:-

1. The contractor shall not store/dump construction material or debris on metalled road.
2. The contractor shall get prior approval from Engineer-in-Charge for the area where the construction material or debris can be stored beyond the metalled road. This area shall not cause any obstruction to the free flow of traffic/inconvenience to the pedestrians. It should be ensured by the contractor that no accidents occur on account of such permissible storage.
3. The contractor shall take appropriate protection measures like raising wind breakers of appropriate height on all sides of the plot/area using CGI sheets or plastic and /or other similar material to ensure that no construction material dust fly outside the plot area.
4. The contractor shall ensure that all the trucks or vehicles of any kind which are used for construction purposes/or are carrying construction material like cement, sand and other allied material are fully covered. The contractor shall take every necessary precautions that the vehicles are properly cleaned and dust free to ensure that enroute their destination, the dust, sand or any other particles are not released in air/contaminate air.
5. The contractor shall provide mask to every worker working on the construction site and involved in loading, unloading and carriage of construction material and construction debris to prevent inhalation of dust particles.
6. The contractor shall provide all medical help, investigation and treatment to the workers involved in the construction of building and carry of construction material and debris relatable to dust emission.
7. The contractor shall ensure that C&D waste is transported to the C & D Waste site only and due record shall be maintained by the contractor.
8. The contractor shall compulsory use of wet jet in grinding and stone cutting.

9. The contractor shall comply all the preventive and protective environmental steps as stated in the MoEF guidelines, 2010.
10. The contractor shall carry out on-Road- Inspection for black smoke generating machinery. The contractor shall use cleaner fuel.
11. The contractor shall ensure that all DG sets comply emission norms notified by MoEF.
12. The contractor shall use vehicles having pollution under control certificate. The emissions can be reduced by a large extent by reducing the speed of a vehicle to 20 kmph. Speed bumps shall be used to ensure speed reduction. In cases where speed reduction cannot effectively reduce fugitive dust, the contractor shall divert traffic to nearby paved areas.
13. The contractor shall ensure that the construction material is covered by tarpaulin. The contractor shall take all other precaution to ensure that no dust particles are permitted to pollute air quality as a result of such storage.
14. The paving of the path for plying of vehicles carrying construction material is more permanent solution to dust control and suitable for longer duration projects. The NIT approving authority shall carry out cost benefit ratio analysis of the same.

Conditions to be included as Agreement item.

1. The contractor shall take appropriate protection measures like raising wind breakers of appropriate height on all sides of the plot/area using CGI sheets or plastic and /or other similar material to ensure that no construction material dust fly outside the plot area. The NIT approving authority shall take such item in the schedule of quantity to ensure that the construction activity does not cause any air pollution during course of construction and/or storage of material or construction activity.
2. The paving of the path for plying of vehicles carrying construction material is more permanent solution to dust control and suitable for longer duration projects. The NIT approving authority shall carry out cost benefit ratio analysis of the same. Based on the cost benefit ratio analysis, the NIT approving authority shall include the item of paving of path in schedule of item which can be utilized as a permanent path for client after construction of project.
3. The NIT approving authority shall take lead of C&D waste from construction site to C&D waste site in the scheduled of item.


Superintending Engineer (C&M)

Issued from file no. CSQ/CM/ 17(1)/2016

Copy to:

- (1) All Spl. DGs/ADGs CPWD. E-in-C PWD, Delhi Govt. They are requested to endorse a copy of this to all CEs, SEs & EEs concerned.


Executive Engineer (C)

Appendix 30 : Ambient Air & Noise Quality Standards comparative chart

A. Ambient Air Quality Standards

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		Applicable Per ADB SPS ^e ($\mu\text{g}/\text{m}^3$)
			Global Update 2005 ^c	Second Edition 2000 ^d	
PM10	Industrial Residential, Rural and Other Areas	60(Annual) 100(24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
	Sensitive Area	60(Annual) 100(24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
PM25	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-	10 (Annual) 25 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)		10 (Annual) 25 (24-hr)
SO2	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	50 (Annual) 20 (24-hr) 500 (10-min)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	20 (Annual) 20 (24-hr) 500 (10-min)
NO2	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	40 (Annual) 80 (24-hr) 200(1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	30 (Annual) 80 (24-hr) 200 (1-hr)
CO	Industrial Residential, Rural and Other Areas	2,000(8-hr) 4,000(1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000(8-hr) 4,000(1-hr) 100,000 (15-min)
	Sensitive Area	2,000(8-hr) 4,000(1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000(8-hr) 4,000(1-hr) 100,000 (15-min)
Ozone (O3)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
Lead (Pb)	Industrial, Residential, Rural and Other Areas Sensitive Area	0.5 (Annual) 1.0 (24-hr) 0.5 (Annual) 1.0 (24-hr)		0.5 (Annual) 0.5 (Annual)	0.5 (Annual) 1.0 (24-hr) 0.5 (Annual) 1.0 (24-hr)

Ammonia (NH₃)	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)
	Sensitive Area	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)
Benzene (C₆H₆)	Industrial Residential, Rural and Other Areas	5 (Annual)			5 (Annual)
	Sensitive Area	5 (Annual)			5 (Annual)
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)			0.001 (Annual)
	Sensitive Area	0.001 (Annual)			0.001 (Annual)
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)			0.006 (Annual)
	Sensitive Area	0.006 (Annual)			0.006 (Annual)
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)			0.02 (Annual)
	Sensitive Area	0.02 (Annual)			0.02 (Annual)

- Sensitive area refers to such areas notified by the India Central Government.
- Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009
- WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. Global update 2005. WHO. 2006
- Air Quality Guidelines for Europe Second Edition. WHO 2000.
- Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADBSPS.

Appendix 31: Vehicle Exhaust Emission Norms

Passenger Cars

Norms	CO(g/km)	HC+ NOx(g/km)
1991 Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998 Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35 (combined)
Bharat Stage-IV	1.0	0.18 (combined)

Heavy Diesel Vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991 Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

(Source: Central Pollution Control Board)

CO = **Carbon Monoxide;**
g/kmhr = **Grams per kilometer-hour;**
HC = **Hydrocarbons;**
NOx = **Oxides of nitrogen;**
PM = **Particulates Matter**

Appendix 32: Drinking Water Standards & Source Surface Water Quality standards

Drinking Water Standards

Group	National Standards for Drinking Water ^a			WHO Guidelines for Drinking-Water Quality, 4 th Edition, 2011 ^b	Applicable Per ADB SPS ^{c, d}
	Parameter	Unit	Max. Concentration Limits ^d		
Physical	Turbidity	NTU	1 (5)	-	1 (5)
	pH		6.5 – 8.5	None	6.5 – 8.5
	Color	Hazen units	5 (15)	None	5 (15)
	Taste and Odor		Agreeable	-	Agreeable
	TDS	mg/l	500 (2,000)	-	500 (2,000)
	Iron	mg/l	0.3	-	0.3
	Manganese	mg/l	0.1 (0.3)	-	0.1 (0.3)
	Arsenic	mg/l	0.01 (0.05)	0.01	0.01
	Cadmium	mg/l	0.003	0.003	0.003
	Chromium	mg/l	0.05	0.05	0.05
	Cyanide	mg/l	0.05	None	0.05
	Fluoride	mg/l	1 (1.5)	1.5	1 (1.5)
	Lead	mg/l	0.01	0.01	0.01
	Ammonia	mg/l	0.5	none established	0.5
Chemical	Chloride	mg/l	250 (1,000)	none established	250 (1,000)
	Sulphate	mg/l	200 (400)	None	200 (400)
	Nitrate	mg/l	45	50	45
	Copper	mg/l	0.05 (1.5)	2	0.05 (1.5)
	Total Hardness	mg/l	200 (600)	-	200 (600)
	Calcium	mg/l	75 (200)	-	75 (200)
	Zinc	mg/l	5 (15)	none established	5 (15)
	Mercury	mg/l	0.001	0.006	0.001
	Aluminum	mg/l	0.1 (0.3)	none established	0.1 (0.3)
	Residual Chlorine	mg/l	0.2	5	0.2
Micro Germs	E-coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 MI sample
	Total Coliform	MPN/100ml			

a. Bureau of India Standard 10200:2012.

b. Health-based guideline values.

c. Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADBSPS.

d. Figures in parenthesis are maximum limits allowed in the absence of alternate source.

Appendix 33: Sample Grievance Registration Form

21 परिशिष्ट) : शिकायत पंजीकरण नमूना फॉर्म(

(To be available in Hindi and English)(हिंदी और अंग्रेजी में उपलब्ध)

The _____ Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing ***(CONFIDENTIAL)*** above your name. Thank you.

परियोजना _____ कार्यान्वयन के संबंध में शिकायतों, सुझावों, प्रश्नों और टिप्पणियों का स्वागत करती है। हम लोगों को शिकायत के साथ उनका नाम और संपर्क जानकारी प्रदान करने के लिए प्रोत्साहित करते हैं ताकि हम स्पष्टीकरण और प्रतिक्रिया के लिए आपसे संपर्क कर सकें।

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Means of disclosure: (प्रकटीकरण के साधन):	

Annex D: Geotechnical Investigation Report

**ASIAN DEVELOPMENT BANK (ADB) ASSISTED
DELHI WATER SUPPLY IMPROVEMENT INVESTMENT PROGRAM**

**GEOTECHNICAL INVESTIGATION REPORT
FOR
PACKAGE DWSIIP 04**

Report No. 16205-B Dated: 17.12.2017

Submitted by:



**UV GLOBAL GEO SOLUTIONS PVT. LTD.
GEOTECHNICAL CONSULTANTS & LAND SURVEYORS**

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Consultant/PMC:

**NJS Consultants Co., Ltd.
In Joint Venture with
ICRA Management Consulting Services Limited
TATA Consulting Engineers Ltd. &
NJS Engineers India Pvt. Ltd.
Gyan Avenue, 12 Pragati Market
Ashok Vihar II, Delhi – 110 052**




UV GLOBAL GEO SOLUTIONS PVT. LTD.

GEOTECHNICAL REPORT

**Project: GEOTECHNICAL INVESTIGATION FOR PACKAGE
DWSIIP 04**

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION


The Government of India is negotiating a multi-tranche financing facility (MFF) with the Asian Development Bank (ADB) for financing the 'Delhi Water Supply Improvement Investment Program' (DWSIIP), which comprises improvement of the water supply system in Wazirabad Water Treatment Plant (WTP) command area of Delhi.

Delhi Jal Board (DJB) is the proposed investment program's Executing Agency (EA). The DJB under the Govt. of NCT of Delhi was established for construction, operation and maintenance of the water supply and wastewater infrastructure facilities within the NCT of Delhi.

The objectives of the Master Plan for Delhi 2021 (MPD 2011) are:

- To ensure equitable Water Supply;
- To extend water supply to outer areas;
- Better Demand Management by reduction in water loss and rationalizing tariff;
- To rationalize energy efficiency through better energy Management and,
- To identify steps to achieve 24 x 7 supply.

DWSIIP will be implemented with the above objectives along with other capacity improvements. The DWSIIP will complement past and ongoing efforts of the Government of National Capital Territory of Delhi (NCTD) to improve water supply services to the residents of NCTD through the access to reliable, continuous and sustainable water supply services improved after implementation of DWSIIP.

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NJS Consultants Co., Ltd. (Japan) have been employed as consultants for Project Monitoring and Implementation of the project.

As a part of the scope under DWSIIP, Geotechnical Investigations are being undertaken to cover the command areas. The scope of works includes construction of buildings, partially underground tanks, laying pipes of various materials and sizes and other ancillary structures. To assess the engineering and other properties of the underlying soil strata borehole investigations were undertaken along with Electrical Resistivity Tests.

We, UV GLOBAL GEO SOLUTIONS PVT. LTD., were assigned by NJS Consultants Co., Ltd. (Japan) to undertake the Geotechnical Investigations for this prestigious project.


The report covers the scope boreholes and ERTs of the package and gives the observations, results of investigations and recommendations based on the same.

A layout plan showing the locations of our field investigation is attached at the end of the report.

1.2 **PURPOSE OF INVESTIGATION**

The purpose of this study are to investigate the stratigraphy at the site and to develop geotechnical recommendations for foundation design and construction. To achieve these purposes, the following study was conducted at the site.

- (a) Drilling 42 boreholes (**37 boreholes to 5.0m, 1 borehole to 30.0m, 1 borehole to 10.0m & 3 boreholes to 15.0m**) to 5.0-30.0m depth or Refusal whichever met earlier, through Soil and to collect disturbed and undisturbed soil samples.

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- (b) Conducting 12 Nos. of Electrical Resistivity tests (E01 to E12) at the site.
- (c) Laboratory testing for selected soil samples to determine different properties of the soils; and
- (d) Analyzing all field and laboratory data in order to develop engineering recommendations for foundation design and construction.
- (e) Preparation and submission of technical report.

2.0 FIELD INVESTIGATIONS CONDUCTED

Locations of Boreholes and ERTs have been marked at the site as per the approved drawing provided by the client to us. These locations have been marked as B5-01 to 28, 31, 32, 34, 36, 42, 44 to 46 & 48, B10-01, B15-01 to 03, B30-01 & E01 to E12 in this report.


3.0 METHODOLOGY/PROCEDURE

3.1 BOREHOLES

The boreholes were progressed to the specified depth of 5.0m-30.0m. The work was done in accordance with IS:1892-1979.

Standard Penetration Tests (SPT) were conducted in the borehole at 1.5-3.0m interval by connecting a split spoon sampler to 'A' rods and driving it by 45 cm using a 63.5 kg hammer falling freely from a height of 75 cm. The tests were done in accordance with IS:2131-1981.

The number of blows for each 15 cm of penetration was recorded. The blows required to penetrate the initial 15 cm of the split spoon for seating the sampler is ignored due to the possible presence of loose materials or cuttings from the drilling operation. The cumulative number of blows required to penetrate the balance 30 cm of the 45 cm sampling interval is termed the SPT value or the 'N' value.

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Disturbed samples were collected from the split spoon after conducting SPT. The samples were preserved in transparent polythene bags. Undisturbed samples were collected by attaching a 100 mm diameter thin walled 'Shelby' tubes and driving the sampler lightly using a 63.5 kg hammer in accordance with IS:2132 .

3.2 ELECTRICAL RESISTIVITY TEST

Electrical resistivity of the soil at the site was determined at the locations specified by the client. The earth resistivity test is used for shallow subsurface exploration by means of electrical measures made at the ground surface.

Resistivity measurements are made by driving four electrodes about 10 to 15 cm into the ground at a pre-selected electrode spacing.

The four electrodes were spaced at equal distance along different locations. The average of the resistivity values for each direction was taken as the mean resistivity for that spacing. The test procedure is in accordance with IS:3043:1987.

Measurements are made by causing a current, I, to pass through the earth and distribute within a relatively large hemispherical earth mass.

The portion of the current that flows along the surface produces a voltage drop, V.

The resistance "R" is the ratio of voltage drop 'V' to current I is directly measured by digital earth resistance tester. The resistivity is determined from the following equation -


$$\rho = 2 \pi a R$$

where :

ρ = apparent resistivity, ohm-m.

a = spacing between the electrodes, metres

R = Resistance, ohms.

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3.3 GROUND WATER


Groundwater level in the boreholes was recorded after 24 hours after drilling was completed. It is mentioned in the borehole logs attached with the report.

4.0 LABORATORY TESTS

The following table presents the various tests conducted on Soil & Water samples in the laboratory:

Laboratory Test		IS : Code Referred
Natural moisture content		IS : 2720 (Part-2)-1973
Grain size analysis		IS : 2720 (Part-4)-1985
Liquid & Plastic limit		IS : 2720 (Part-5)-1985
Unconsolidated Undrained Triaxial shear test		IS : 2720 (Part-11)-1993
Consolidated Drained Direct Shear Test		IS : 2720 (Part-13)-1986
Unconfined Compression Test		IS : 2720 (Part-10)-1991
Specific Gravity Test		IS : 2720 (Part-3)-1980
Chemical Analysis of soil	Determination of pH value	IS : 2720 (Part-26)-1987
	Determination of total soluble sulphate	IS : 2720 (Part-27)-1977
	Determination of chloride content	IS : 3025 (Part-24)-1998
Chemical Analysis of water	Determination of total soluble sulphate	IS : 3025 (Part-11)-1996
	Determination of chloride content	IS : 3025 (Part-24)-1998
	Determination of pH value	IS : 3025 (Part-32)-1993

All test Results are being presented at Table no 1 & 42 of soil profiles & Fig. No. 43 to 170 attached in the report.

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5.0 SITE STRATIGRAPHY

A fill is met to about 0.5-2.5m depth at some borehole locations at the site. Below fill, the soils met at the site are in alternate layers of light brown Sandy silt(CL), Silty sand(SM) & Fine Sand (SP-SM) to the final explored depth of 5.0m-30.0m.

Groundwater was encountered at about **2.50-8.70m** depth below ground surface during our field investigation (Oct-Nov, 2017). Fluctuations may occur in measured water table due to variation in rainfall and surface evaporation rates.


The SPT values at site range from 7 to 15 to about 3.0m depth and from 15 to 26 to about 12.0m depth. Below this, SPT values range from 28 to 53 to the final explored depth of 30.0m.

6.0 LIQUEFACTION ANALYSIS

As per IS 1893-2002, liquefaction is likely in Sand strata below water table for SPT values less than 15. At this site, Groundwater was encountered at about **2.50-8.70m** depth below ground surface. The soils classify primarily as Sandy Silt (CL), Silty sand (SM) & Fine Sand below foundation level.

The SPT values at site range from 7 to 15 to about 3.0m depth and from 15 to 26 to about 12.0m depth. Below this, SPT values range from 28 to 53 to the final explored depth of 30.0m.

On review of all soil parameters like, SPT values, Soil gradation, Depth to water table etc., we are of the opinion that **the soil is liquefiable up to 4.5m depth at Wazirabad WTP location(B15-01 to B15-03). However, at other locations, the soil is non-liquefiable.**

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7.0 **FOUNDATION TYPE & DEPTH**

Reviewing the site Stratigraphy, SPT 'N' values and laboratory test results, We recommend that Isolated open spread foundation or Raft foundation at or below 2.0m depth below the existing ground surface may be provided at the site to support the structural loads. However, for Pipe laying & Temporary structures, we recommend the founding depth at or below 1.0m depth below existing ground surface.

However for Wazirabad WTP location (B15-01 to B15-03), We recommend that Isolated open spread foundation or Raft foundation at or below 5.0m depth below the existing ground surface may be provided at the site to support the structural loads.

However, in any case, it should be ensured that the foundation is seated at-least 0.5m into natural soil below fill formation.


As ground water is met at shallow depth in some borehole locations, dewatering may be required to complete the construction under dry condition.

Alternatively, at Wazirabad WTP location, Bored cast-in-situ pile foundation may also be provided at the site to support the structural loads. Recommendations for the same are provided in section 9.0 of this report.

8.0 **CONCEPT OF ANALYSIS FOR OPEN/RAFT FOUNDATIONS.**

Bearing capacity analysis for Open spread foundations/Raft foundation have been done in general accordance with IS:6403-1981. For the soil conditions encountered at this site, average of local and general shear failure conditions has been used for analysis.

Settlement analysis has been performed based on the SPT values as per chart given in IS:8009 Part-I-1976. As per IS 1904-1986, the tolerable total settlement is taken as 50 mm.

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Appropriate values have been substituted into the bearing capacity equation given in IS-6403 to compute the safe net bearing capacity. The values have been checked to determine the settlement of the foundation under the safe bearing pressure. The allowable bearing pressure has been taken as the lower of the two values computed from the bearing capacity shear failure criterion as well as that computed from the tolerable settlement criterion. The same has been recommended for the design.


9.0 RECOMMENDATIONS

9.1 OPEN/RAFT FOUNDATIONS

The following table presents our recommended values of net allowable bearing pressure for 2-5 m wide Isolated Open Spread foundations or Raft foundation (width > 6.0m) bearing at or below 1.0 m depth below the existing ground surface along with Modulus of Sub-grade reaction & Modulus of Elasticity Values for different locations.

Borehole Location	Foundation Depth below Existing ground level, m	Recommended Net Allowable Bearing Pressure, T/m ²	Modulus of Sub grade reaction, Kg/cm ³	Modulus of Elasticity, MPa
B5-01 to 06, 08 to 11, 13, 15 to 18, 28,31,32,34,36,42,44 to 46 & 48.	1.0*	7.0*	0.5*	4.5*
	2.0	10.7	0.9	7.1
	3.0	13.0	1.0	8.2
	3.5	14.0	1.1	8.6
B5-07, 12, 14, 19 to 27.	1.0*	6.8*	0.4*	4.0*
	2.0	10.0	0.8	6.5
	3.0	12.0	0.9	7.6
	3.5	13.0	1.0	8.0
B10-01 & B30-01	1.0*	8.0*	6.0*	5.0*
	2.0	11.5	1.0	8.0
	3.0	13.5	1.1	8.9
	4.0	16.3	1.4	9.8
	5.0	18.8	1.7	11.0
	6.0	21.5	1.8	11.8
B15-01 to B15-03	5.0	12.0	0.8	7.0
	5.5	13.5	0.9	8.0

(*) Values at 1m are for temporary structures and pipe lines only

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The above values include a safety factor of 2.5. Total settlement of foundation designed for the above net bearing pressure is expected to be about 50 mm. Net bearing pressure for foundations at intermediate depths may be interpolated linearly between the values given above.


9.2 BORED CAST-IN-SITU PILE FOR WTP WAZIRABAD LOCATION (B15-01 TO B15-03)

Bored cast-in-situ piles are a feasible foundation scheme to support the structural loads of the proposed building. The following table presents the various parameters used for calculating pile capacities.

Depth, m		Soil Classification	c, T/m ²	ϕ , degree	γ , T/m ³
From	To				
0.0	4.5	Liquefiable	--	--	--
4.5	7.0	Fine Sand	0.0	28	1.70
7.0	12.0	Fine Sand	0.0	28	1.80
12.0	15.0	Fine Sand	0.0	29	1.90

The following table presents our recommended Compressive pile capacities for 450 mm, 500mm and 600 mm diameter Bored piles with a cut off level of 1.5-2.0m depth below NGL. For pile capacity design, water table has been considered to rise upto ground surface for worst condition.

Pile Diameter , mm	Pile Tip Length Below COL, m	Recommended Compressive Pile capacities , Tonnes
450	11.0	18.0
	12.0	20.0
	13.0	22.0
500	11.0	22.0
	12.0	25.0
	13.0	28.0

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Pile Diameter , mm	Pile Tip Length Below COL, m	Recommended Compressive Pile capacities , Tonnes
600	11.0	30.0
	12.0	34.0
	13.0	38.0

The above values are based on as per IS:2911, Part-1, Section-II and include a safety factor of 2.5. Safe capacities of piles of intermediate length may be interpolated linearly between the values given above. Piles should be load tests to verify capacities as per IS:2911,Part-IV.

Note: The investigation conducted at the Wazirabad WTP location is very limited. The recommendations provided above for the same are simply guidelines to understand the Stratigraphy of the area. We recommend that a detailed investigation with more no. of boreholes with deeper depth should be conducted at the site to evaluate the accurate bearing capacities.

10.0 ELECTRICAL RESISTIVITY TEST RESULT

Twelve Electrical resistivity tests were conducted at the site as per IS : 3043-1987 . The tests were conducted using the Wenner configuration along different directions at various electrode spacings ranging from 1 to 10 m. The average apparent resistivity values are tabulated below:

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Electrode Spacing, m	Average Resistivity, ohm-m											
	E01	E02	E03	E04	E05	E06	E07	E08	E09	E10	E11	E12
1.0	16.2	19.0	9.6	16.6	18.2	19.5	5.2	12.2	18.2	11.3	6.8	53.4
2.0	12.4	17.0	11.2	10.1	15.3	26.3	5.2	6.1	8.9	2.8	3.3	46.5
3.0	10.6	13.8	9.1	10.2	12.5	26.9	3.9	4.2	5.7	0.8	4.6	39.6
5.0	8.2	12.9	8.2	8.8	9.2	16.0	4.6	4.8	6.0	4.2	5.7	21.4
7.0	7.5	8.8	5.3	7.9	10.8	17.6	5.3	4.0	5.3	1.3	4.4	18.0
10.0	4.9	3.8	3.1	11.9	10.4	11.3	5.3	4.9	5.0	5.7	4.4	12.6

These resistivity data are used as an indicator for potential for corrosion of buried metallic pipes and other utility lines.


11.0 LABORATORY PERMEABILITY TEST RESULTS

Permeability tests were conducted at different samples in the laboratory. The coefficient of permeability is tabulated as below.

Borehole No.	Depth, m	Permeability, k, cm/sec.
B5-06	3.00	9.23E-05
B5-09	1.50	4.78E-04
B5-12	4.50	7.26E-03
B5-31	1.50	2.18E-03
B15-02	4.50	8.88E-03

12.0 CHEMICAL RESULTS

Chemical test results on soil and groundwater are presented on sheet no. 170 of the report. The results indicate that the soils contain about 0.11-0.14 percent sulphates and 0.02-0.04 percent chlorides. The pH value of soil is to about 8.0~8.2 indicating somewhat alkaline condition. The groundwater contains 290 to 348 mg/litre of sulphate and 240 to 320 mg/litre of chlorides. The pH value of groundwater is 7.7-8.0 indicating somewhat alkaline condition.

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We recommend the following measures to limit the potential for chemical attack:


- (1) Concrete for Isolated Open Spread Foundation/ Raft Foundation should contain a minimum cement content of 330 kg/m³ of cement.
- (2) Water cement ratio in foundation concrete should be 0.50.
- (3) A clear concrete cover over the reinforcement steel of at least 40mm should be provided for all foundations.

13.0 CLOSURE

We are thankful to client to provide the opportunity to perform this investigation by us. We have pleasure in submitting this report. Please contact us when we can be of further service to you.

For UV GLOBAL GEO SOLUTIONS PVT. LTD.

**(PUSHPENDRA KUMAR)
DIRECTOR**

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-01		TERMINATION DEPTH (M) 5.0m		TABLE NO. 1		
												WATER TABLE : Not met						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	7	Fill <div>(0.6m)</div>	0	68	32	0	N.P.	N.P.	N.P. : Non Plastic	2.68	1.70	1.54	10.5	0.5,1.0 1.50 (DST)	0.00	29°	
SPT1	1.50 1.95		Loose to Medium dense light brown Silty Sand (SM)															
UDS1	2.25 2.55		Loose, 0.6m to 3.5m															
SPT2	3.00 3.45	9	Medium dense, 3.5m to 5.0m	0	63	37	0	N.P.	N.P.		2.69							
SPT3	4.50 4.95	11																<div>(5.0m)</div>
DST:Drained Direct Shear Test																		

DST:Drained Direct Shear Test



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BH.No. B5-02


WATER TABLE :
Not met

TERMINATION
DEPTH (M)


5.0m

TABLE NO. 2

Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test		
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction
DS1	0.00 0.50	7	Fill (0.5m)	0	65	35	0	N.P.	N.P.	Non Plastic	2.68	1.72	1.56	10.1	0.5,1.0 1.50 (DST)	0.00	30°
SPT1	1.50 1.95		Loose light brown Silty Sand (SM)														
UDS1	2.25 2.55		(3.0m)														
SPT2	3.00 3.45	11	Medium dense light brown Sandy Silt, low plastic (CL)	2	29	59	10	27.9	19.6	8.3	2.70	DST:Drained Direct Shear Test					
SPT3	4.50 4.95	13	(5.0m)														


		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-04		TERMINATION DEPTH (M) 5.0m			TABLE NO. 4		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	9	Loose to Medium dense light brown Sandy Silt, low plastic (CL)	1	30	59	10	28.1	19.7	8.4	2.69								
SPT1	1.50 1.95		Loose, 0.0m to 2.0m																
UDS1	2.25 2.55		Medium dense, 2.0m to 5.0m									1.66	1.50	10.8	1,2,3 (UUT)	0.50	9°		
SPT2	3.00 3.45	10		0	21	66	13	29.0	19.8	9.2	2.71								
SPT3	4.50 4.95	11	(5.0m)																
UUT : Unconsolidated Undrained Triaxial Shear Test																			

UUT : Unconsolidated Undrained Triaxial Shear Test


		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-06		TERMINATION DEPTH (M) 5.0m			TABLE NO. 6		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	6	Loose to Medium dense light brown Sandy Silt, low plastic (CL)	0	18	66	16	33.6	21.8	11.8	2.71	1.67	1.50	11.6	1,2,3 (UUT)	0.45	8°		
SPT1	1.50 1.95		Loose, 0.0m to 3.5m																
UDS1	2.25 2.55																		
SPT2	3.00 3.45	9	Medium dense, 3.5m to 5.0m	2	19	64	15	31.1	20.4	10.7	2.70								
SPT3	4.50 4.95	11																	
(5.0m)																			
UUT : Unconsolidated Undrained Triaxial Shear Test																			

UUT : Unconsolidated Undrained Triaxial Shear Test


(5.0m)

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-07		TERMINATION DEPTH (M) 5.0m		TABLE NO. 7		
												WATER TABLE : 4.00m						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	7	Loose to Medium dense light brown Sandy Silt, low plastic (CL)															
SPT1	1.50 1.95		Loose, 0.0m to 2.0m															
UDS1	2.25 2.55		Medium dense, 2.0m to 3.5m	0	24	65	11	28.7	20.2	8.5	2.69	1.71	1.54	11.2	1,2,3 (UUT)	0.50	11°	
SPT2	3.00 3.45	10																
SPT3	4.50 4.95	8	Loose, 3.5m to 5.0m (5.0m)	2	26	61	11	28.4	19.8	8.6	2.70							
UUT : Unconsolidated Undrained Triaxial Shear Test																		

UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-08		TERMINATION DEPTH (M) 5.0m			TABLE NO. 8		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	9	Loose light brown Silty Sand (SM) (0.5m)	2	25	63	10	28.0	19.9	8.1	2.69	1.72	1.55	10.7	1,2,3 (UUT)	0.60	12°		
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL)																
UDS1	2.25 2.55		Loose, 0.5m to 2.0m Medium dense, 2.0m to 5.0m																
SPT2	3.00 3.45	13		3	28	58	11	28.5	19.8	8.7	2.70								
SPT3	4.50 4.95	15	(5.0m)																
UUT : Unconsolidated Undrained Triaxial Shear Test																			

UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-09		TERMINATION DEPTH (M)		TABLE NO. 9		
WATER TABLE : Not met																		
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %						Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction
DS1	0.00 0.50	8	Loose light brown Sandy Silt, low plastic (CL) (3.0m)	0	24	66	10	28.3	20.0	8.3	2.70	1.68	1.53	10.1	1,2,3 (UUT)	0.60	12°	
SPT1	1.50 1.95																	
UDS1	2.25 2.55																	
SPT2	3.00 3.45	13	Medium dense light brown Silty Sand (SM) (5.0m)	3	59	38	0	N.P.	N.P.		2.68							
SPT3	4.50 4.95	17																
UUT : Unconsolidated Undrained Triaxial Shear Test																		

UUT : Unconsolidated Undrained Triaxial Shear Test

N.P. : Non Plastic



Project : Geotechnical Investigation for Package DWSIIP 04

BH.No. B5-10


TERMINATION
DEPTH (M)

TABLE NO. 10


WATER TABLE :
Not met


5.0m


Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test		
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction
DS1	0.00 0.50	7	Loose to Medium dense light brown Sandy Silt, low plastic (CL)	1	25	64	10	27.8	19.8	8.0	2.69						
SPT1	1.50 1.95		Loose, 0.0m to 2.5m														
UDS1	2.25 2.55		Medium dense, 2.5m to 5.0m										1.70	1.55	9.8	1,2,3 (UUT)	0.55
SPT2	3.00 3.45	10		5	23	61	11	28.5	20.1	8.4	2.70						
SPT3	4.50 4.95	12	(5.0m)														
UUT : Unconsolidated Undrained Triaxial Shear Test																	

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-11		TERMINATION DEPTH (M) 5.0m			TABLE NO. 11			
												WATER TABLE : Not met								
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test					
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction			
DS1	0.00 0.50	11	Medium dense light brown Sandy Silt, low plastic (CL) (5.0m)	1	32	57	10	27.9	20.0	7.9	2.69									
SPT1	1.50 1.95																			
UDS1	2.25 2.55												1.71	1.55	10.2	1,2,3 (UUT)	0.60	13°		
SPT2	3.00 3.45	13																		
SPT3	4.50 4.95	18			3	26	61	10	28.3	20.1	8.2	2.71								
UUT : Unconsolidated Undrained Triaxial Shear Test																				


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-12		TERMINATION DEPTH (M) 5.0m			TABLE NO. 12		
												WATER TABLE : 3.80m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	8	Fill																
DS2	1.50 1.95																		
SPT1	3.00 3.45		Loose to Medium dense light grey Fine Sand (SP-SM) Lose, 2.5m to 3.5m Medium dense, 3.5m to 5.0m	2	89	9	0	N.P.	N.P.		2.66				0.5,1.0 1.50 (DST)	0.00	30°		
UDS1	3.50 3.80											1.78	1.56	14.1					
SPT2	4.50 4.95	12		0	93	7	0	N.P.	N.P.		2.65								
													DST:Drained Direct Shear Test						

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-13		TERMINATION DEPTH (M) 5.0m			TABLE NO. 13		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	12	Fill (1.0m)	2	56	42	0	N.P.	N.P.	N.P. : Non Plastic	2.69	1.71	1.55	10.0	0.5,1.0 1.50 (DST)	0.00	31°		
SPT1	1.50 1.95		Medium dense light brown Silty Sand (SM)																
UDS1	2.25 2.55		(3.0m)																
SPT2	3.00 3.45	13	Medium dense light brown Sandy Silt, low plastic (CL)	3	28	60	9	28.0	19.8	8.2	2.70								
SPT3	4.50 4.95	16	(5.0m)																
DST:Drained Direct Shear Test																			

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-14		TERMINATION DEPTH (M) 5.0m			TABLE NO. 14		
												WATER TABLE : 3.10m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	9	Fill (1.0m)	1	22	65	12	28.4	18.8	9.6	2.70	1.75	1.53	14.6	1,2,3 (UUT)	0.60	11°		
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL)																
UDS1	2.25 2.55	11	Loose, 1.0m to 2.5m Medium dense, 2.5m to 5.0m	3	26	61	10	28.1	19.9	8.2	2.71								
SPT2	3.00 3.45																		
SPT3	4.50 4.95	15	(5.0m)																
UUT : Unconsolidated Undrained Triaxial Shear Test																			

UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-15		TERMINATION DEPTH (M)		TABLE NO. 15		
												WATER TABLE : Not met						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	10	Medium dense light brown Silty Sand (SM) (5.0m)	2	59	39	0	N.P.	N.P.	N.P. : Non Plastic	2.68	1.70	1.54	10.4	0.5,1.0 1.50 (DST)	0.00	30°	
SPT1	1.50 1.95																	
UDS1	2.25 2.55																	
SPT2	3.00 3.45	13		4	62	34	0	N.P.	N.P.		2.69							
SPT3	4.50 4.95	15																
DST:Drained Direct Shear Test																		

DST:Drained Direct Shear Test



Project : Geotechnical Investigation for Package DWSIIP 04

BH.No. B5-16


TERMINATION
DEPTH (M)

TABLE NO. 16


WATER TABLE :
Not met


5.0m

Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test		
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction
DS1	0.00 0.50	8	Fill (1.0m)	1	23	63	13	29.1	20.4	8.7	2.71	1.70	1.53	10.8	1,2,3 (UUT)	0.55	10°
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL) Loose, 1.0m to 2.0m														
UDS1	2.25 2.55		Medium dense, 2.0m to 5.0m														
SPT2	3.00 3.45	11															
SPT3	4.50 4.95	14	 (5.0m)	4	24	60	12	28.6	20.1	8.5	2.70						
UUT : Unconsolidated Undrained Triaxial Shear Test																	


		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-17		TERMINATION DEPTH (M) 5.0m		TABLE NO. 17		
												WATER TABLE : Not met						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	7	Fill <div>(1.2m)</div>	0	25	64	11	28.5	19.8	8.7	2.70	1.66	1.50	10.6	1,2,3 (UUT)	0.50	9°	
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL) Loose, 1.2m to 3.5m															
UDS1	2.25 2.55																	
SPT2	3.00 3.45	9	Medium dense, 3.5m to 5.0m <div>(5.0m)</div>	0	20	66	14	31.2	20.7	10.5	2.71							
SPT3	4.50 4.95	11																
UUT : Unconsolidated Undrained Triaxial Shear Test																		

UUT : Unconsolidated Undrained Triaxial Shear Test


		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-18		TERMINATION DEPTH (M) 5.0m			TABLE NO. 18		
												WATER TABLE : not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	12	Fill																
DS2	1.50 1.95																		
SPT1	3.00 3.45		Medium dense light brown Silty Sand (SM)	2	68	30	0	N.P.	N.P.		2.67								
UDS1	3.50 3.80								N.P. : Non Plastic			1.74	1.57	10.8	0.5,1.0 1.50 (DST)	0.00	31 ^o		
SPT2	4.50 4.95	16		1	62	37	0	N.P.	N.P.		2.68								
													DST:Drained Direct Shear Test						

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-19		TERMINATION DEPTH (M) 5.0m			TABLE NO. 19		
												WATER TABLE : 2.80m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	3	Fill (0.5m)	0	18	64	18	34.1	22.4	11.7	2.71	1.71	1.50	14.1	1,2,3 (UUT)	0.50	8°		
SPT1	1.50 1.95		Loose light brown Sandy Silt, low plastic (CL)																
UDS1	2.25 2.55	4																	
SPT2	3.00 3.45																		
SPT3	4.50 4.95	5	(5.0m)	1	19	63	17	32.8	21.9	10.9	2.70								
UUT : Unconsolidated Undrained Triaxial Shear Test																			


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-20		TERMINATION DEPTH (M) 5.0m			TABLE NO. 20		
												WATER TABLE : 2.50m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	8	Fill <div>(1.0m)</div>	0	18	68	14	31.1	19.8	11.3	2.71	1.74	1.52	14.6	1,2,3 (UUT)	0.60	10°		
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL)																
UDS1	2.25 2.55		Loose, 1.0m to 3.5m																
SPT2	3.00 3.45	9	Medium dense, 3.5m to 5.0m <div>(5.0m)</div>	2	22	64	12	29.2	19.5	9.7	2.70								
SPT3	4.50 4.95	12																	
UUT : Unconsolidated Undrained Triaxial Shear Test																			


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-21		TERMINATION DEPTH (M) 5.0m			TABLE NO. 21		
												WATER TABLE : 2.70m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	5	Fill (0.5m)												1,2,3 (UUT)	0.55	9°		
SPT1	1.50 1.95		Loose light brown Sandy Silt, low plastic (CL)																
UDS1	2.25 2.55	8		0	20	65	15	32.1	21.5	10.6	2.70	1.70	1.50	13.2					
SPT2	3.00 3.45																		
SPT3	4.50 4.95	10	(5.0m)	2	24	58	16	31.4	20.2	11.2	2.69								
UUT : Unconsolidated Undrained Triaxial Shear Test																			

UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-22		TERMINATION DEPTH (M)		TABLE NO. 22		
												WATER TABLE : 3.80m						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	8	Loose to Medium dense light brown Silty Sand (SM) Loose, 0.0m to 2.0m	2	69	29	0	N.P.	N.P.	N.P. : Non Plastic	2.68	1.72	1.54	11.4	0.5,1.0 1.50 (DST)	0.00	31°	
SPT1	1.50 1.95																	
UDS1	2.25 2.55	11	Medium dense, 2.0m to 5.0m	2	69	29	0	N.P.	N.P.	N.P. : Non Plastic	2.68	1.72	1.54	11.4	0.5,1.0 1.50 (DST)	0.00	31°	
SPT2	3.00 3.45																	
SPT3	4.50 4.95	13	(5.0m)	1	65	34	0	N.P.	N.P.		2.68							
DST:Drained Direct Shear Test																		

DST:Drained Direct Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-23		TERMINATION DEPTH (M) 5.0m			TABLE NO. 23		
												WATER TABLE : 4.20m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	8	Fill (0.5m)	2	24	62	12	29.1	19.8	9.3	2.70	1.73	1.53	12.9	1,2,3 (UUT)	0.60	11°		
SPT1	1.50 1.95		Loose light brown Sandy Silt, low plastic (CL)																
UDS1	2.25 2.55		(3.0m)																
SPT2	3.00 3.45		Medium dense light brown Silty Sand (SM)																
SPT3	4.50 4.95	14	(5.0m)	0	66	34	0	N.P. N.P. : Non Plastic	N.P.		2.68								
UUT : Unconsolidated Undrained Triaxial Shear Test																			

UUT : Unconsolidated Undrained Triaxial Shear Test




WATER TABLE :
2.90m

5.0m


TABLE NO. 24

Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test												
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction										
DS1	0.00 0.50	10	Loose light brown Silty Sand (SM) <div>(3.0m)</div>	0	65	35	0	N.P.	N.P.	Non Plastic	2.68	1.77	1.56	13.2	0.5,1.0 1.50 (DST)	0.00	30°										
SPT1	1.50 1.95																										
UDS1	2.25 2.55																										
SPT2	3.00 3.45	12	Medium dense light grey Fine Sand (SP-SM) <div>(5.0m)</div>					0	89	11								0	N.P.	N.P.		2.66	DST:Drained Direct Shear Test				
SPT3	4.50 4.95	10																									

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-25		TERMINATION DEPTH (M) 5.0m		TABLE NO. 25		
												WATER TABLE : 4.80m						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	9	Loose light brown Silty Sand (SM) <div>(1.0m)</div>	0	62	38	0	N.P.	N.P.	N.P. : Non Plastic	2.69	1.73	1.55	11.5	1,2,3 (UUT)	0.55	12°	
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL) Loose, 1.0m to 2.0m															
UDS1	2.25 2.55		Medium dense, 2.0m to 3.0m <div>(3.0m)</div>															
SPT2	3.00 3.45	11	Medium dense light grey Fine Sand (SP-SM)	0	93	7	0	N.P.	N.P.		2.65							
SPT3	4.50 4.95	12	<div>(5.0m)</div>															


UUT : Unconsolidated Undrained Triaxial Shear Test

UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-26		TERMINATION DEPTH (M) 5.0m			TABLE NO. 26			
												WATER TABLE : 4.20m								
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test					
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction			
DS1	0.00 0.50	6	Loose light brown Silty Sand (SM) (0.5m)	0	23	65	12	28.9	18.9	10.0	2.71	1.74	1.54	12.8	1,2,3 (UUT)	0.50	13°			
SPT1	1.50 1.95		Loose light brown Sandy Silt, low plastic (CL)																	
UDS1	2.25 2.55		(3.0m)																	
SPT2	3.00 3.45		Loose to Medium dense light grey Fine Sand (SP-SM) Loose, 3.0m to 4.0m																	
SPT3	4.50 4.95	12	Medium dense, 4.0m to 5.0m (5.0m)	0	92	8	0	N.P. N.P. : Non Plastic	N.P.		2.66									

UUT : Unconsolidated Undrained Triaxial Shear Test

N.P. : Non Plastic

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-27		TERMINATION DEPTH (M)		TABLE NO. 27			
												WATER TABLE : 3.20m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	8	Loose light brown Sandy Silt, low plastic (CL) (0.5m)	1	60	39	0	N.P.	N.P.	N.P. : Non Plastic	2.68	1.75	1.56	12.1	0.5,1.0 1.50 (DST)	0.00	30°		
SPT1	1.50 1.95		Loose to Medium dense light brown Silty Sand (SM) Loose, 0.5m to 2.0m																
UDS1	2.25 2.55	12	Medium dense, 2.0m to 3.0m (3.0m)	0	94	6	0	N.P.	N.P.		2.65								
SPT2	3.00 3.45		Medium dense light grey Fine Sand (SP-SM)																
SPT3	4.50 4.95	13	(5.0m)																

DST:Drained Direct Shear Test



Project : Geotechnical Investigation for Package DWSIIP 04

BH.No. B5-28


WATER TABLE :
Not met

TERMINATION
DEPTH (M)


5.0m

TABLE NO. 28


Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	10	Loose light brown Silty Sand (SM) (0.5m)	2	27	61	10	28.1	19.6	8.5	2.70			1.70	1.54	10.3	1,2,3 (UUT)	0.65	11°
SPT1	1.50 1.95		Medium dense light brown Sandy Silt, low plastic (CL)																
UDS1	2.25 2.55	13																	
SPT2	3.00 3.45																		
SPT3	4.50 4.95	17	(5.0m)	4	29	58	9	27.8	20.0	7.8	2.68								

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-32		TERMINATION DEPTH (M) 5.0m		TABLE NO. 30		
												WATER TABLE : Not met						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	15	Fill <div>(0.6m)</div>															
SPT1	1.50 1.95		Medium dense light brown Sandy Silt, low plastic (CL)															
UDS1	2.25 2.55	14		2	24	62	12	28.7	19.3	9.4	2.71	1.71	1.54	10.9	1,2,3 (UUT)	0.65	10°	
SPT2	3.00 3.45																	
SPT3	4.50 4.95	19	<div>(5.0m)</div>															
UUT : Unconsolidated Undrained Triaxial Shear Test																		


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-34		TERMINATION DEPTH (M) 5.0m		TABLE NO. 31		
												WATER TABLE : Not met						
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %						Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction
DS1	0.00 0.50	10	Fill	0	23	64	13	30.7	20.5	10.2	2.71	1.71	1.53	11.5	1,2,3 (UUT)	0.55	9°	
SPT1	1.50 1.95		(1.3m) Medium dense light brown Sandy Silt, low plastic (CL)															
UDS1	2.25 2.55	10																
SPT2	3.00 3.45																	
SPT3	4.50 4.95	12	(5.0m)	2	21	65	12	29.8	20.1	9.7	2.69							
UUT : Unconsolidated Undrained Triaxial Shear Test																		


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-36		TERMINATION DEPTH (M) 5.0m			TABLE NO. 32		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	8	Fill (1.0m)	1	22	64	13	29.8	20.1	9.7	2.70	1.70	1.53	10.8	1,2,3 (UUT)	0.50	10°		
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL) Loose, 1.0m to 2.0m																
UDS1	2.25 2.55		Medium dense, 2.0m to 5.0m																
SPT2	3.00 3.45	11		0	20	66	14	30.2	19.5	10.7	2.71								
SPT3	4.50 4.95	12	(5.0m)																
UUT : Unconsolidated Undrained Triaxial Shear Test																			


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-42		TERMINATION DEPTH (M) 5.0m			TABLE NO. 33		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	10	Fill																
DS2	1.50 1.95																		
SPT1	3.00 3.45		Medium dense light brown Sandy Silt, low plastic (CL)	3	25	61	11	28.6	20.2	8.4	2.70								
UDS1	3.50 3.80											1.68	1.52	10.8	1,2,3 (UUT)	0.55	10°		
SPT2	4.50 4.95	12	(5.0m)	2	21	67	10	27.9	19.5	8.4	2.68								
UUT : Unconsolidated Undrained Triaxial Shear Test																			


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-44		TERMINATION DEPTH (M) 5.0m			TABLE NO. 34		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	10	Loose to Medium dense light brown Sandy Silt, low plastic (CL) Loose, 0.0m to 1.0m Medium dense, 1.0m to 5.0m	4	25	60	11	28.1	19.3	8.8	2.69	1.72	1.55	10.7	1,2,3 (UUT)	0.60	11°		
SPT1	1.50 1.95																		
UDS1	2.25 2.55																		
SPT2	3.00 3.45	13	(5.0m)	2	23	63	12	28.9	19.9	9.0	2.71								
SPT3	4.50 4.95	15																	


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-45		TERMINATION DEPTH (M) 5.0m			TABLE NO. 35		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	7	Loose to Medium dense light brown Sandy Silt, low plastic (CL) Loose, 0.0m to 2.5m Medium dense, 2.5m to 5.0m (5.0m)																
SPT1	1.50 1.95																		
UDS1	2.25 2.55			2	24	62	12	28.5	20.1	8.4	2.69	1.71	1.54	11.0	1,2,3 (UUT)	0.50	10°		
SPT2	3.00 3.45	12																	
SPT3	4.50 4.95	13		3	23	63	11	28.0	19.2	8.8	2.70								
UUT : Unconsolidated Undrained Triaxial Shear Test																			


UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-46		TERMINATION DEPTH (M)		TABLE NO. 36		
												WATER TABLE : Not met		5.0m				
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	8	Fill (1.0m)	0	28	60	12	28.9	18.9	10.0	2.71	1.69	1.52	10.9	1,2,3 (UUT)	0.55	9°	
SPT1	1.50 1.95		Loose to Medium dense light brown Sandy Silt, low plastic (CL)															
UDS1	2.25 2.55		Loose, 1.0m to 2.5m															
			Medium dense, 2.5m to 5.0m															
SPT2	3.00 3.45	11																
SPT3	4.50 4.95	13	(5.0m)	2	31	55	12	29.5	20.6	8.9	2.69							
UUT : Unconsolidated Undrained Triaxial Shear Test																		

UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B5-48		TERMINATION DEPTH (M) 5.0m			TABLE NO. 37		
												WATER TABLE : Not met							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	9	Loose to Medium dense light brown Sandy Silt, low plastic (CL)	0	25	65	10	28.2	19.8	8.4	2.70	1.69	1.53	10.7	1,2,3 (UUT)	0.55	13°		
SPT1	1.50 1.95		Loose, 0.0m to 2.0m																
UDS1	2.25 2.55		Medium dense, 2.0m to 5.0m																
SPT2	3.00 3.45	11	(5.0m)	2	34	55	9	27.1	18.9	8.2	2.69								
SPT3	4.50 4.95	15																	
UUT : Unconsolidated Undrained Triaxial Shear Test																			

UUT : Unconsolidated Undrained Triaxial Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B10-01		TERMINATION DEPTH (M) 10.0m			TABLE NO. 38		
												WATER TABLE : 8.70m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
DS1	0.00 0.50	8	Loose to Medium dense light brown Sandy Silt, low plastic(CL)																
SPT1	1.50 1.95		Loose, 0.0m to 2.0m	0	20	67	13	29.3	19.8	9.5	2.71								
UDS1	2.25 2.55		Medium dense, 2.0m to 6.0m									1.73	1.55	11.3	1,2,3 (UUT)	0.65	9°		
SPT2	3.00 3.45	12	(6.0m)																
SPT3	4.50 4.95	16																	
UDS2	5.25 5.55			2	24	63	11	28.4	19.5	8.9	2.70								
SPT4	6.00 6.45	27	Medium dense to Dense light grey Fine Sand (SP-SM)																
SPT5	7.50 7.95	29	Medium dense, 6.0m to 9.0m																
UDS3	8.25 8.55		(10.0m)									1.81	1.59	13.9	0.5,1.0 1.5 (DST)	0.00	32°		
SPT6	9.00 9.45	32		Dense, 9.0m to 10.0m	0	92	8	0	N.P. N.P. : Non Plastic	N.P.		2.66				DST:Drained Direct Shear Test			
SPT7	10.00 10.45	30																	

UUT : Unconsolidated Undrained Triaxial Shear Test



Project : Geotechnical Investigation for Package DWSIIP 04

BH.No. B15-01


WATER TABLE :
3.00m


TERMINATION
DEPTH (M)

15.0m

TABLE NO. 39

[illegible]

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B15-01		TERMINATION DEPTH (M) 15.0m			TABLE NO. 39a		
GLOBAL												WATER TABLE : 3.00m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
UDS4	11.25 11.55	26	Medium dense to Dense light grey Fine Sand (SP-SM)	0	88	12	0	N.P.	N.P.	N.P. : Non Plastic	2.66	1.93	1.65	16.9	0.5,1.0 1.50 (DST)	0.00	33°		
SPT8	12.00 12.45		Medium dense, 2.0m to 14.0m												DST:Drained Direct Shear Test				
SPT9	13.50 13.95	28																	
UDS5	14.25 14.55		Dense, 14.0m to 15.0m																
SPT10	15.00 15.45	32	(15.0m)	2	91	7	0	N.P.	N.P.		2.65								

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04							BH.No. B15-02		TERMINATION DEPTH (M) 15.0m			TABLE NO. 40		
GLOBAL											WATER TABLE : 3.10m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	9	Fill	0	94	6	0	N.P.	N.P.	N.P. : Non Plastic	2.65	1.80	1.56	15.1	0.5,1.0 1.50 (DST)	0.00	31°	
SPT1	1.50 1.95																	
UDS1	2.25 2.55		(2.5m)															
SPT2	3.00 3.45		Loose to Medium dense light grey Fine Sand (SP-SM) Loose, 2.5m to 3.5m															
SPT3	4.50 4.95	11	Medium dense, 3.5m to 14.0m	0	92	8	0	N.P.	N.P.		2.66	1.86	1.60	16.5	0.5,1.0 1.50 (DST)	0.00	32°	
UDS2	5.25 5.55	14																
SPT4	6.00 6.45																	
SPT5	7.50 7.95	15																0
UDS3	8.25 8.55	19																
SPT6	9.00 9.45																	
SPT7	10.50 10.95	22																

DST:Drained Direct Shear Test



Project : Geotechnical Investigation for Package DWSIIP 04


BH.No. B15-02


WATER TABLE :
3.10m


TERMINATION
DEPTH (M)
15.0m

TABLE NO. 40a

Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test		
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction
UDS4	11.25 11.55	25	Medium dense to Dense light grey Fine Sand (SP-SM)	1	90	9	0	N.P.	N.P.	Non Plastic	2.67	1.97	1.67	17.8	0.5,1.0 1.50 (DST)	0.00	35°
SPT8	12.00 12.45		Medium dense, 3.5m to 14.0m														
SPT9	13.50 13.95	Dense, 14.0m to 15.0m															
UDS5	14.25 14.55																
SPT10	15.00 15.45	(15.0m)															


		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04							BH.No. B15-03		TERMINATION DEPTH (M) 15.0m			TABLE NO. 41		
GLOBAL											WATER TABLE : 3.05m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	10	Fill															
SPT1	1.50 1.95																	
UDS1	2.25 2.55																	
SPT2	3.00 3.45		(2.4m) Medium dense light grey Fine Sand (SP-SM)	0	92	8	0	N.P.	N.P.		2.66							
								N.P. : Non Plastic										
SPT3	4.50 4.95	12																
UDS2	5.25 5.55	15										1.78	1.55	14.8	0.5,1.0 1.50 (DST)	0.00	32°	
SPT4	6.00 6.45			0	91	9	0	N.P.	N.P.		2.65		DST:Drained Direct Shear Test					
SPT5	7.50 7.95																	
UDS3	8.25 8.55	21										1.87	1.61	16.0	0.5,1.0 1.50 (DST)	0.00	33°	
SPT6	9.00 9.45																	
SPT7	10.50 10.95		26		0	93	7	0	N.P.	N.P.		2.65						

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B15-03		TERMINATION DEPTH (M) 15.0m			TABLE NO. 41a		
GLOBAL												WATER TABLE : 3.05m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
UDS4	11.25 11.55	25	Medium dense to Dense light grey Fine Sand (SP-SM)	0	92	8	0	N.P.	N.P.	N.P. : Non Plastic	2.66	1.92	1.64	17.2	0.5,1.0 1.50 (DST)	0.00	34°		
SPT8	12.00 12.45		Medium dense, 2.4m to 13.5m																
SPT9	13.50 13.95	33	Dense, 13.5m to 15.0m																
UDS5	14.25 14.55																		
SPT10	15.00 15.45	40	(15.0m)																
													DST:Drained Direct Shear Test						

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B30-01		TERMINATION DEPTH (M) 30.0m		TABLE NO. 42		
				Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test			
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction	
DS1	0.00 0.50	8	Loose to Medium dense light brown Sandy Silt, low plastic(CL)	0	19	69	12	28.7	19.7	9.0	2.70	1.70	1.54	10.6	1,2,3 (UUT)	0.60	10 ^o	
SPT1	1.50 1.95		Loose, 0.0m to 2.0m															
UDS1	2.25 2.55		Medium dense, 2.0m to 6.0m															
SPT2	3.00 3.45	16	(6.0m)	1	93	6	0	N.P.	N.P.	N.P. : Non Plastic	2.65	1.84	1.61	14.2	0.5,1.0 1.5 (DST)	0.00	33 ^o	
SPT3	4.50 4.95	18																
UDS2	5.25 5.55																	
SPT4	6.00 6.45	21	Medium dense to Dense light grey Fine Sand (SP-SM)															
SPT5	7.50 7.95	29	Medium dense, 6.0m to 9.0m	1	93	6	0	N.P.	N.P.	N.P. : Non Plastic	2.65	1.84	1.61	14.2	0.5,1.0 1.5 (DST)	0.00	33 ^o	
UDS3	8.25 8.55																	
SPT6	9.00 9.45	36	Dense, 9.0m to 10.5m															
SPT7	10.50 10.95	29	Medium dense light brown Sandy Silt, low plastic (CL)															

UUT : Unconsolidated Undrained Triaxial Shear Test

DST:Drained Direct Shear Test

		SOIL PROFILE		Project : Geotechnical Investigation for Package DWSIIP 04								BH.No. B30-01		TERMINATION DEPTH (M) 30.0m			TABLE NO. 42a		
GLOBAL												WATER TABLE : 8.60m							
Sample type	Depth (m)	N-Value	SOIL DESCRIPTION	Grain Size Analysis				Atterberg Limits			Specific Gravity	Natural Density gms/cm ³	Dry Density gms/cm ³	Moisture Content %	Triaxial Test				
				Gravel %	Sand %	Silt %	Clay %	Liquid %	Plastic %	Plasticity Index %					Confining Pressure Kg/cm ²	Cohesion Intercept Kg/cm ²	Angle of Internal Friction		
UDS4	11.25 11.55	27	Medium dense light brown Sandy Silt, low plastic (CL)	2	23	64	11	28.5	20.0	8.5	2.69	1.89	1.62	16.8	1,2,3 (UUT)	0.95	11°		
SPT8	12.00 12.45		(13.5m)	UUT : Unconsolidated Undrained Triaxial Shear Test															
SPT9	13.50 13.95	21	Medium dense light brown Silty Sand (SM)																
UDS5	14.25 14.55	20	(15.0m)	0	69	31	0	N.P.	N.P.		2.68								
SPT10	15.00 15.45		Medium dense to Dense light brown Sandy Silt, low plastic (CL) Medium dense, 15.0m to 18.0m																
UDS6	17.25 17.55	31																	
SPT11	18.00 18.45		Dense, 18.0m to 29.0m																
UDS7	20.25 20.55	41										1.96	1.65	18.9	1,2,3 (UUT)	1.10	9°		
SPT12	21.00 21.45			3	18	66	13	29.3	18.8	10.5	2.71								
UDS8	23.25 23.55	44																	
SPT13	24.00 24.45																		
UDS9	26.25 26.55											2.02	1.68	20.4	1,2,3 (UUT)	1.35	10°		

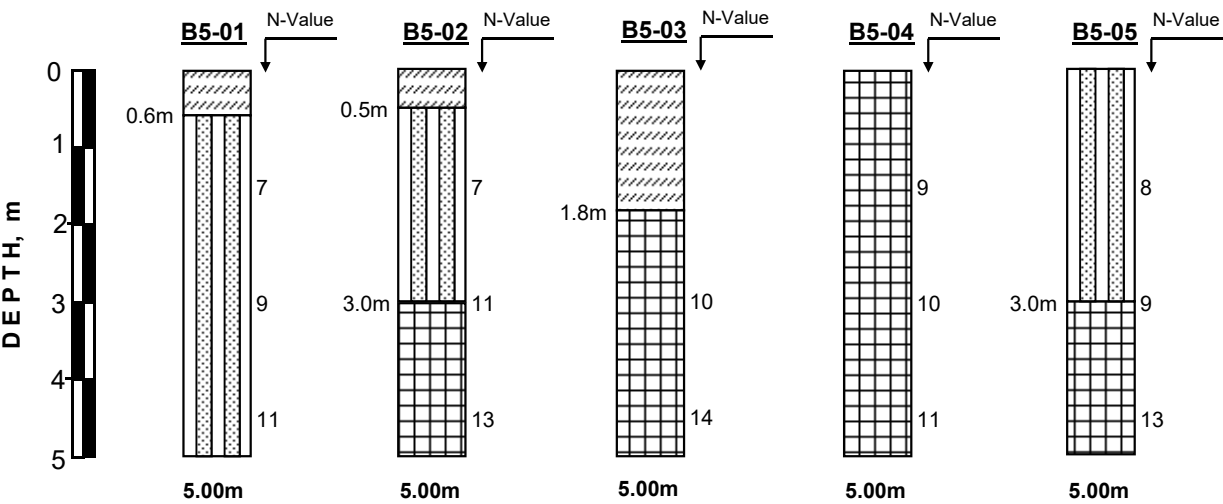


Project : Geotechnical Investigation for Package DWSIIP 04

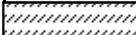

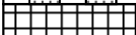
WATER TABLE :
8.60m

TABLE NO. 42b

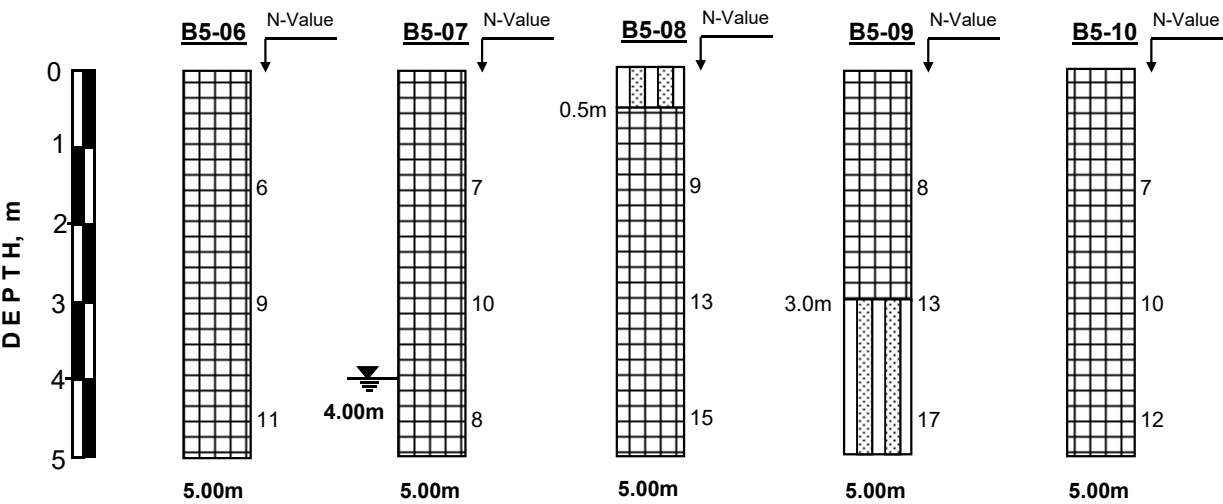
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SUMMARY OF BOREHOLE PROFILE

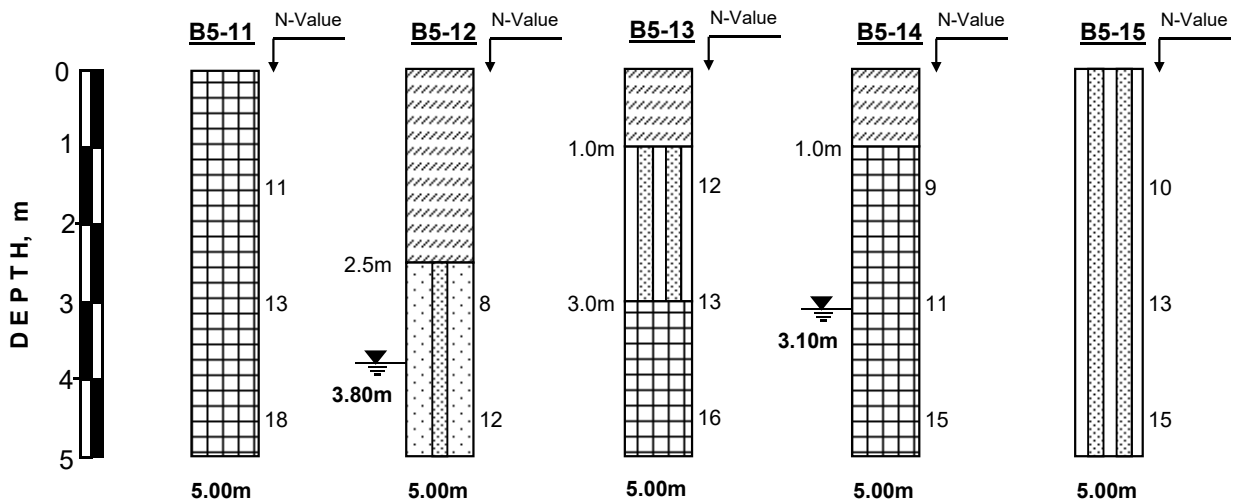
LEGEND	
SYMBOL	DESCRIPTION
	Fill
	Silty sand
	Sandy silt

GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SUMMARY OF BOREHOLE PROFILE

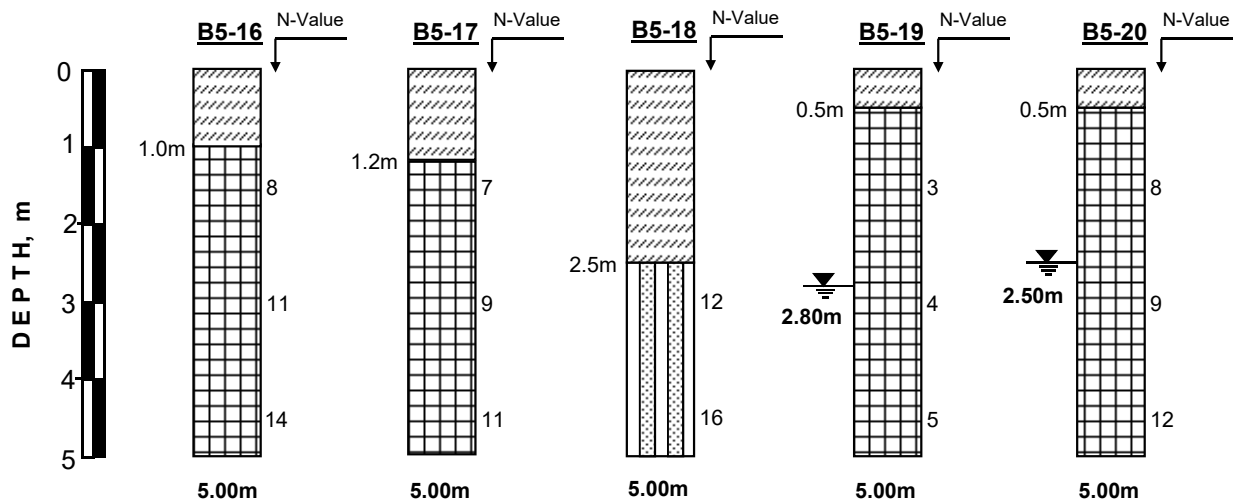
LEGEND	
SYMBOL	DESCRIPTION
	Silty sand
	Sandy silt
	Water table



SUMMARY OF BOREHOLE PROFILE

LEGEND	
SYMBOL	DESCRIPTION
	Fill
	Silty sand
	Sandy silt
	Fine sand
	Water table

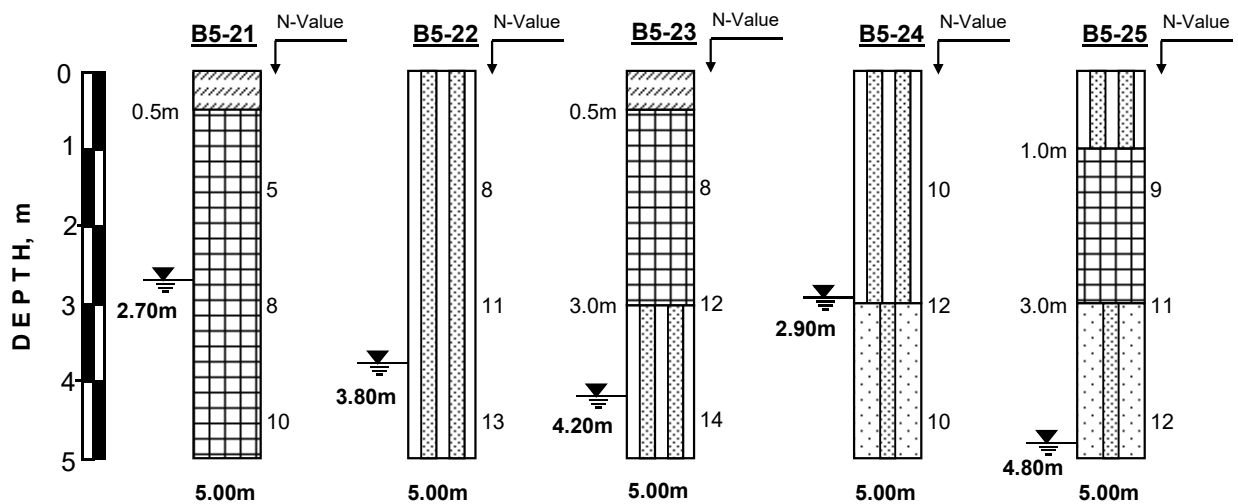
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SUMMARY OF BOREHOLE PROFILE

LEGEND	
SYMBOL	DESCRIPTION
	Fill
	Silty sand
	Sandy silt
	Water table

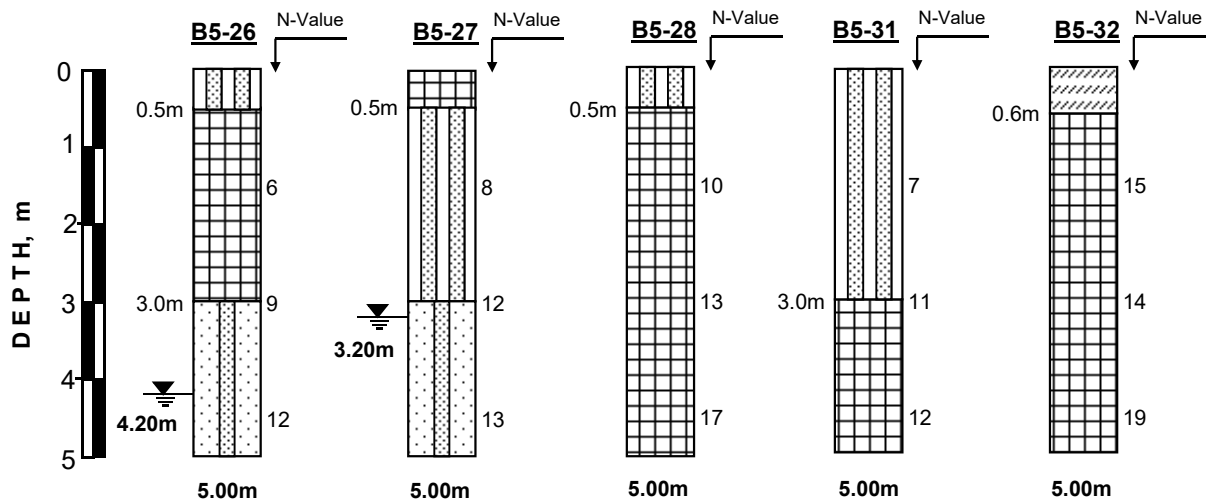
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SUMMARY OF BOREHOLE PROFILE

LEGEND	
SYMBOL	DESCRIPTION
	Fill
	Silty sand
	Sandy silt
	Fine sand
	Water table

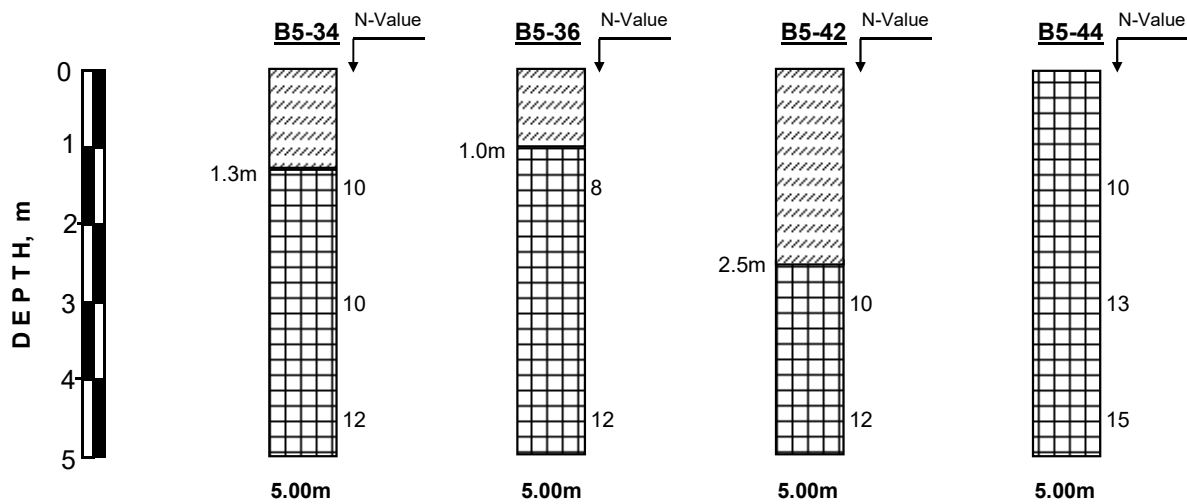
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SUMMARY OF BOREHOLE PROFILE

LEGEND	
SYMBOL	DESCRIPTION
	Fill
	Silty sand
	Sandy silt
	Fine sand
	Water table

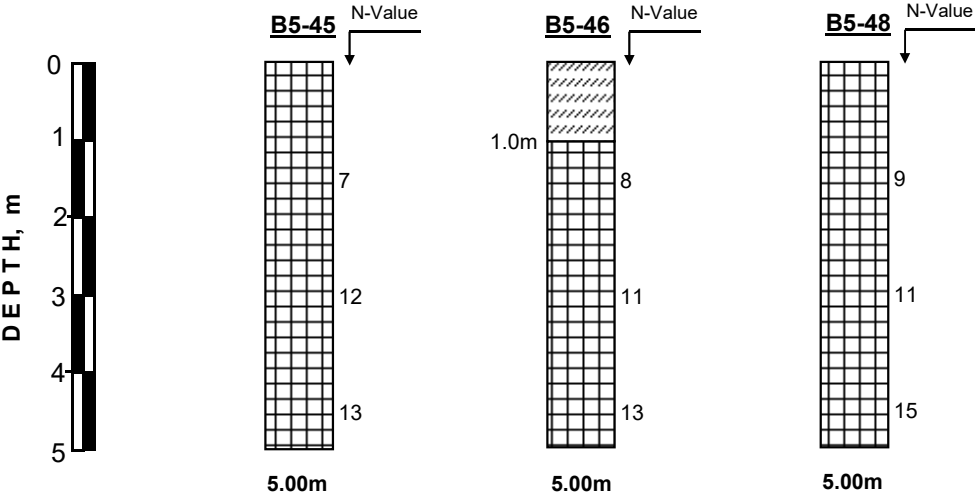
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04





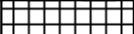
SUMMARY OF BOREHOLE PROFILE

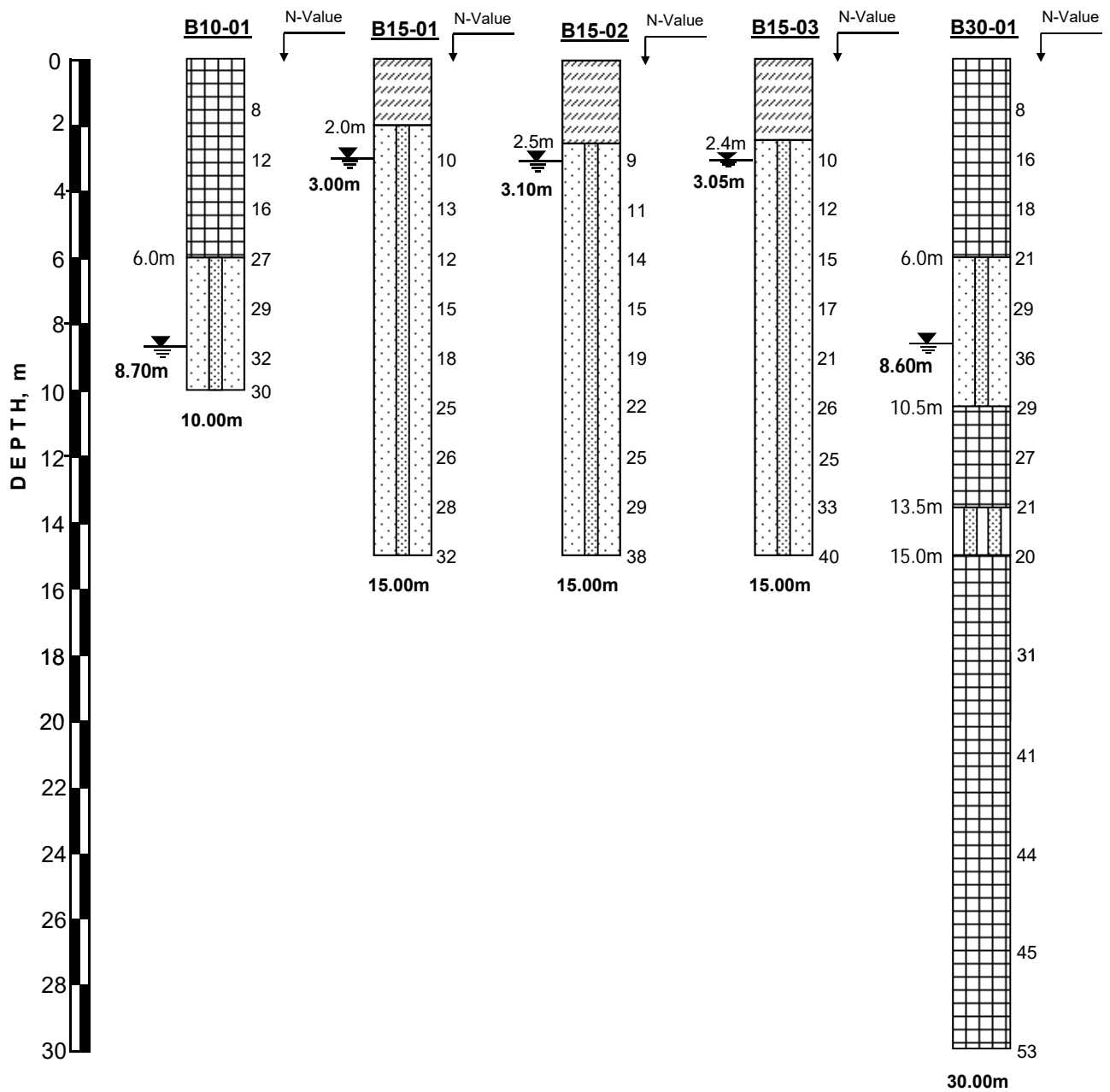
<u>LEGEND</u>	
SYMBOL	DESCRIPTION
	Fill
	Sandy silt

GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SUMMARY OF BOREHOLE PROFILE

LEGEND	
SYMBOL	DESCRIPTION
	Fill
	Silty sand
	Sandy silt

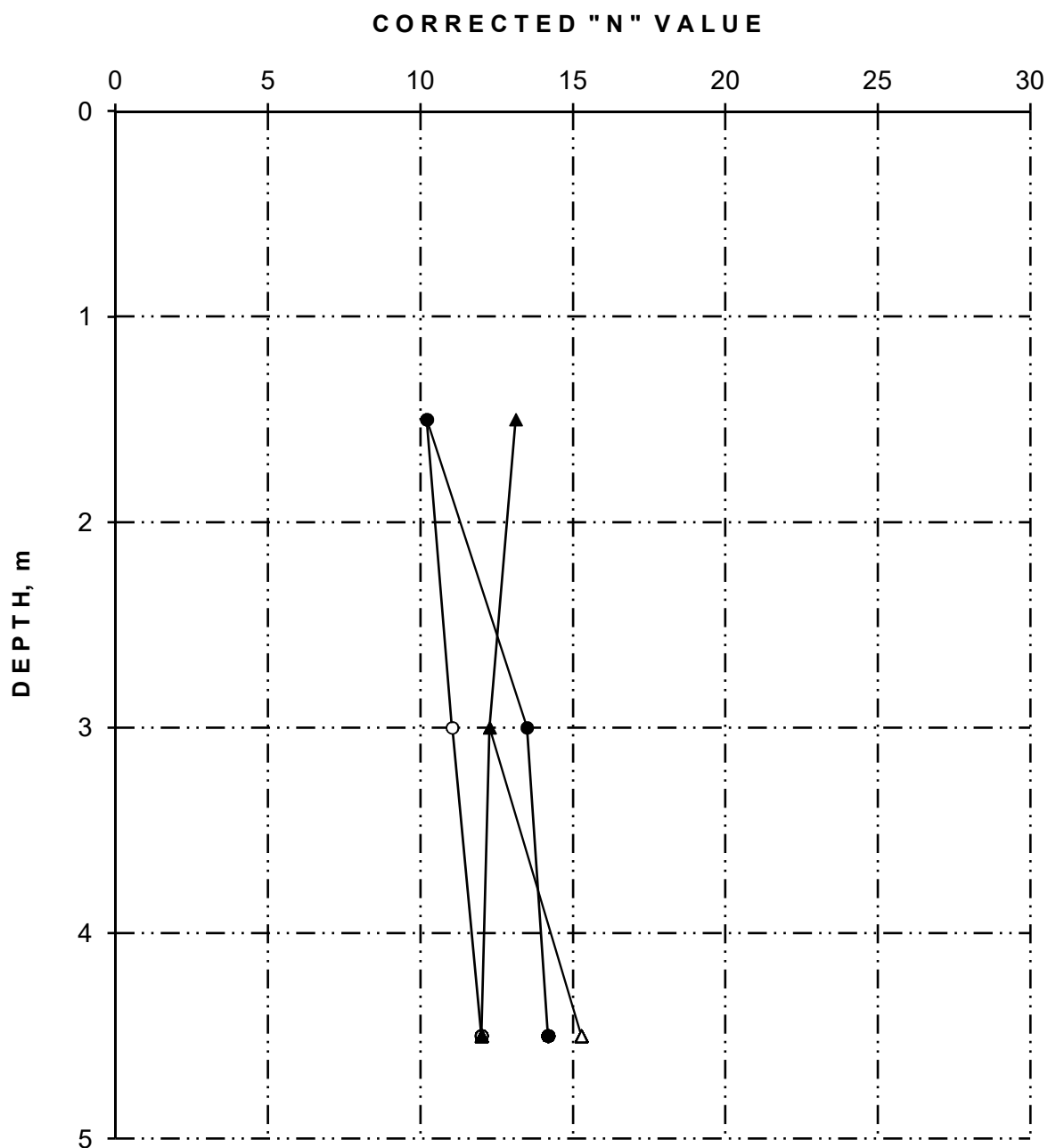


SUMMARY OF BOREHOLE PROFILE

LEGEND	
SYMBOL	DESCRIPTION
	Fill
	Silty sand
	Sandy silt
	Fine sand
	Water table



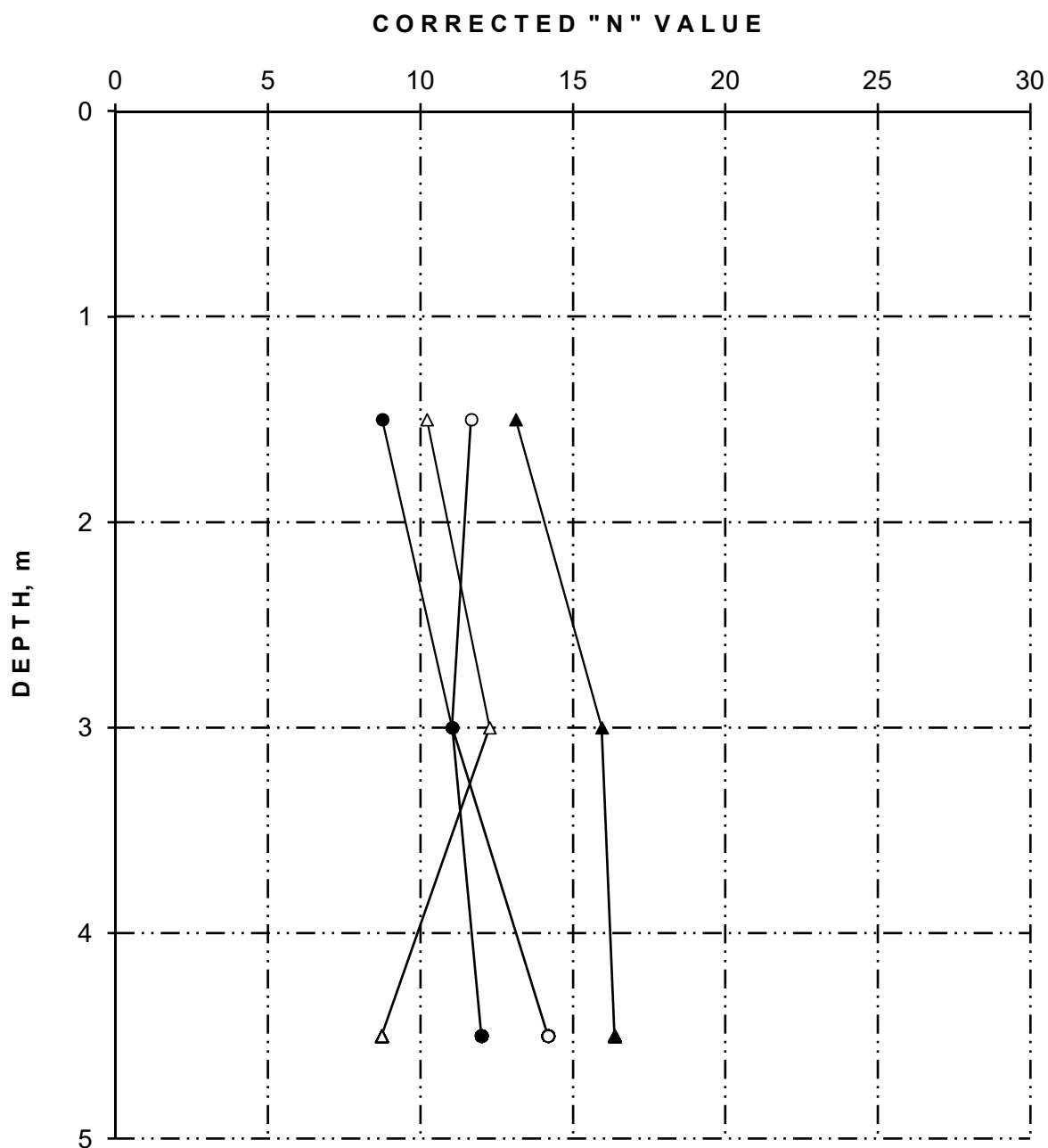
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
—○—	B5-01
—●—	B5-02
—△—	B5-03
—▲—	B5-04



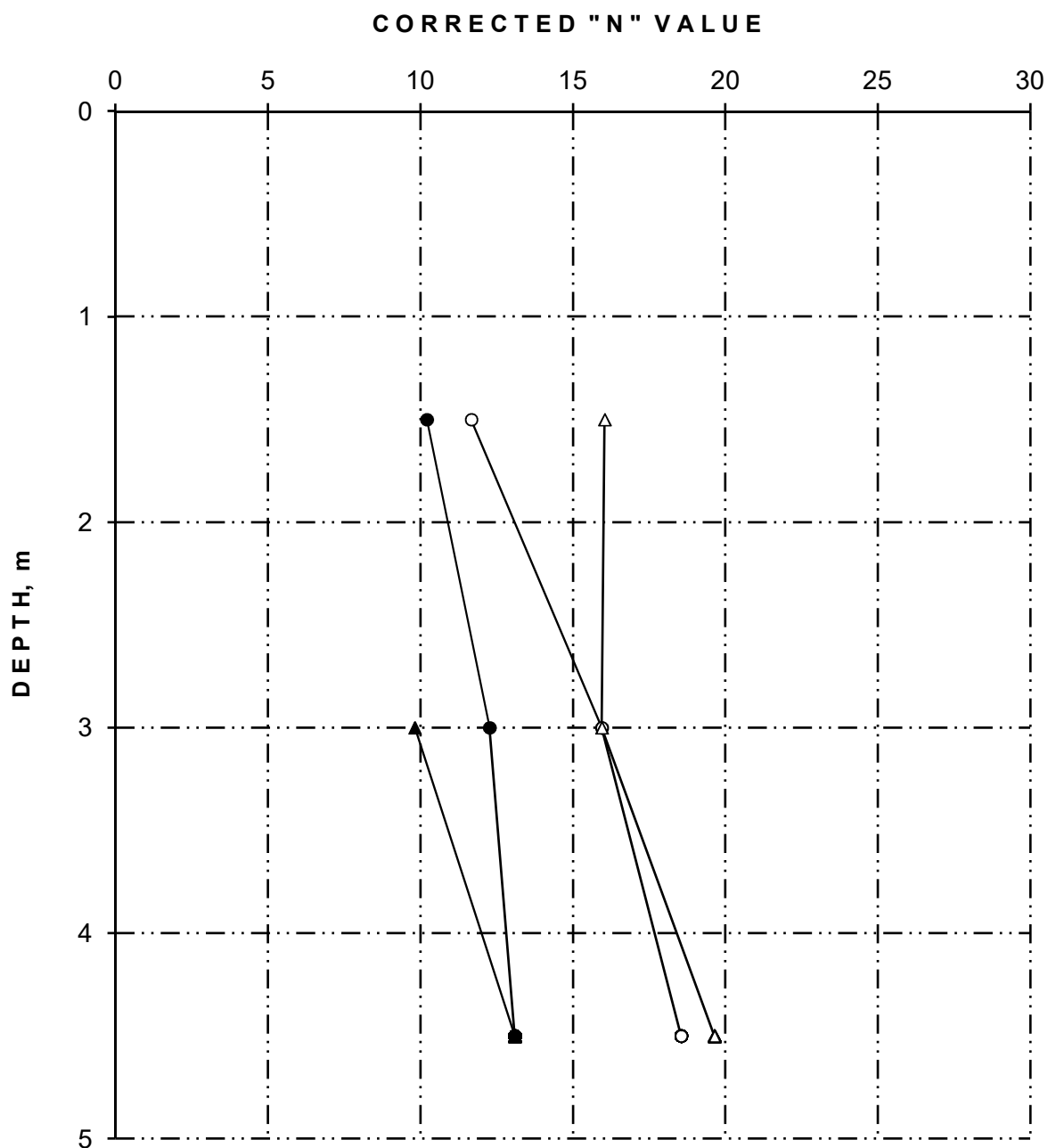
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
—○—	B5-05
—●—	B5-06
—△—	B5-07
—▲—	B5-08



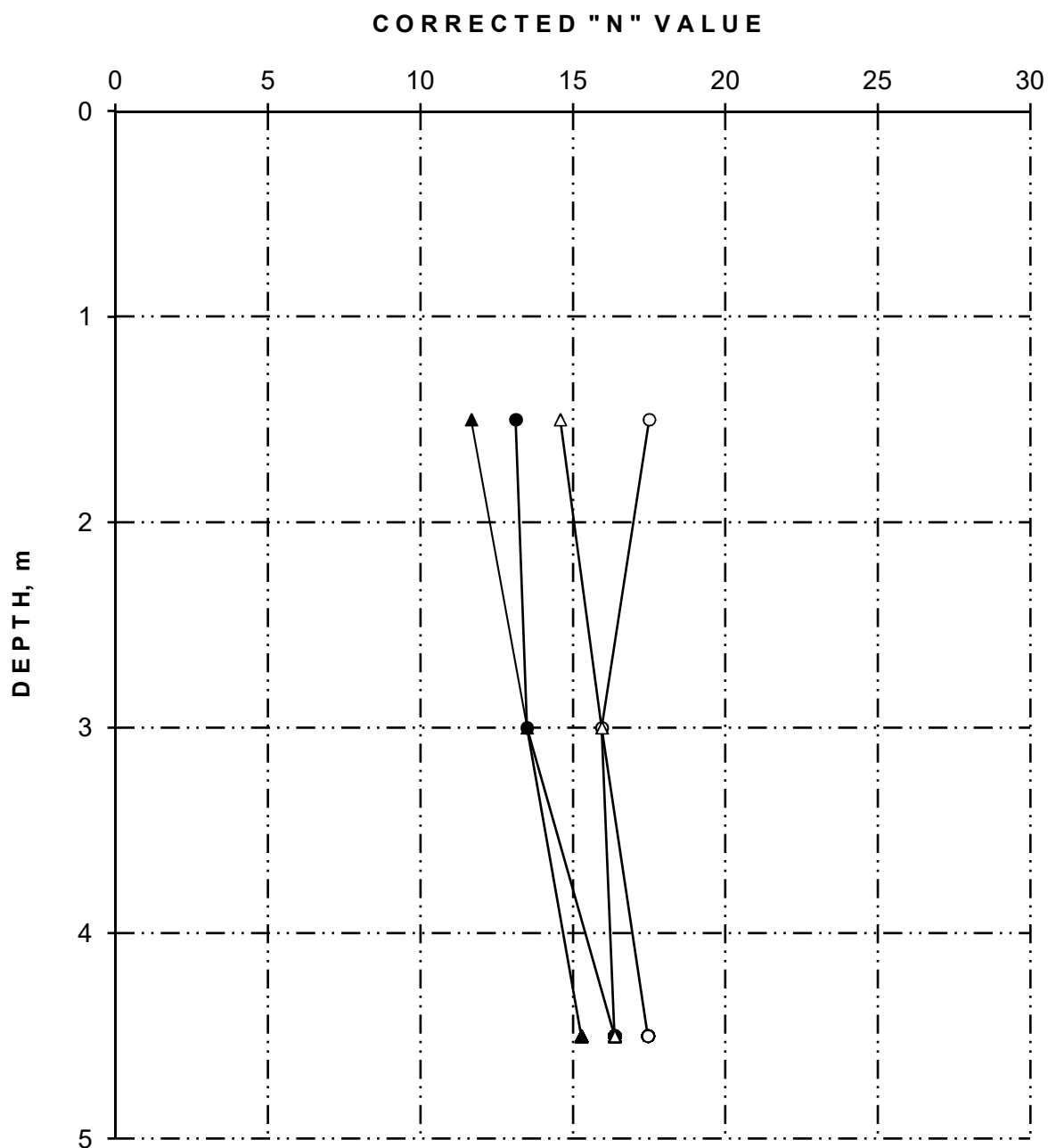
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
—○—	B5-09
—●—	B5-10
—△—	B5-11
—▲—	B5-12



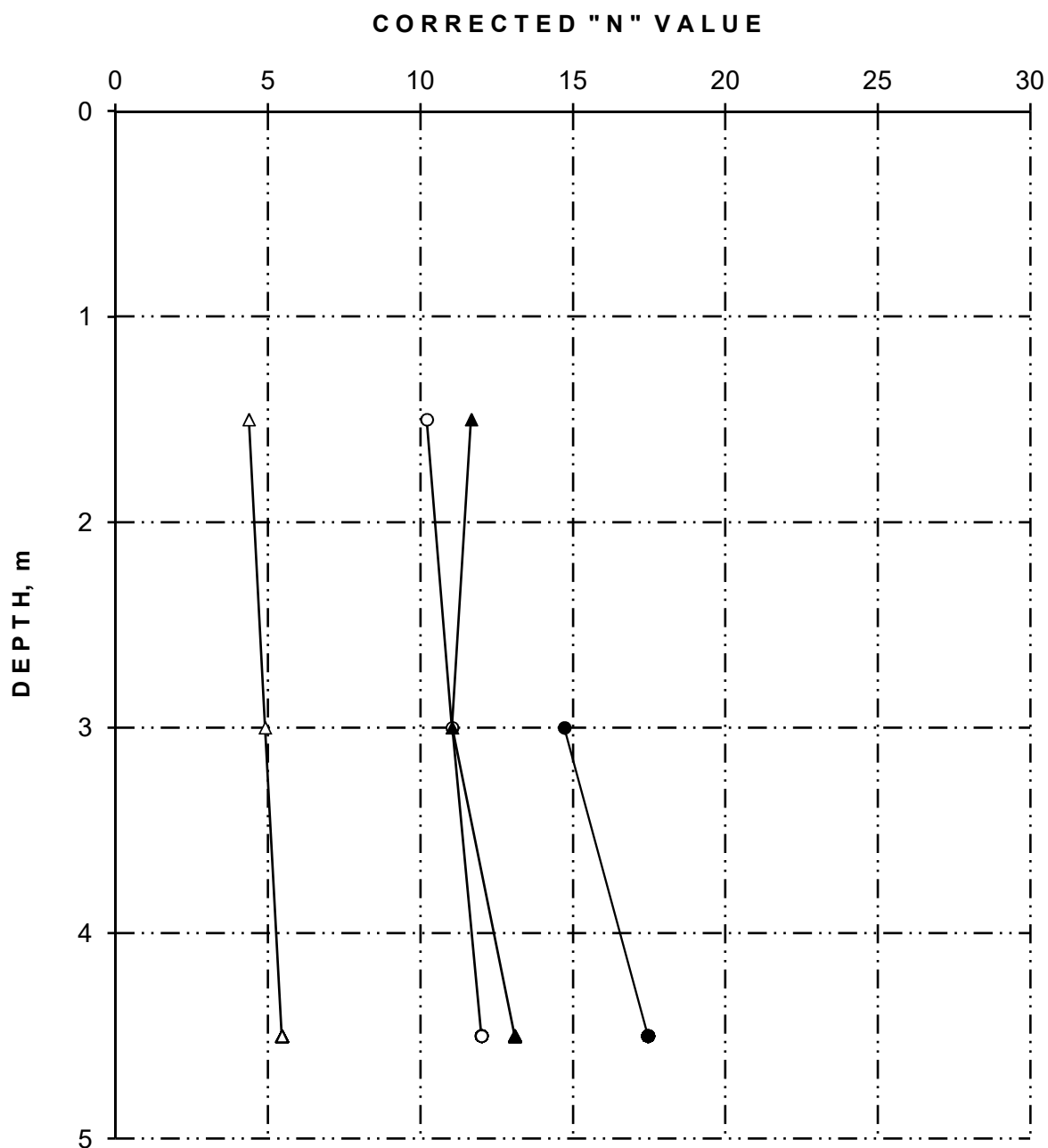
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
—○—	B5-13
—●—	B5-14
—△—	B5-15
—▲—	B5-16



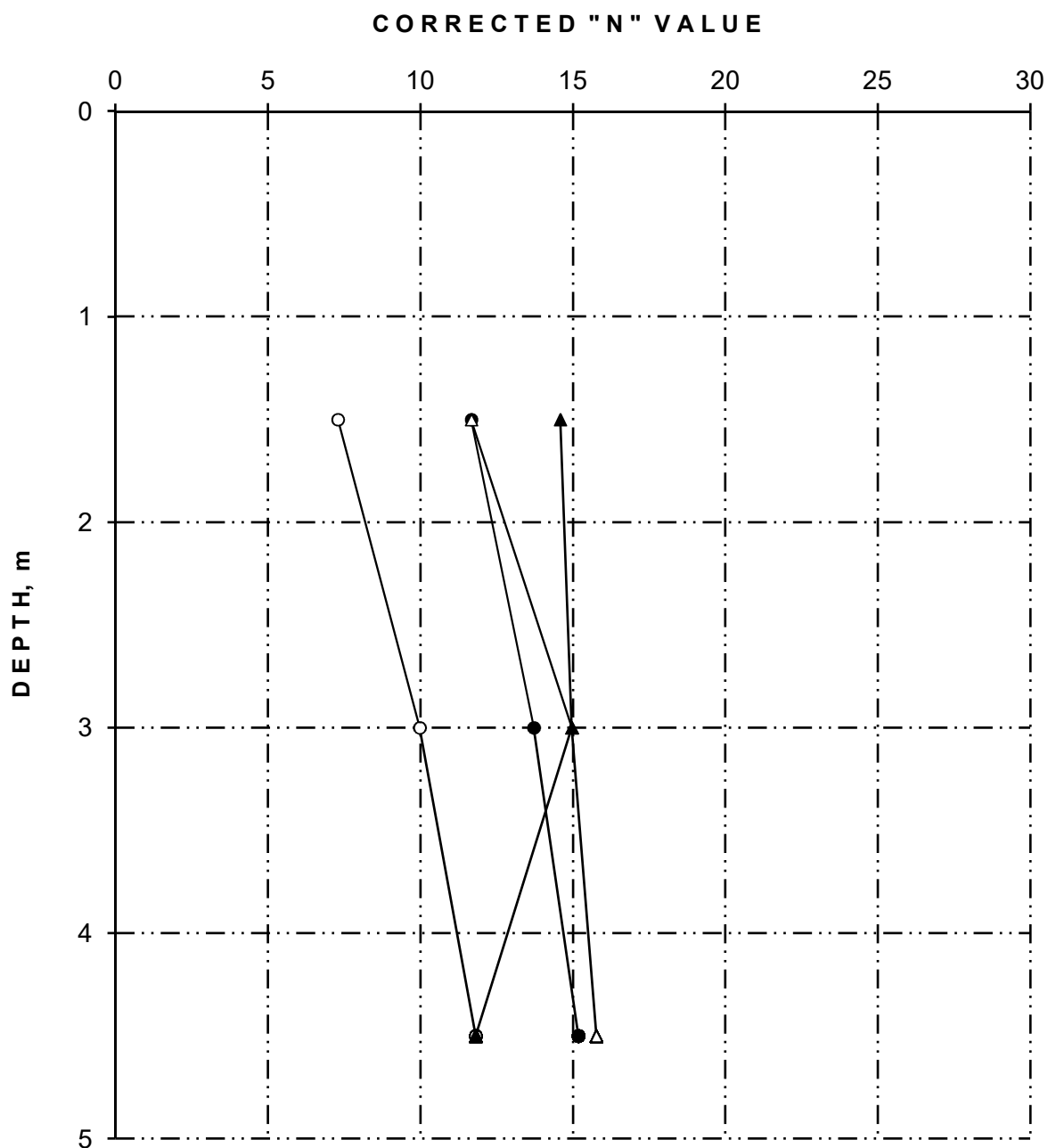
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
—○—	B5-17
—●—	B5-18
—△—	B5-19
—▲—	B5-20



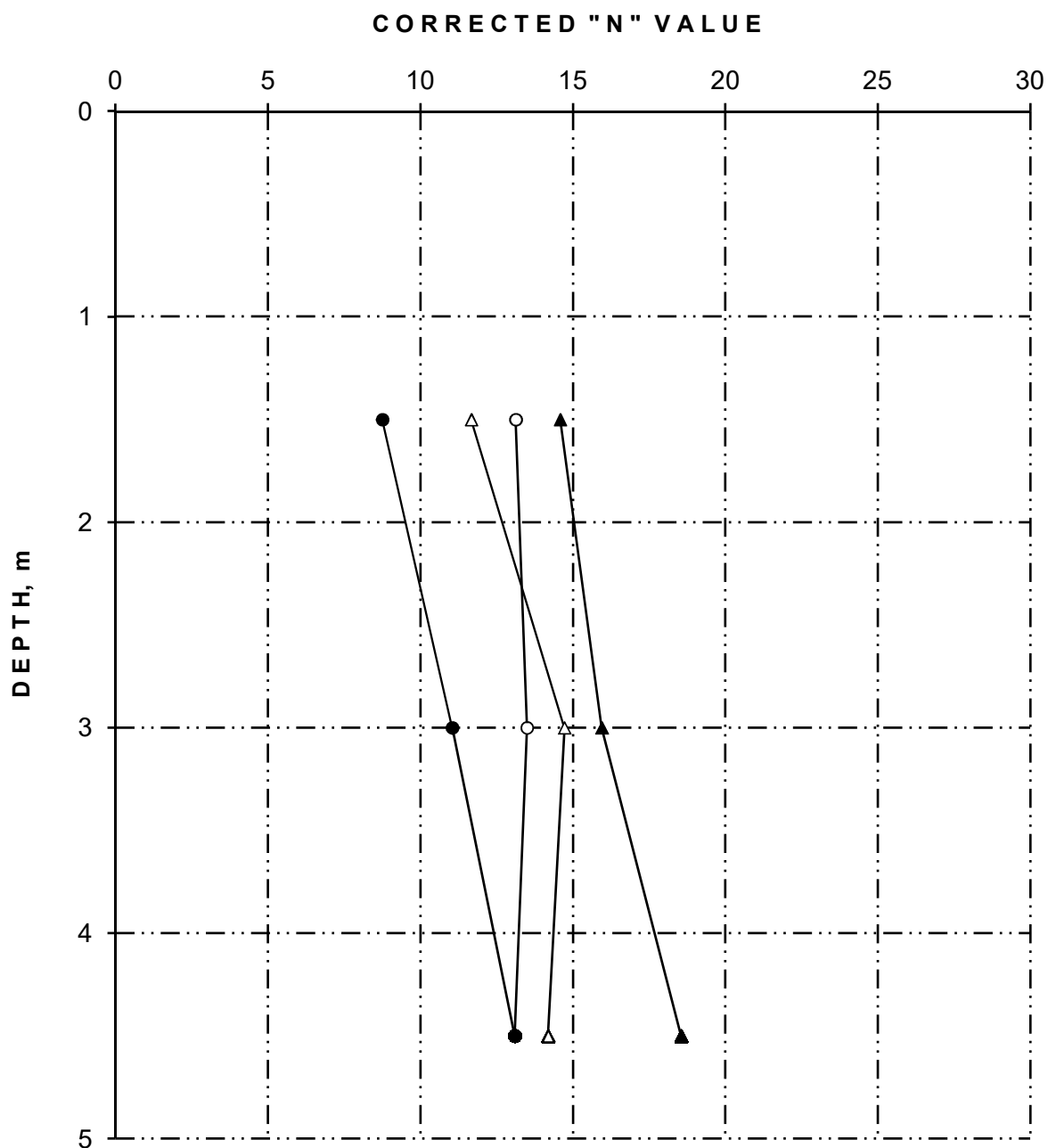
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
—○—	B5-21
—●—	B5-22
—△—	B5-23
—▲—	B5-24



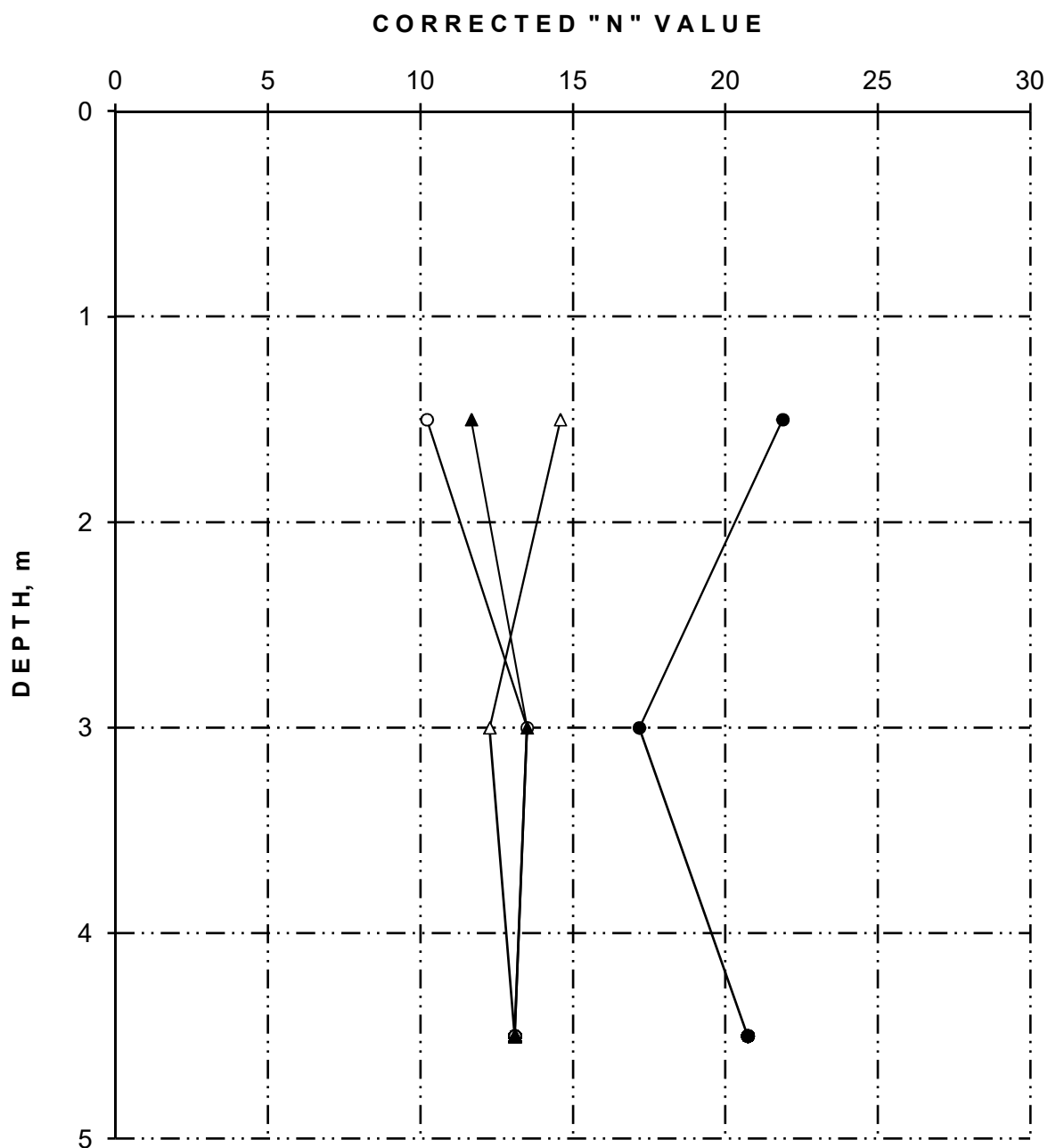
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
○	B5-25
●	B5-26
△	B5-27
▲	B5-28



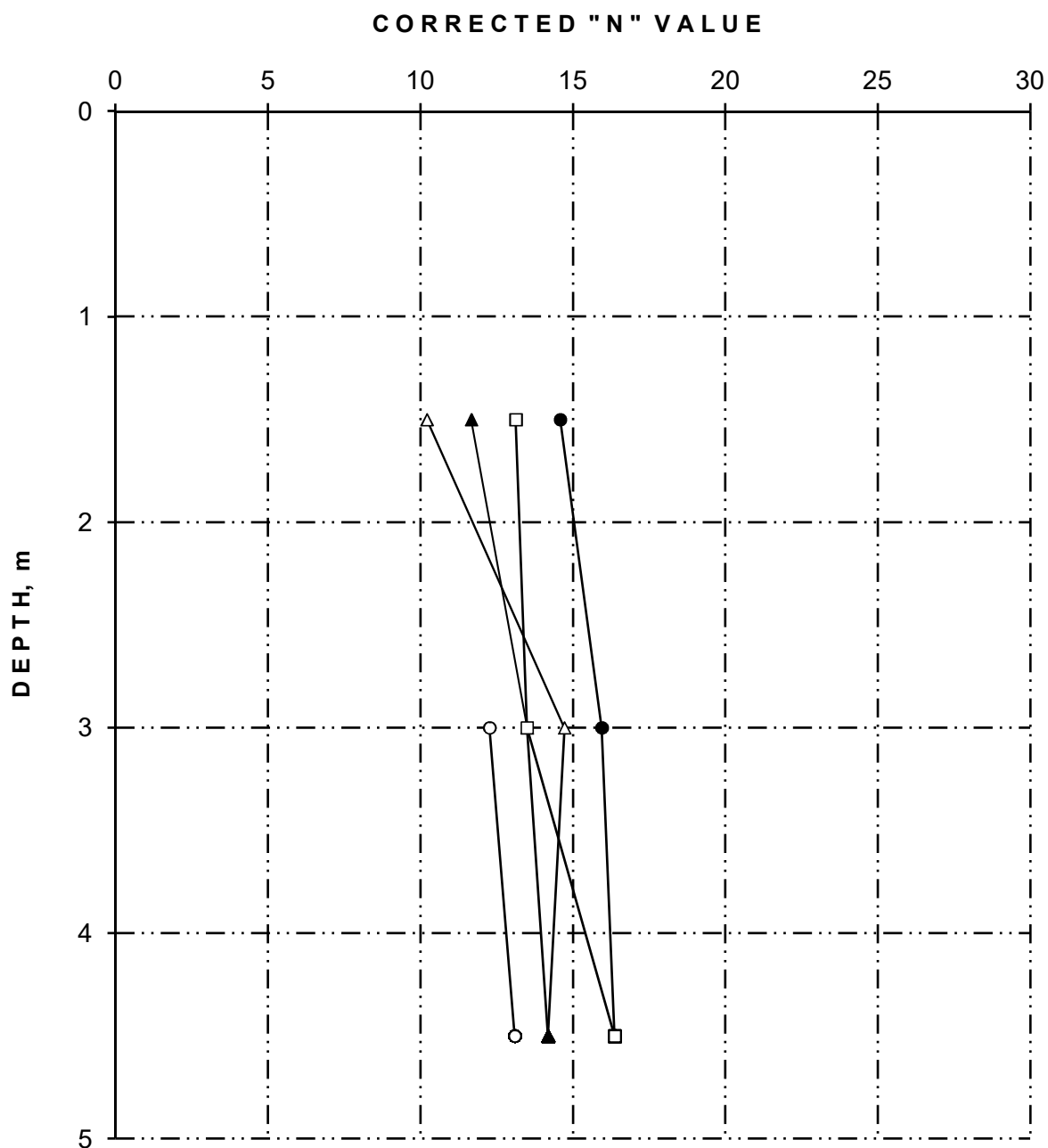
STANDARD PENETRATION TEST



LEGEND	
Symbol	BH.No.
—○—	B5-31
—●—	B5-32
—△—	B5-34
—▲—	B5-36



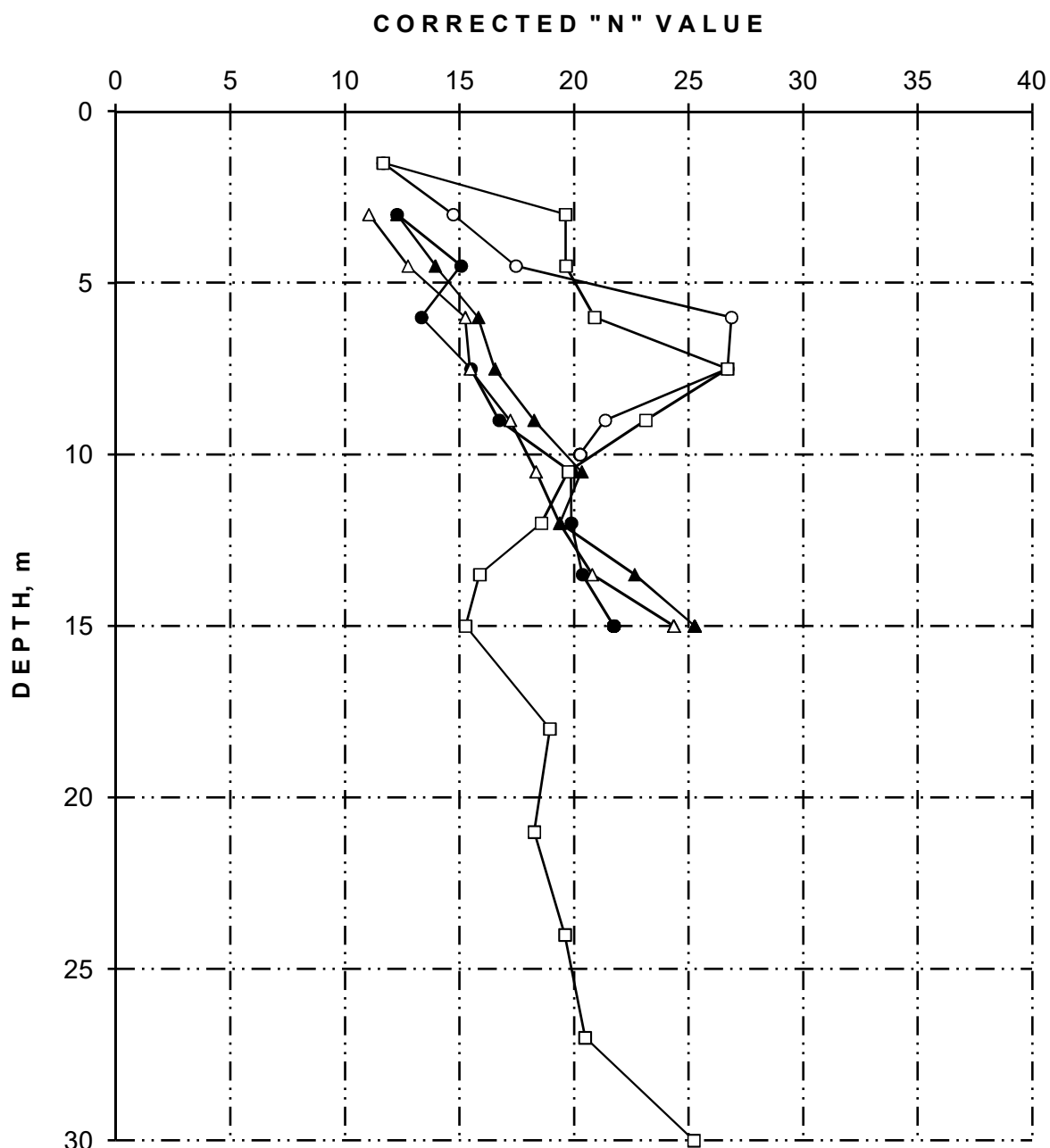
STANDARD PENETRATION TEST



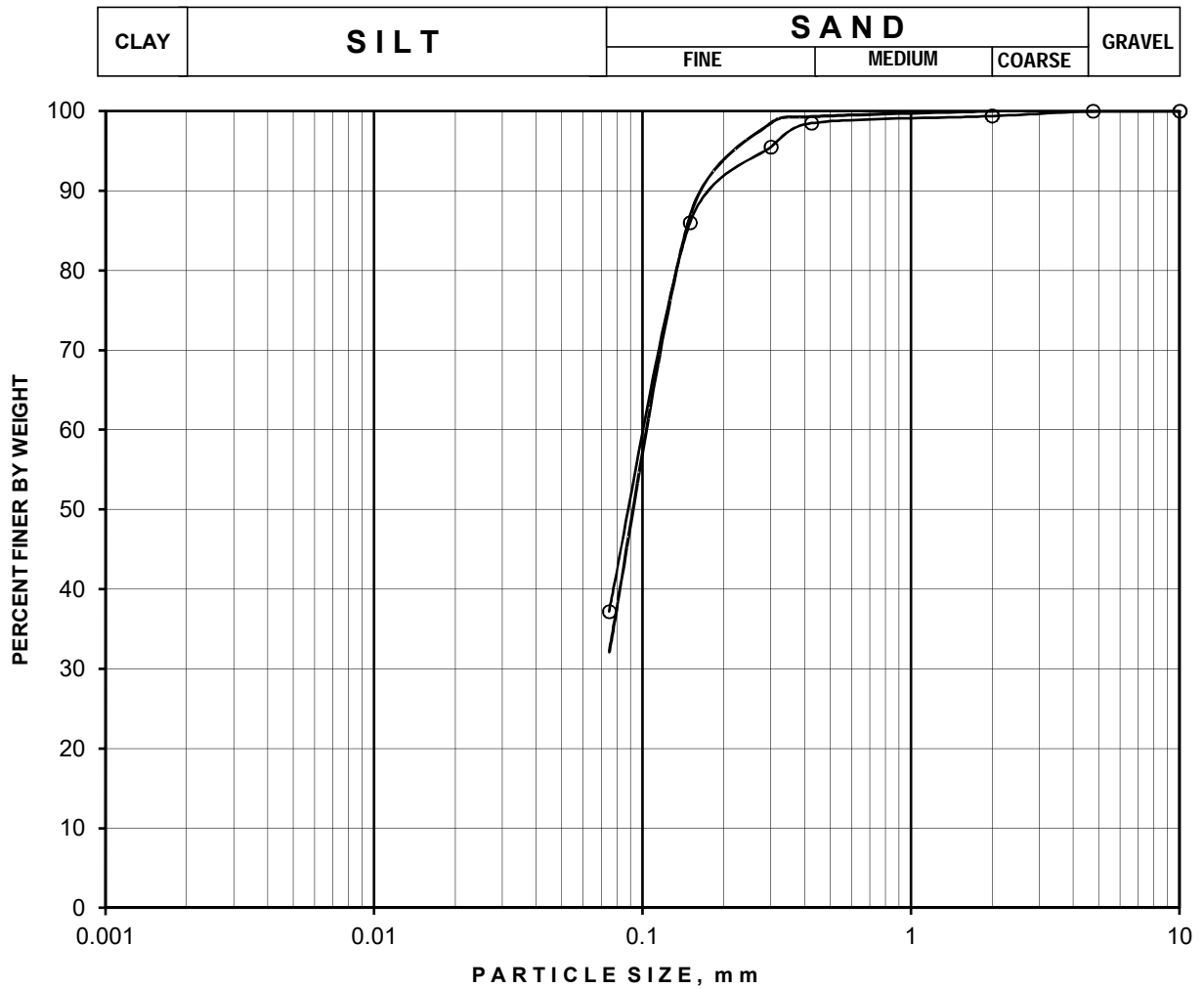
LEGEND	
Symbol	BH.No.
—○—	B5-42
—●—	B5-44
—△—	B5-45
—▲—	B5-46
—□—	B5-48



STANDARD PENETRATION TEST



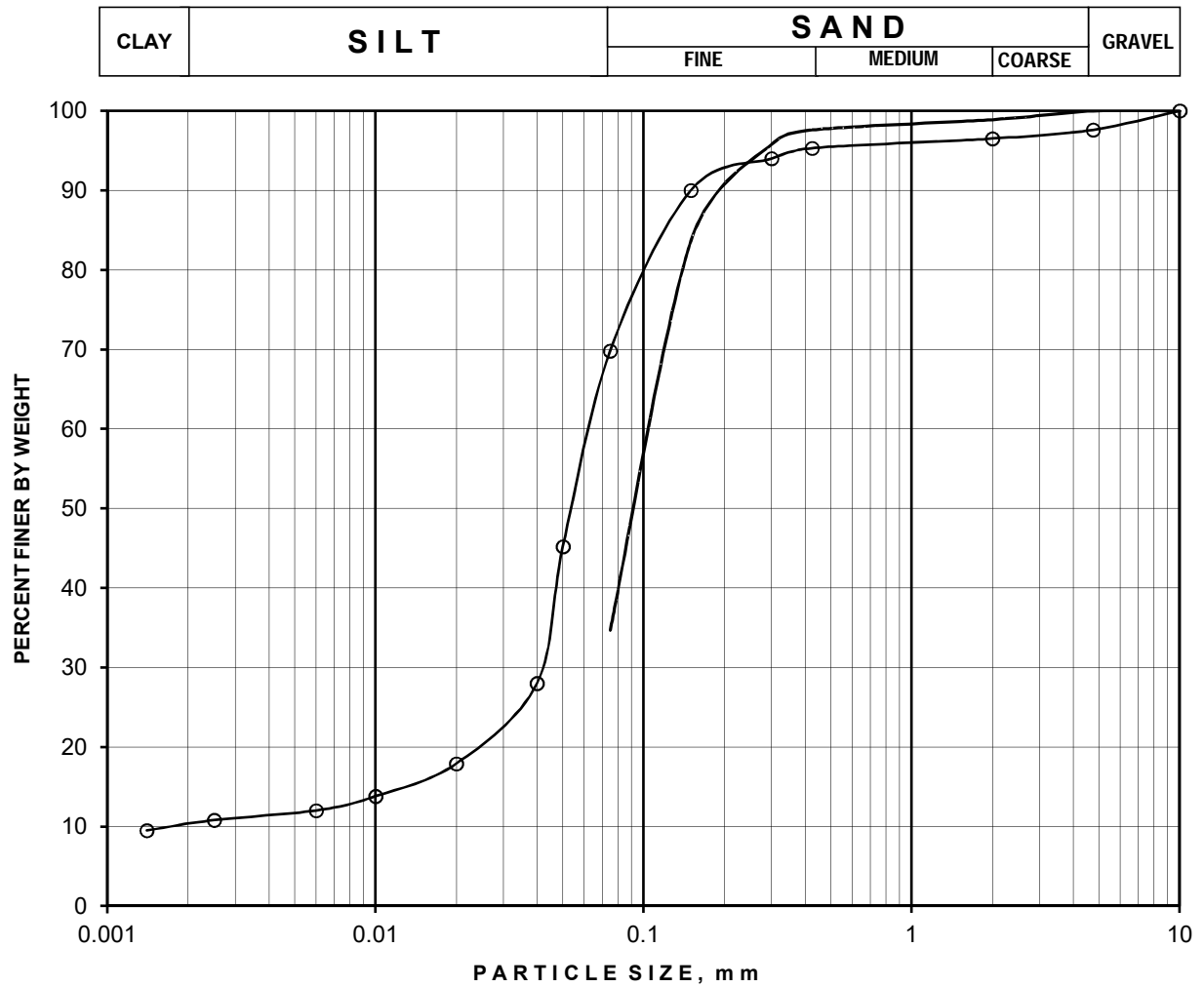
LEGEND	
Symbol	BH.No.
—○—	B10-01
—●—	B15-01
—△—	B15-02
—▲—	B15-03
—□—	B30-01



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-01/2.25	Silty sand (SM)	0	68	32	0
—○—	B5-01/4.50	Silty sand (SM)	0	63	37	0

GRAIN SIZE ANALYSIS

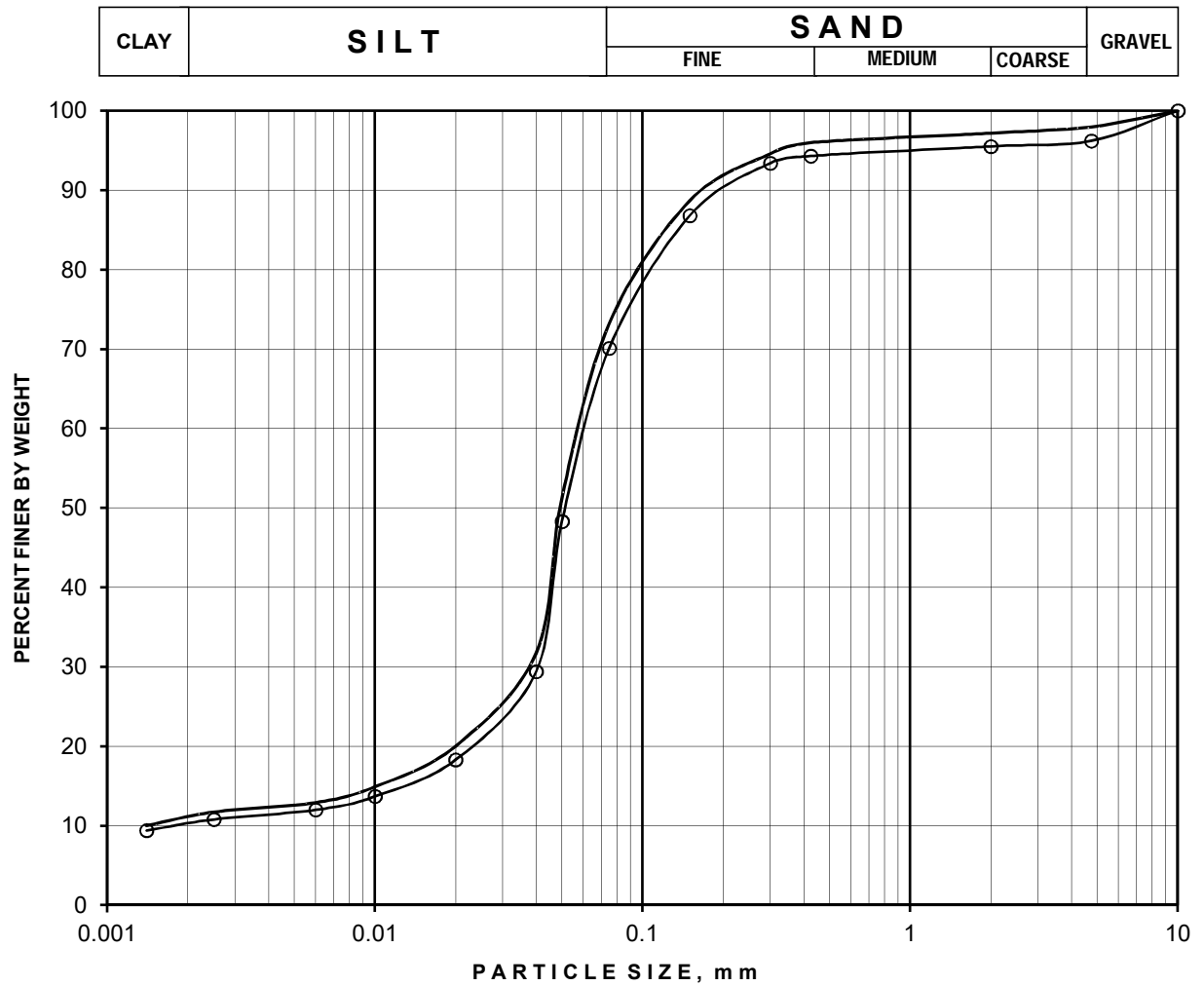
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-02/1.50	Silty sand (SM)	0	65	35	0
○	B5-02/4.50	Sandy silt (CL)	2	29	59	10

GRAIN SIZE ANALYSIS

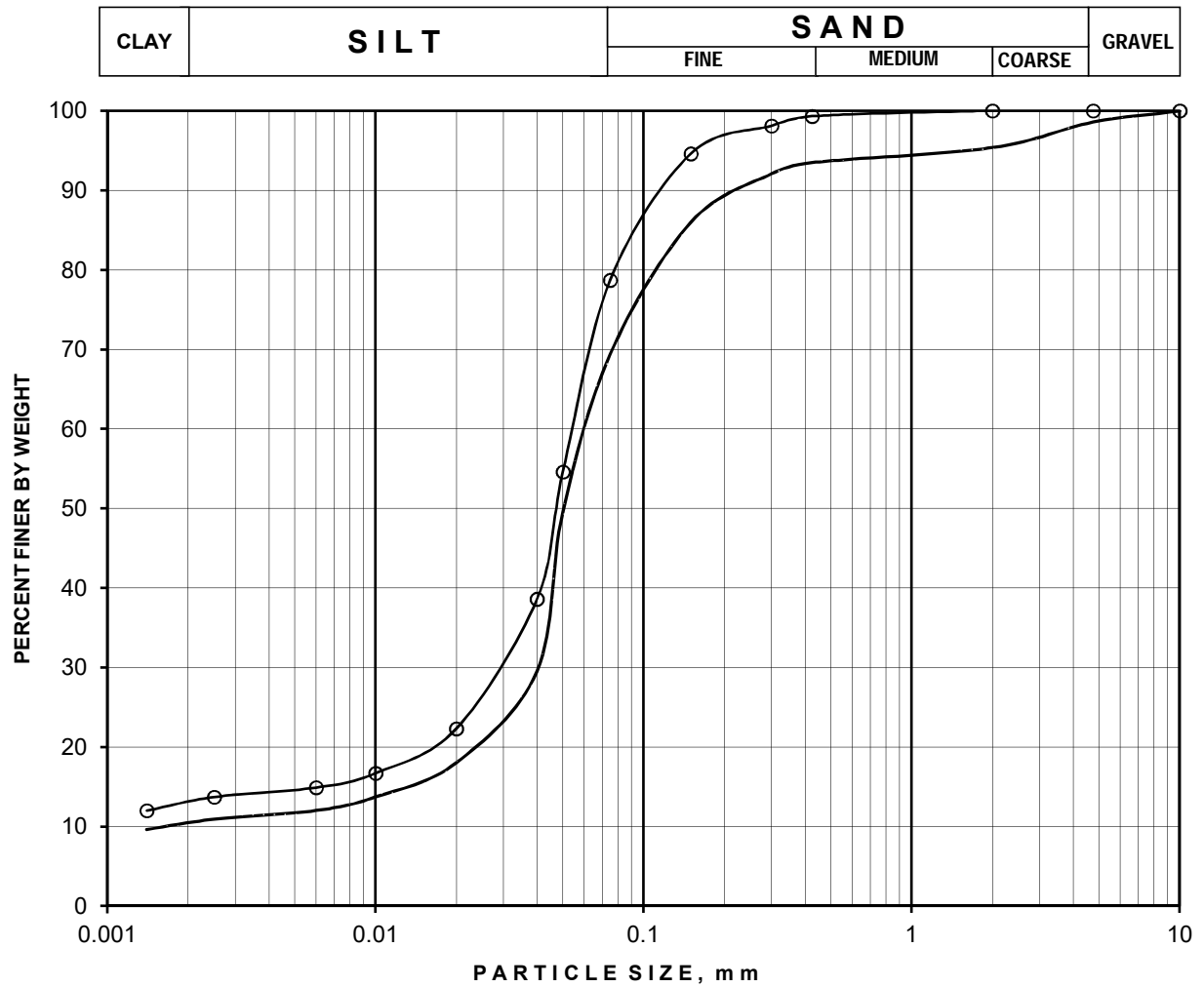
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-03/2.25	Sandy silt (CL)	2	25	62	11
○	B5-03/4.50	Sandy silt (CL)	4	26	60	10

GRAIN SIZE ANALYSIS

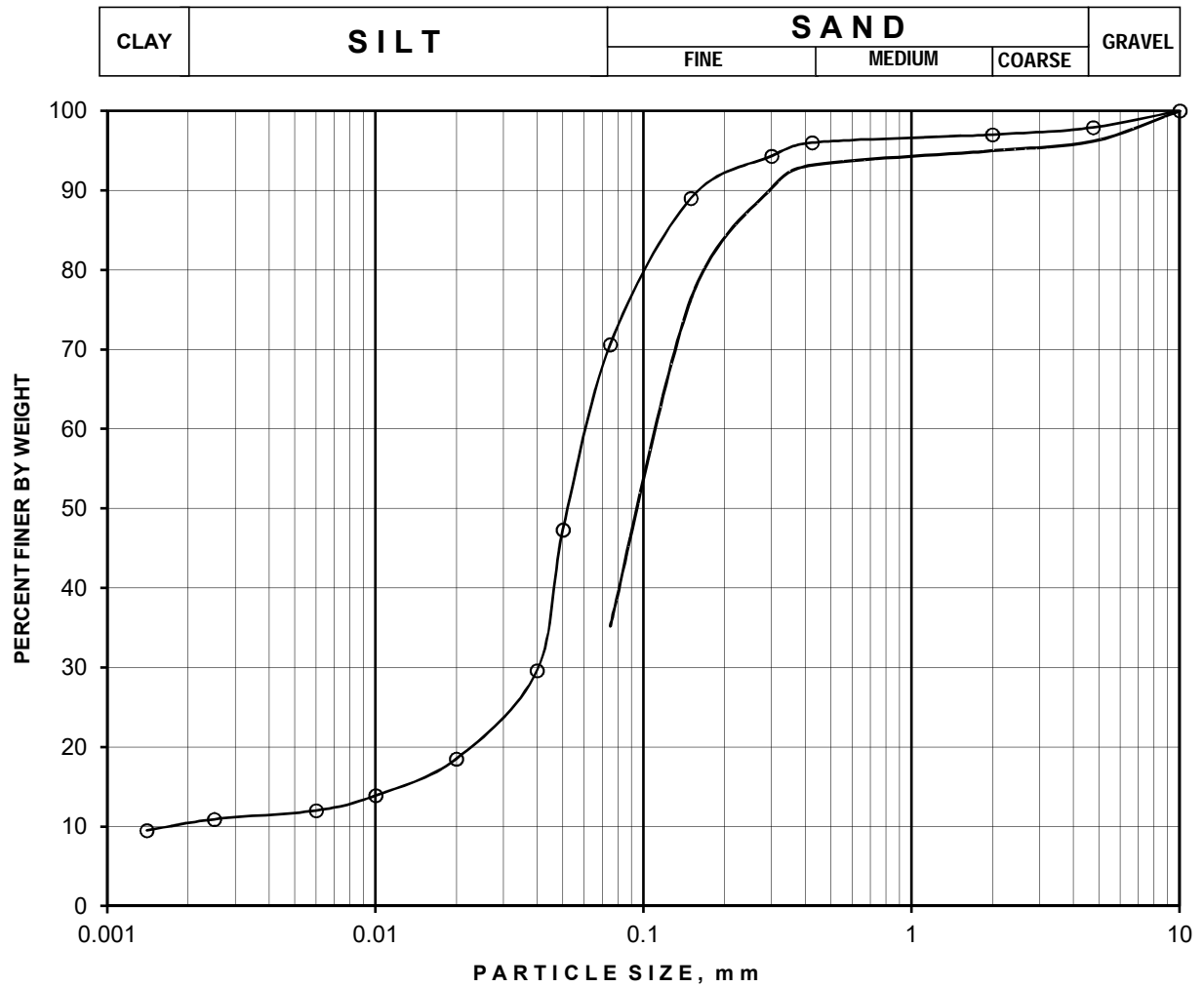
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-04/0.00	Sandy silt (CL)	1	30	59	10
○	B5-04/3.00	Sandy silt (CL)	0	21	66	13

GRAIN SIZE ANALYSIS

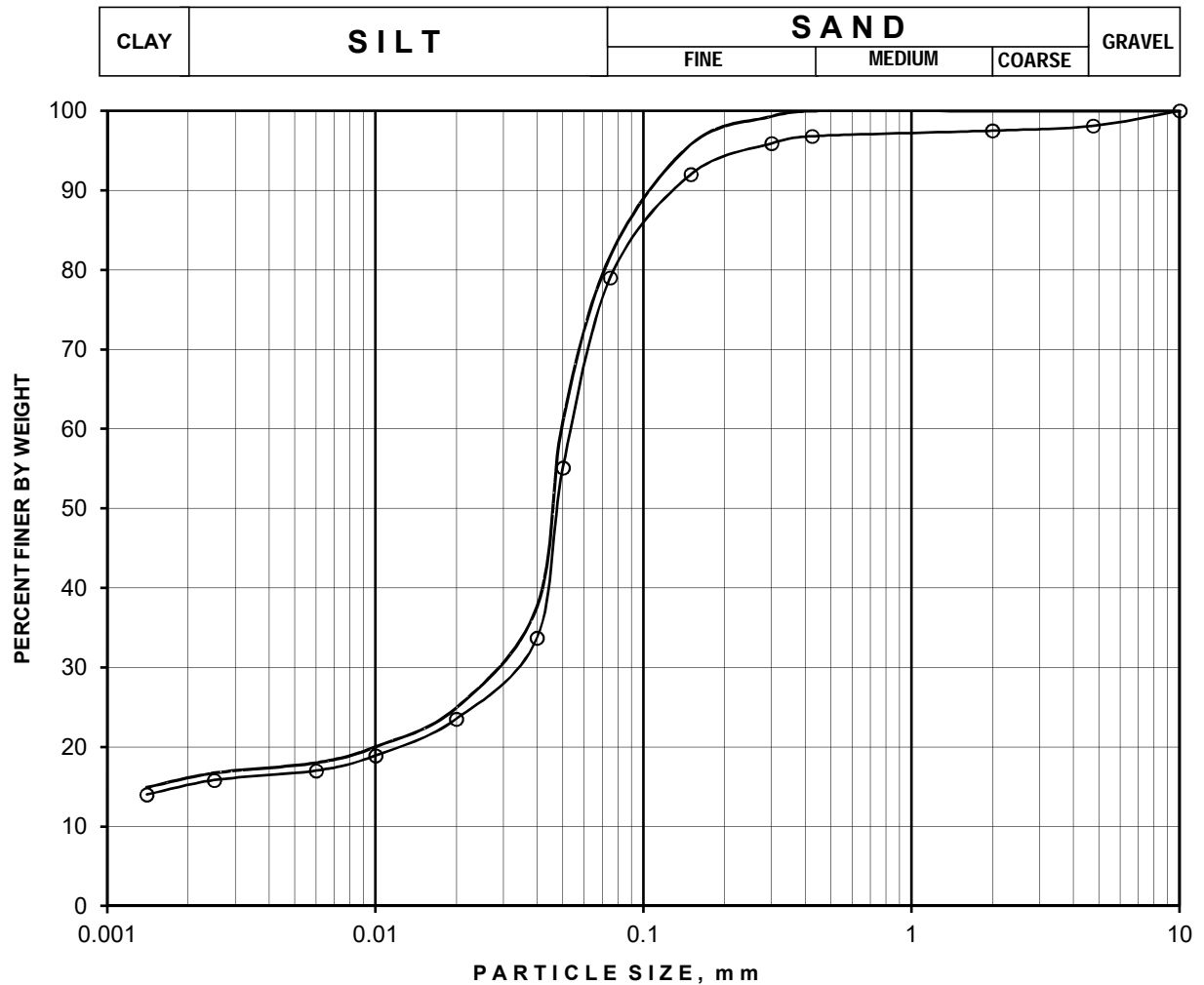
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-05/1.50	Silty sand (SM)	4	61	35	0
○	B5-05/3.00	Sandy silt (CL)	2	27	61	10

GRAIN SIZE ANALYSIS

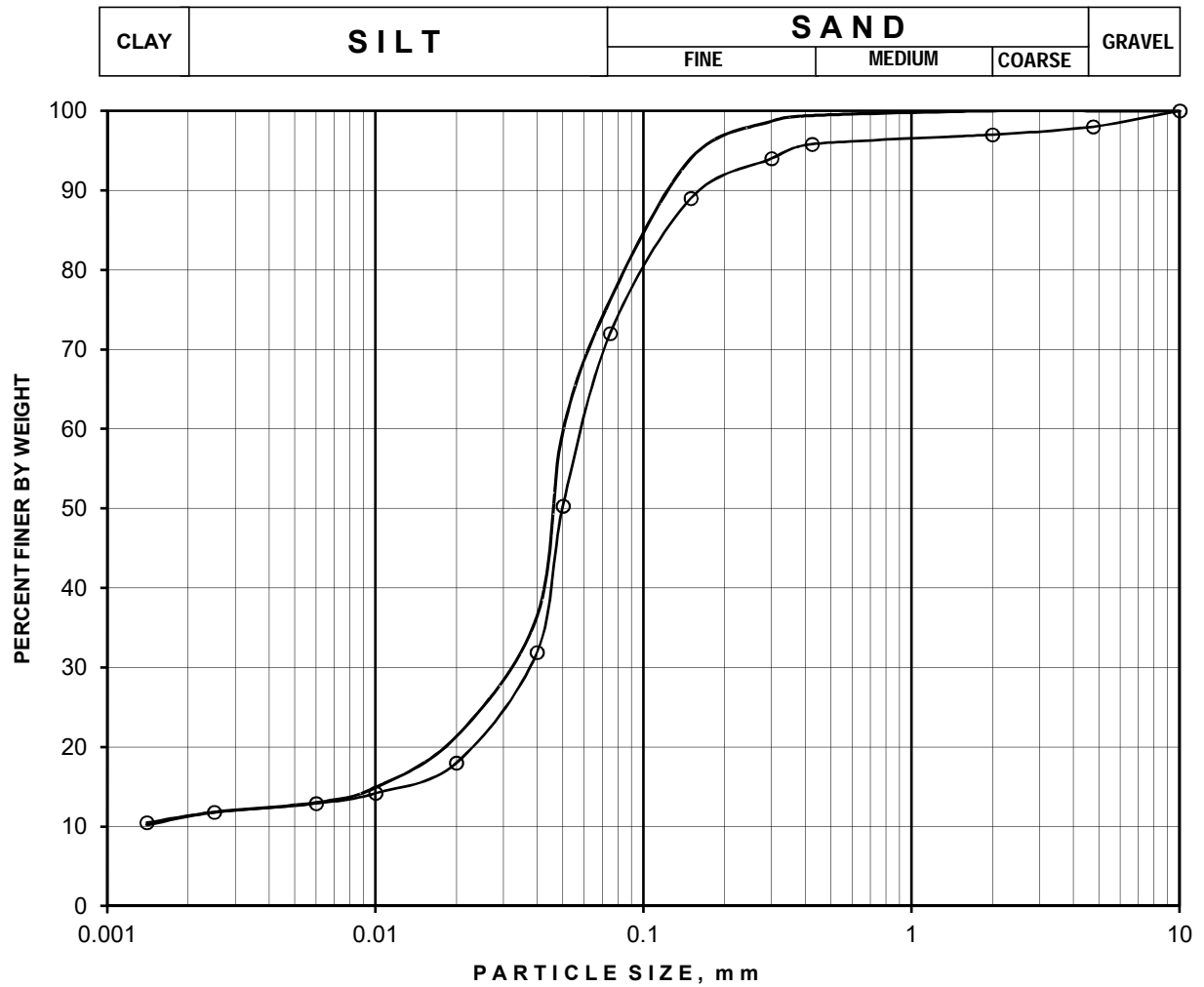
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-06/1.50	Sandy silt (CL)	0	18	66	16
—○—	B5-06/4.50	Sandy silt (CL)	2	19	64	15

GRAIN SIZE ANALYSIS

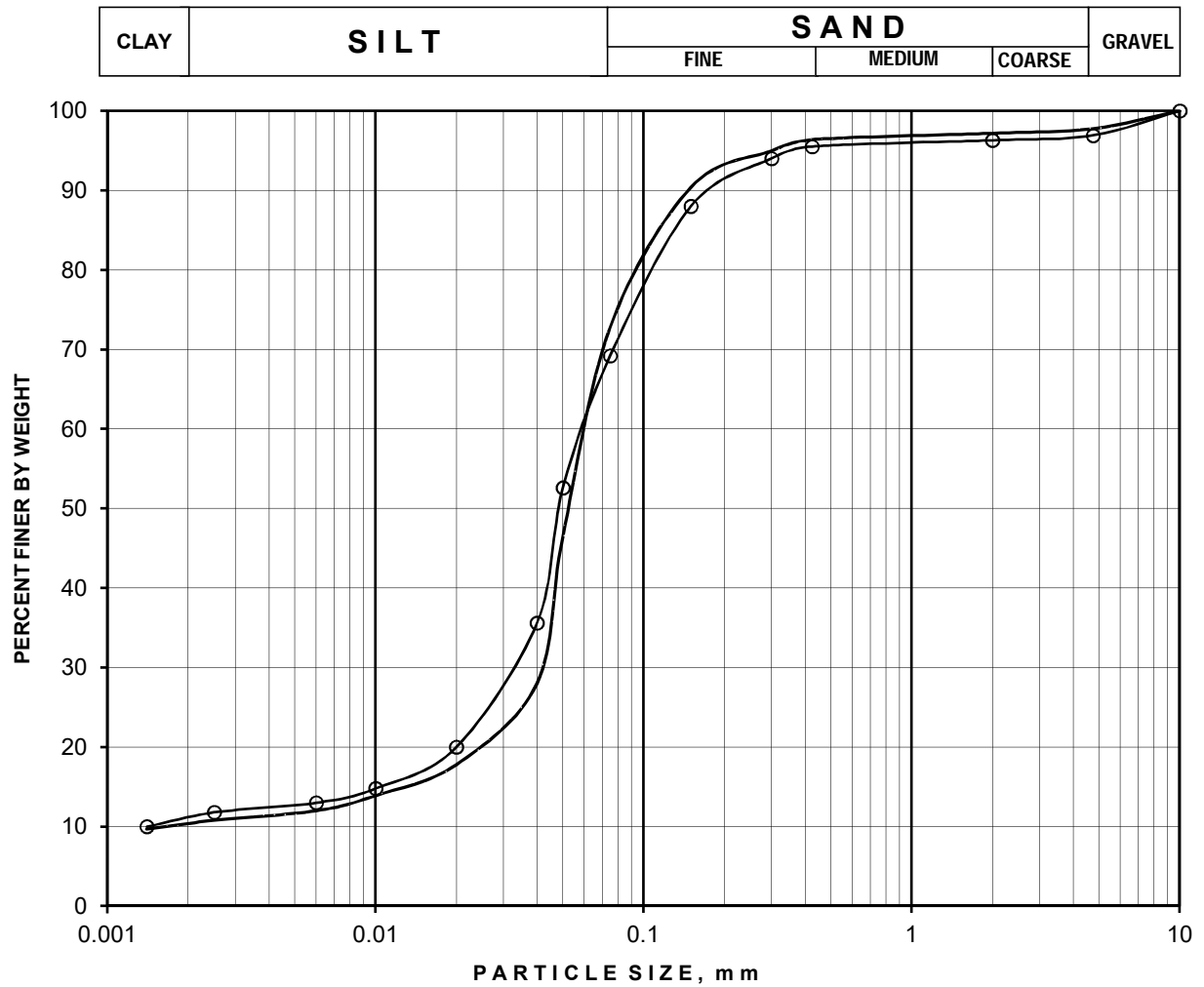
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-07/2.25	Sandy silt (CL)	0	24	65	11
—○—	B5-07/4.50	Sandy silt (CL)	2	26	61	11

GRAIN SIZE ANALYSIS

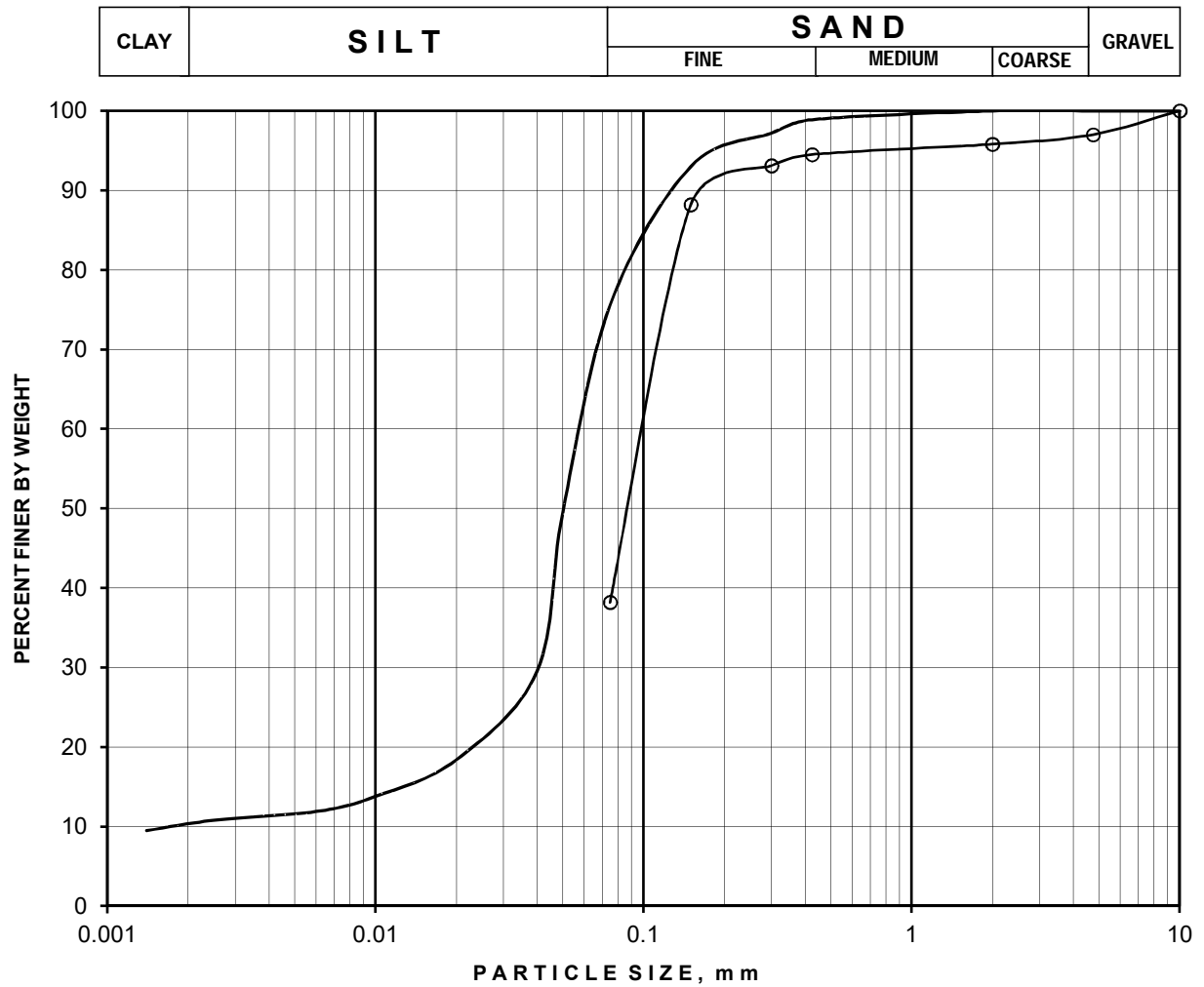
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-08/1.50	Sandy silt (CL)	2	25	63	10
○	B5-08/4.50	Sandy silt (CL)	3	28	58	11

GRAIN SIZE ANALYSIS

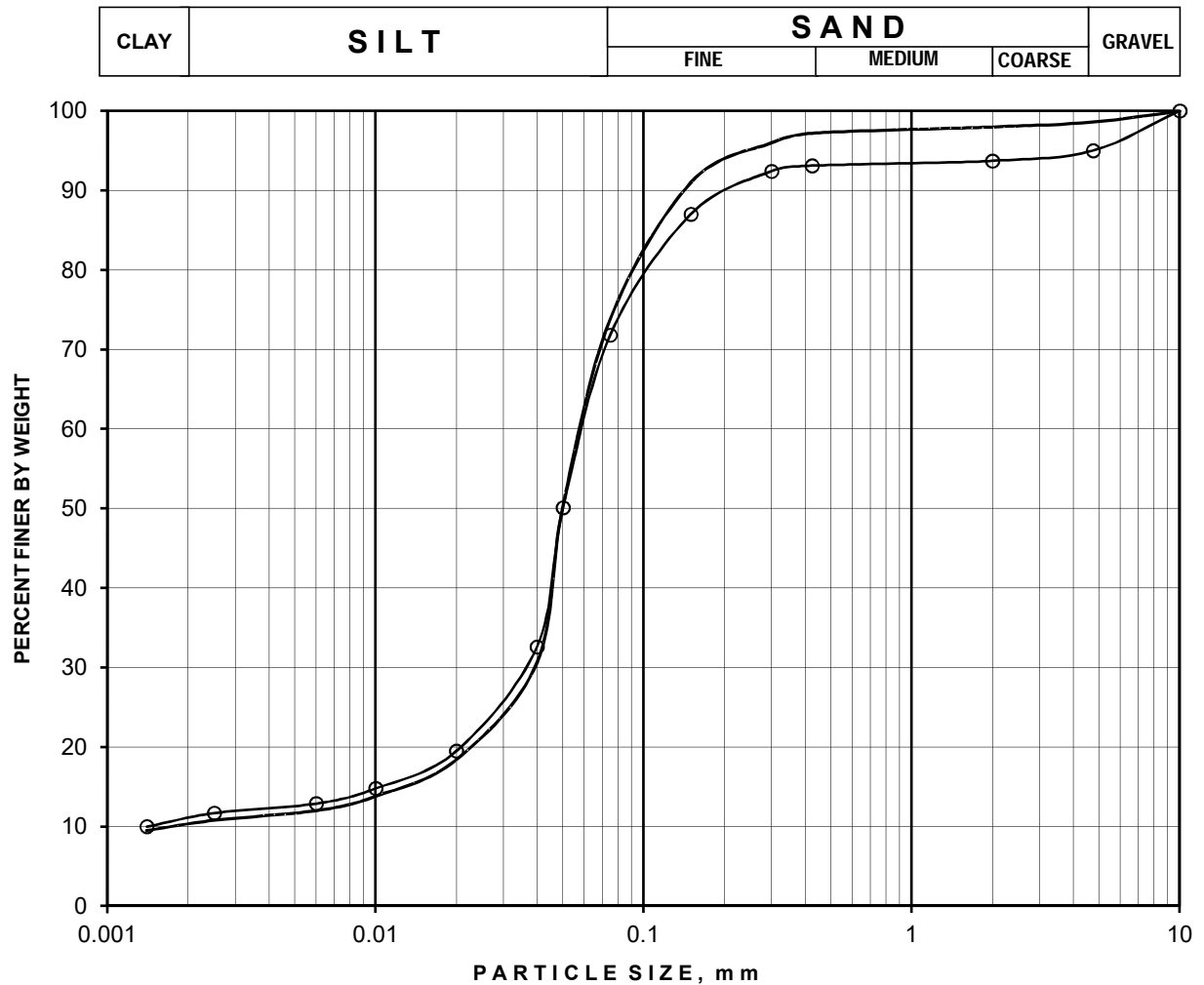
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-09/0.00	Sandy silt (CL)	0	24	66	10
○	B5-09/4.50	Silty sand (SM)	3	59	38	0

GRAIN SIZE ANALYSIS

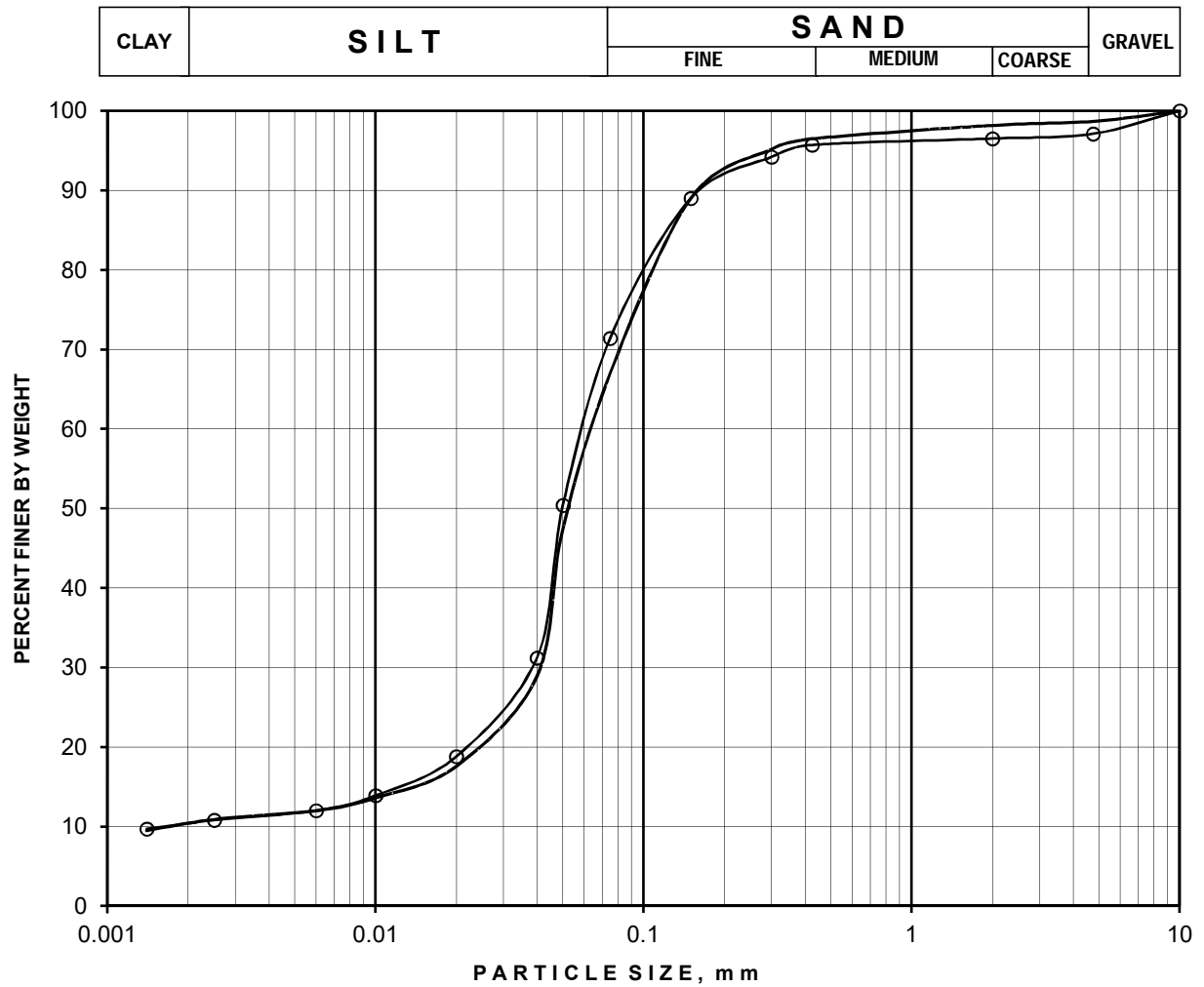
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-10/0.00	Sandy silt (CL)	1	25	64	10
—○—	B5-10/3.00	Sandy silt (CL)	5	23	61	11

GRAIN SIZE ANALYSIS

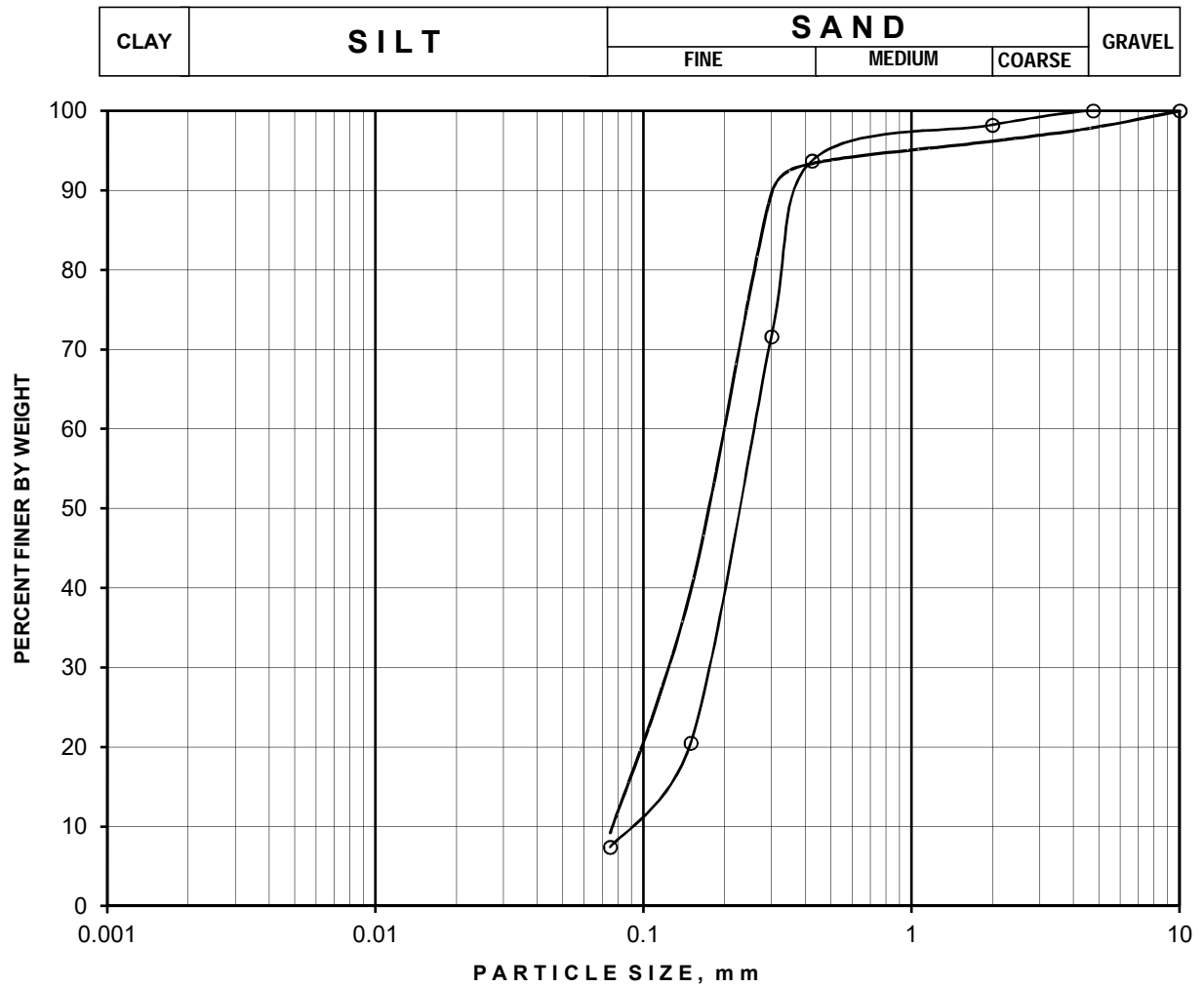
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-11/0.00	Sandy silt (CL)	1	32	57	10
○	B5-11/4.50	Sandy silt (CL)	3	26	61	10

GRAIN SIZE ANALYSIS

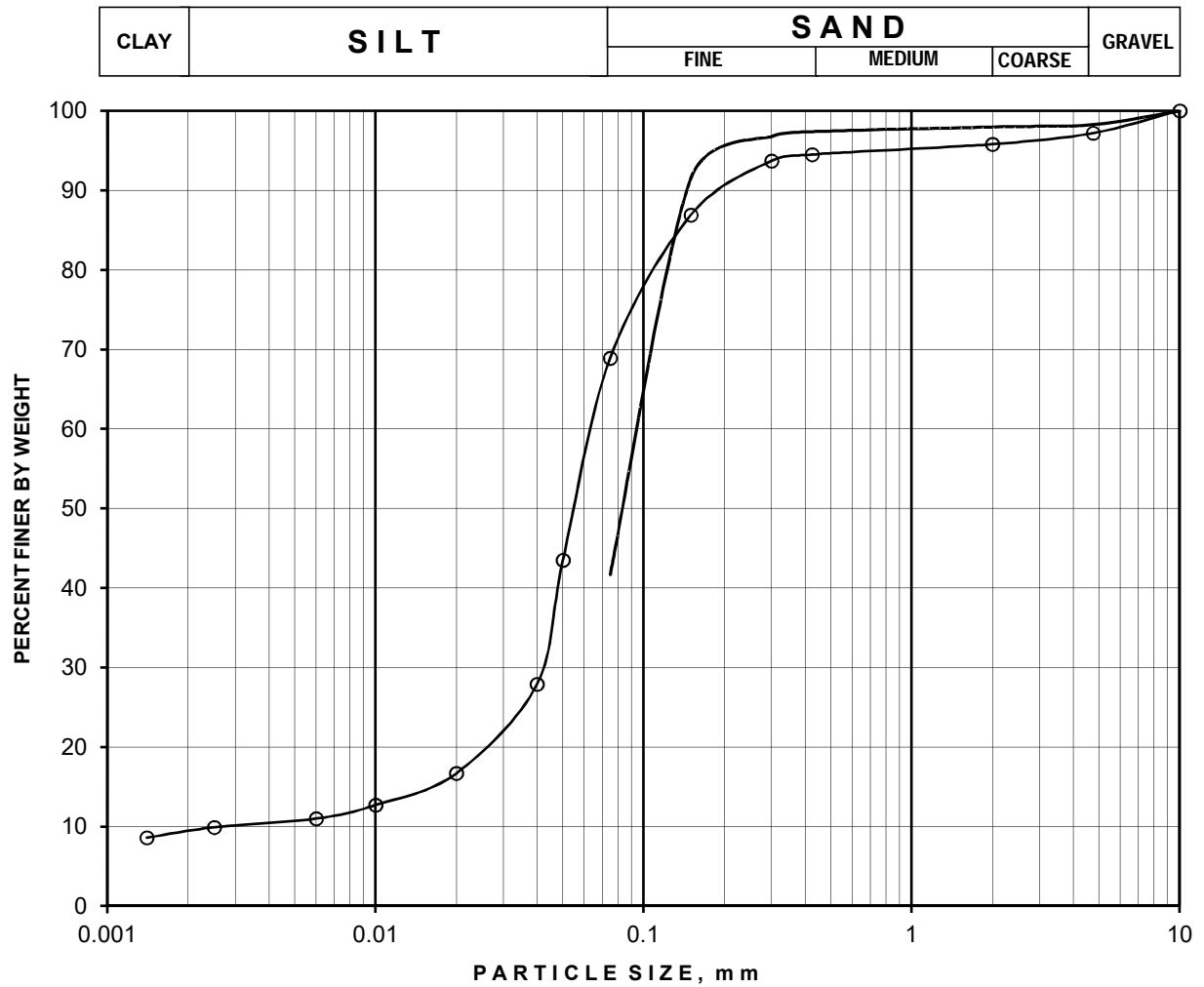
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-12/3.00	Fine sand (SP-SM)	2	89	9	0
—○—	B5-12/4.50	Fine sand (SP-SM)	0	93	7	0

GRAIN SIZE ANALYSIS

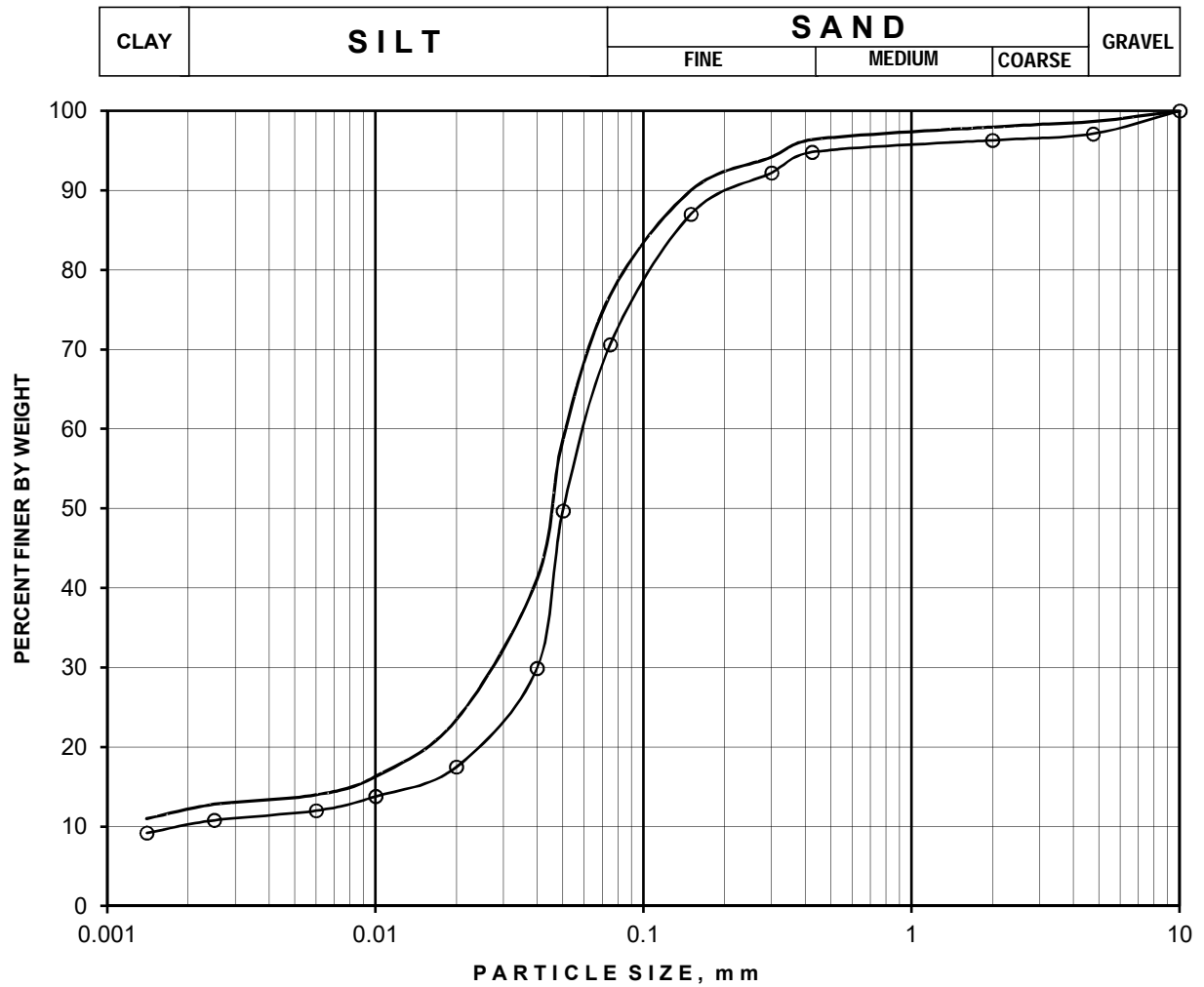
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-13/1.50	Silty sand (SM)	2	56	42	0
○	B5-13/4.50	Sandy silt (CL)	3	28	60	9

GRAIN SIZE ANALYSIS

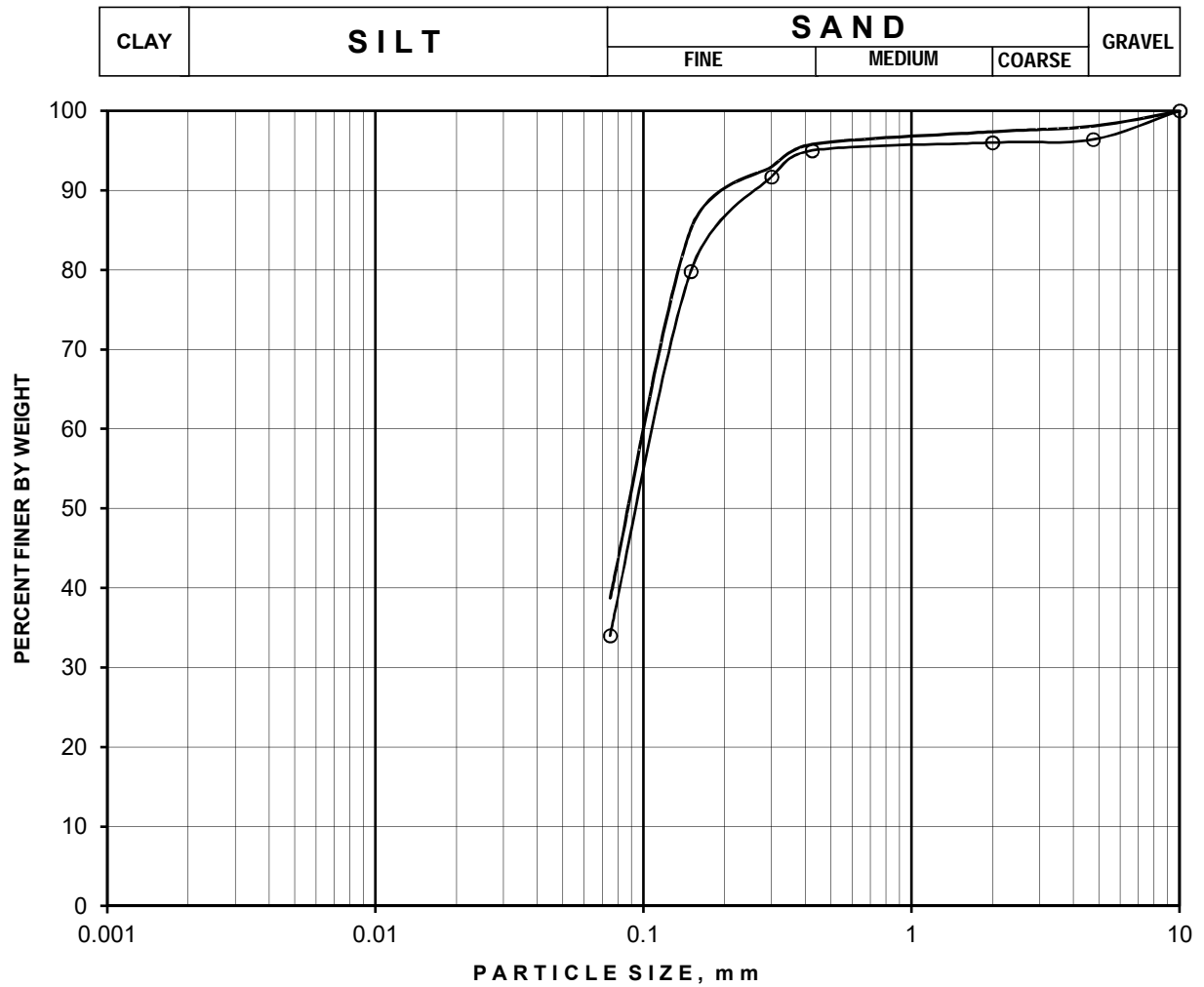
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-14/2.25	Sandy silt (CL)	1	22	65	12
○	B5-14/4.50	Sandy silt (CL)	3	26	61	10

GRAIN SIZE ANALYSIS

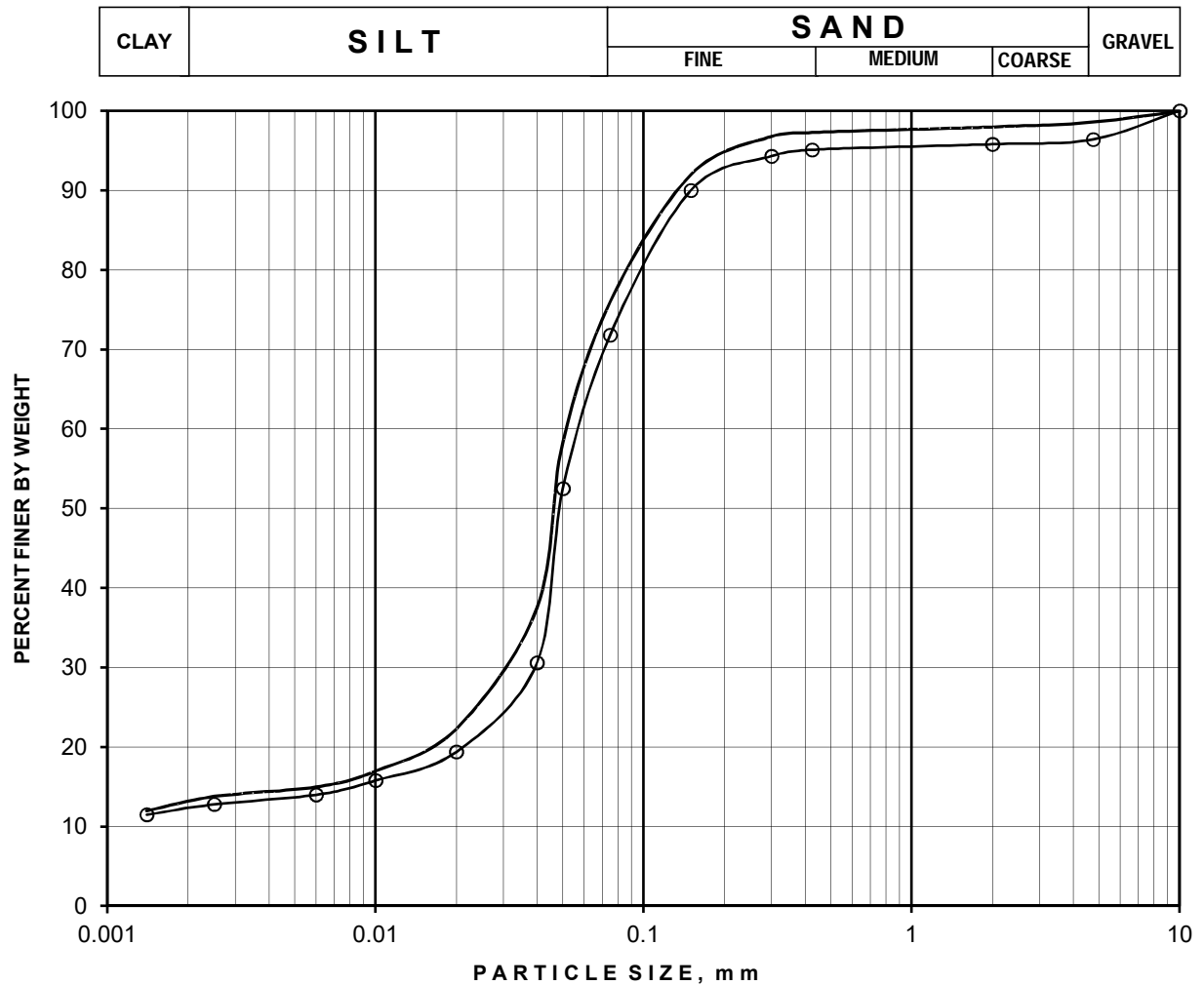
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-15/1.50	Silty sand (SM)	2	59	39	0
○	B5-15/4.50	Silty sand (SM)	4	62	34	0

GRAIN SIZE ANALYSIS

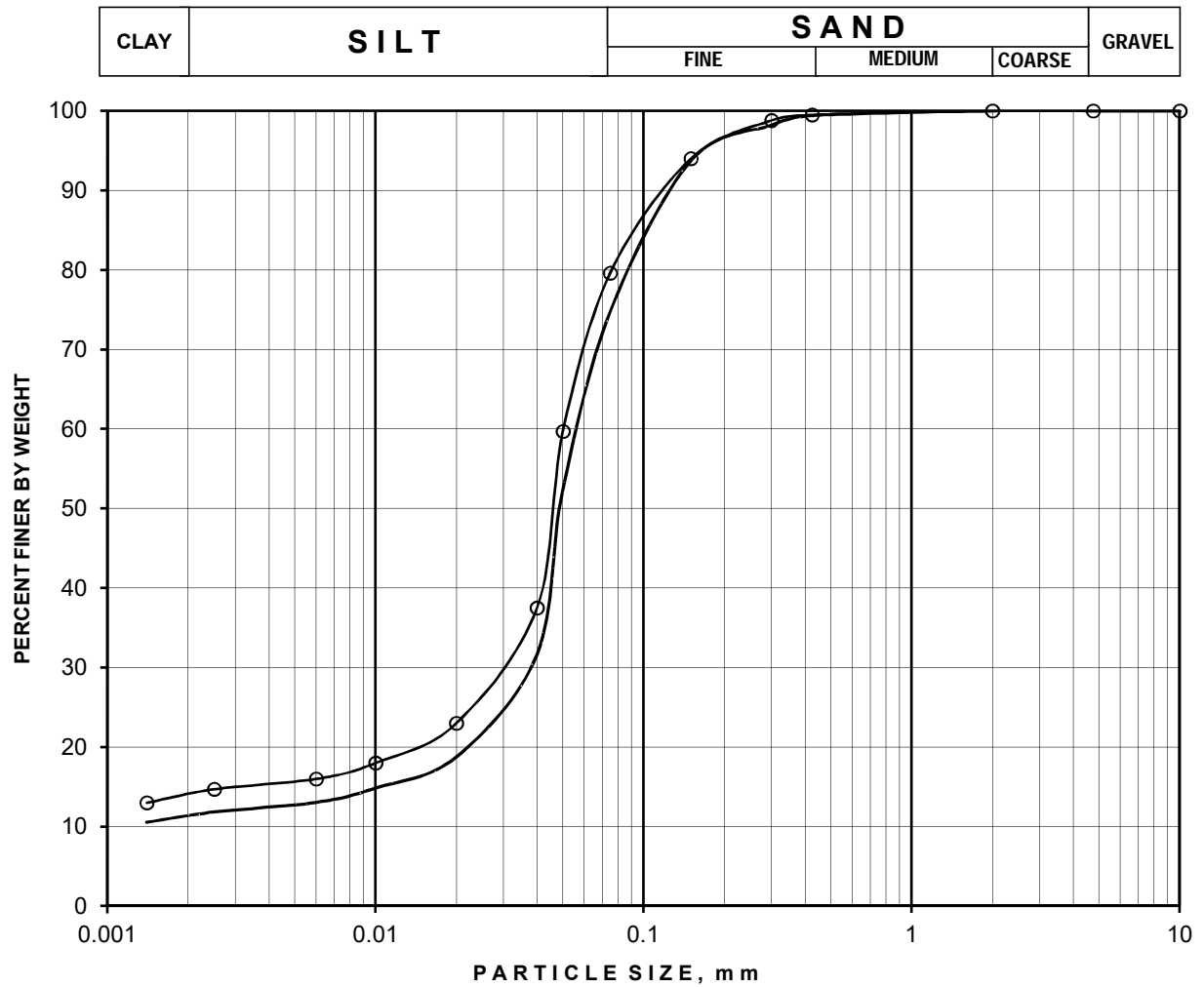
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-16/1.50	Sandy silt (CL)	1	23	63	13
—○—	B5-16/4.50	Sandy silt (CL)	4	24	60	12

GRAIN SIZE ANALYSIS

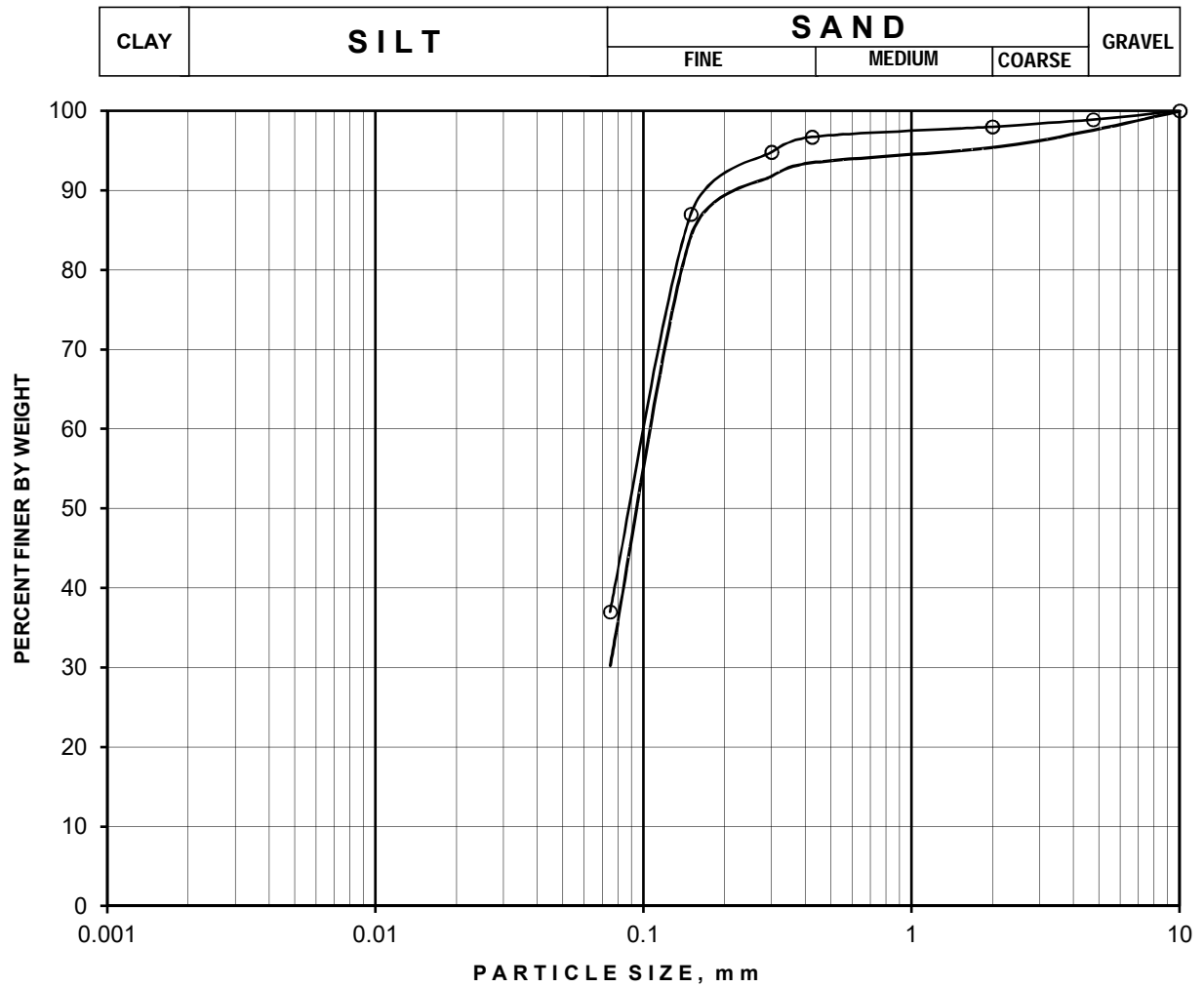
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-17/0.00	Sandy silt (CL)	0	25	64	11
○	B5-17/3.00	Sandy silt (CL)	0	20	66	14

GRAIN SIZE ANALYSIS

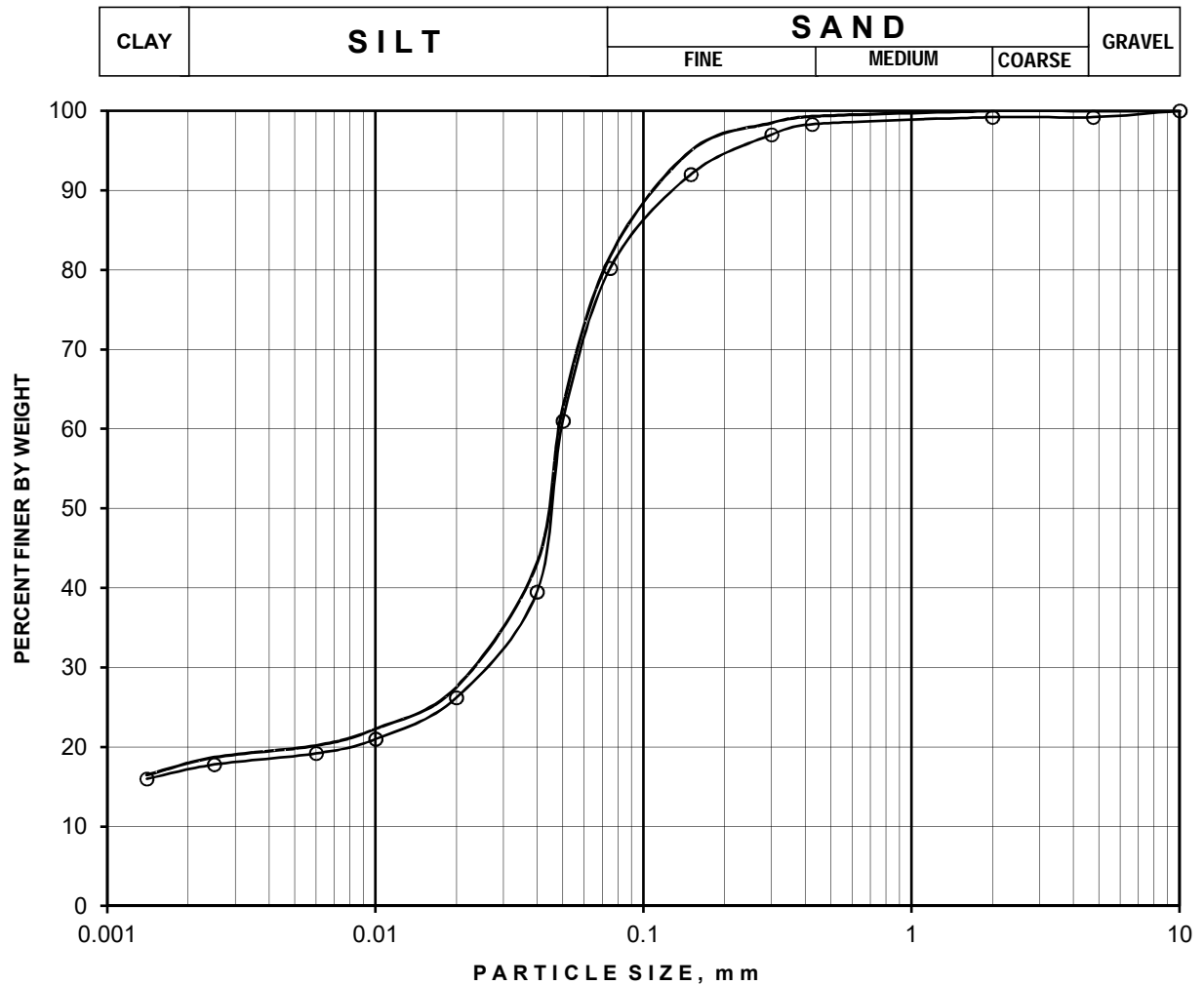
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-18/3.00	Silty sand (SM)	2	68	30	0
○	B5-18/4.50	Silty sand (SM)	1	62	37	0

GRAIN SIZE ANALYSIS

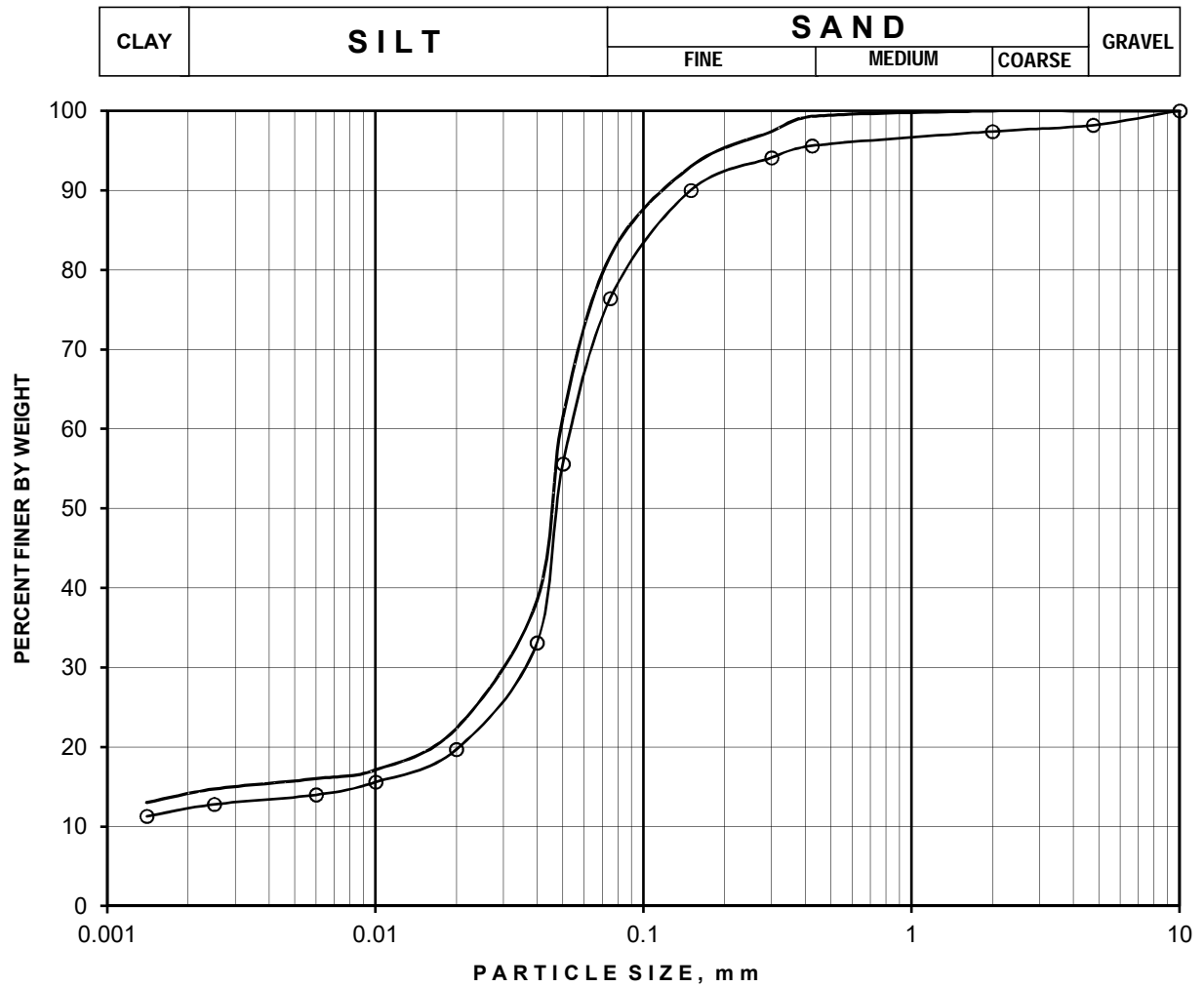
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-19/1.50	Sandy silt (CL)	0	18	64	18
—○—	B5-19/4.50	Sandy silt (CL)	1	19	63	17

GRAIN SIZE ANALYSIS

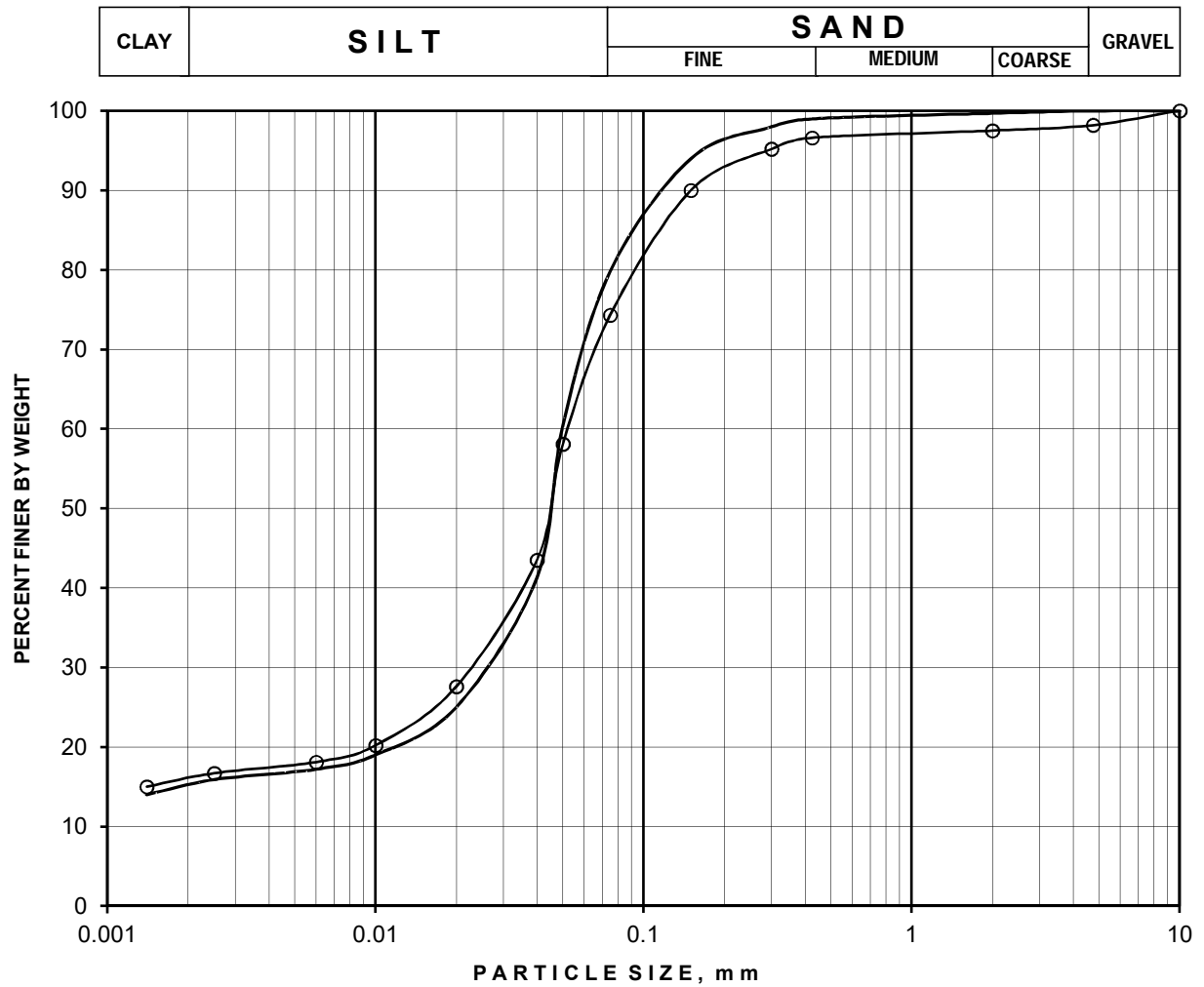
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-20/1.50	Sandy silt (CL)	0	18	68	14
○	B5-20/3.00	Sandy silt (CL)	2	22	64	12

GRAIN SIZE ANALYSIS

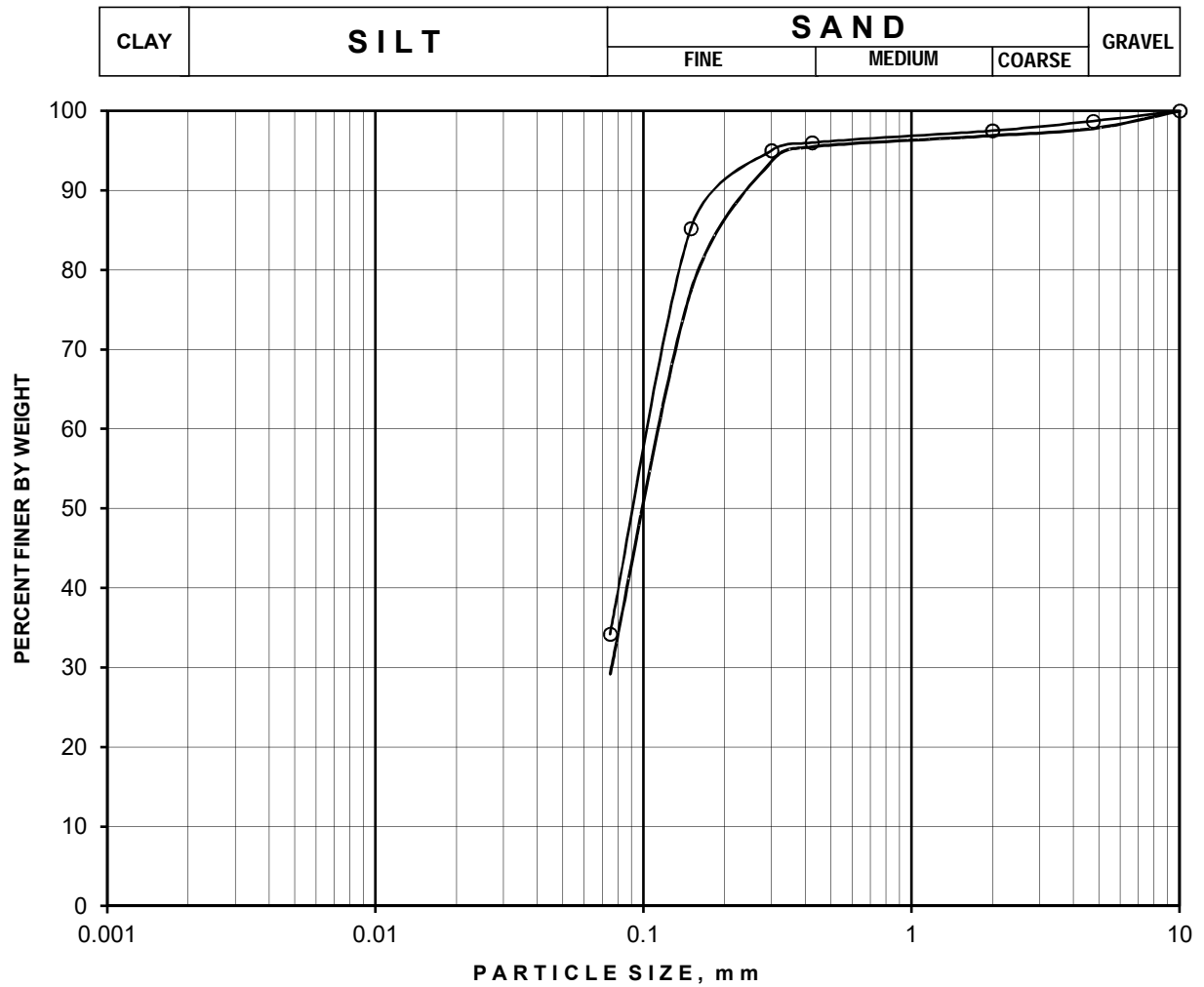
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-21/2.25	Sandy silt (CL)	0	20	65	15
○	B5-21/4.50	Sandy silt (CL)	2	24	58	16

GRAIN SIZE ANALYSIS

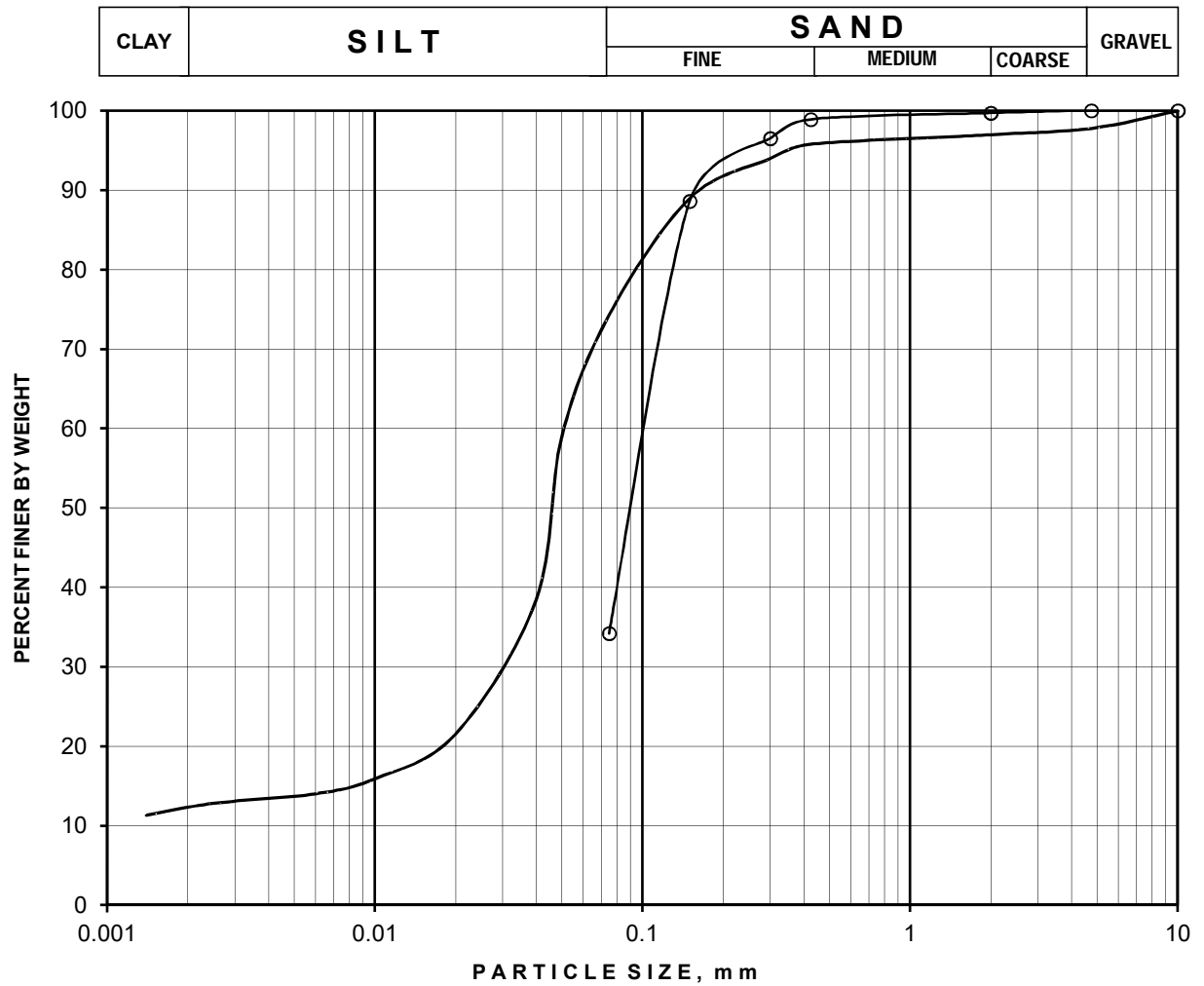
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-22/2.25	Silty sand (SM)	2	69	29	0
○	B5-22/4.50	Silty sand (SM)	1	65	34	0

GRAIN SIZE ANALYSIS

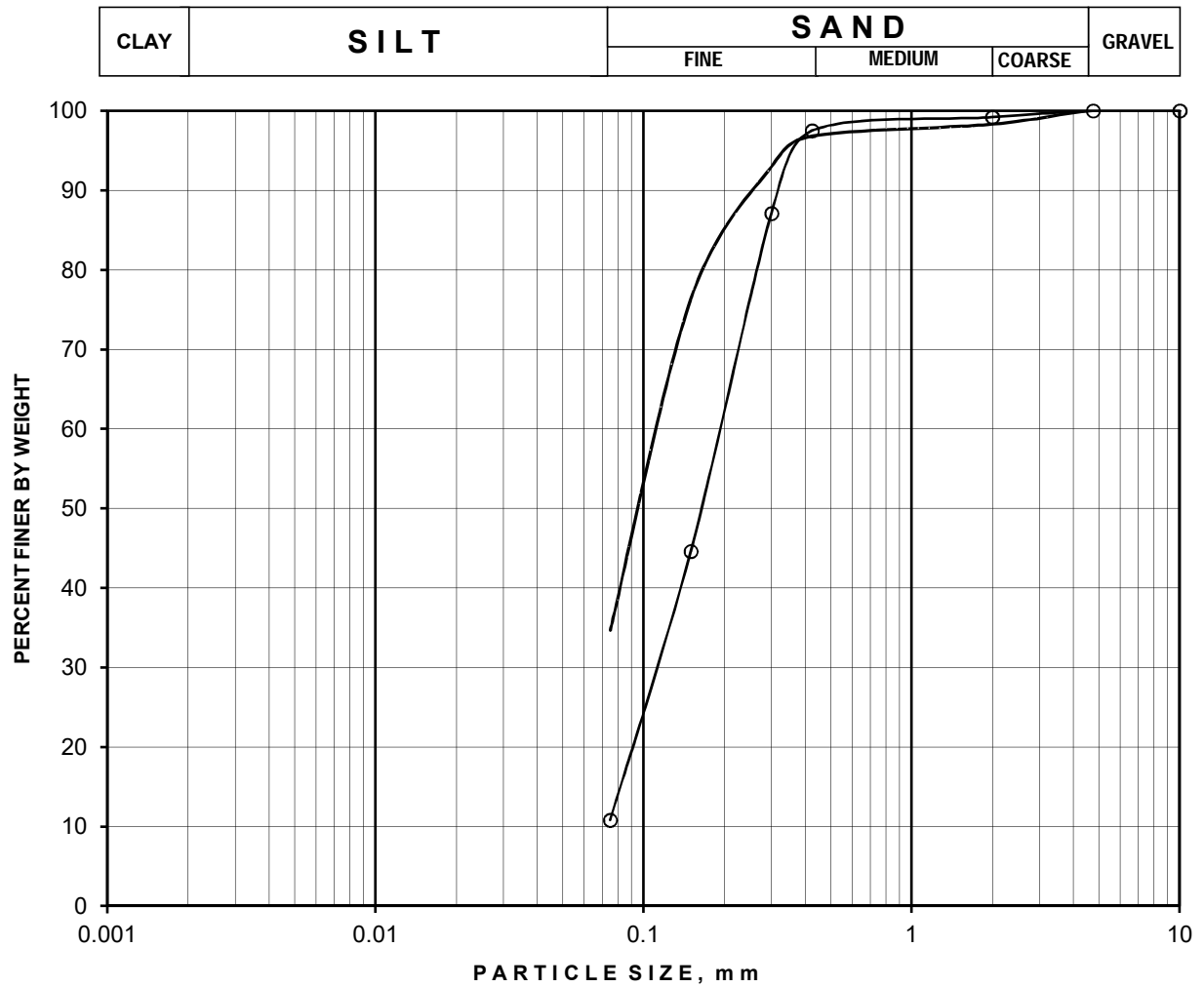
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-23/1.50	Sandy silt (CL)	2	24	62	12
○	B5-23/4.50	Silty sand (SM)	0	66	34	0

GRAIN SIZE ANALYSIS

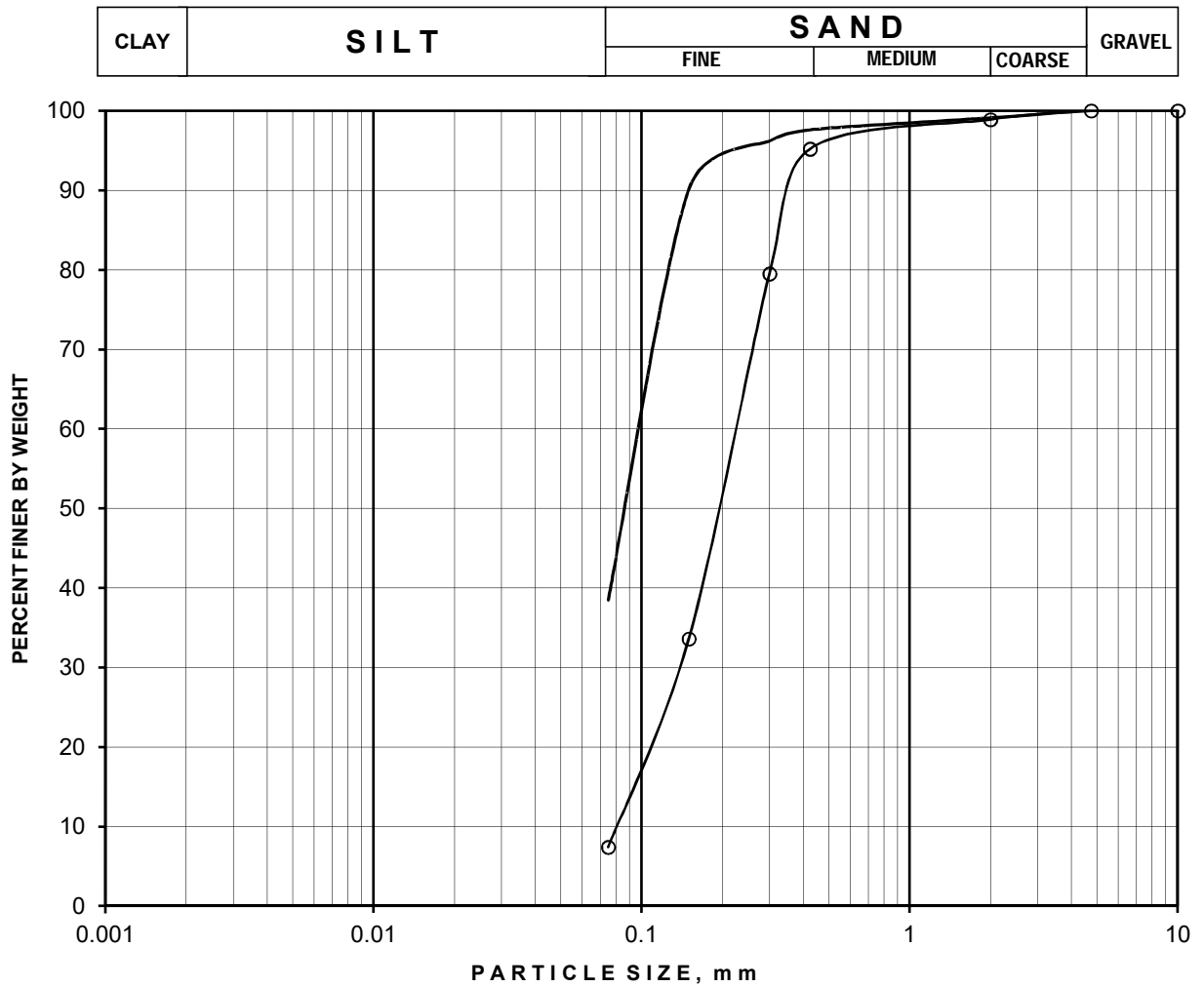
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-24/1.50	Silty sand (SM)	0	65	35	0
○	B5-24/4.50	Fine sand (SP-SM)	0	89	11	0

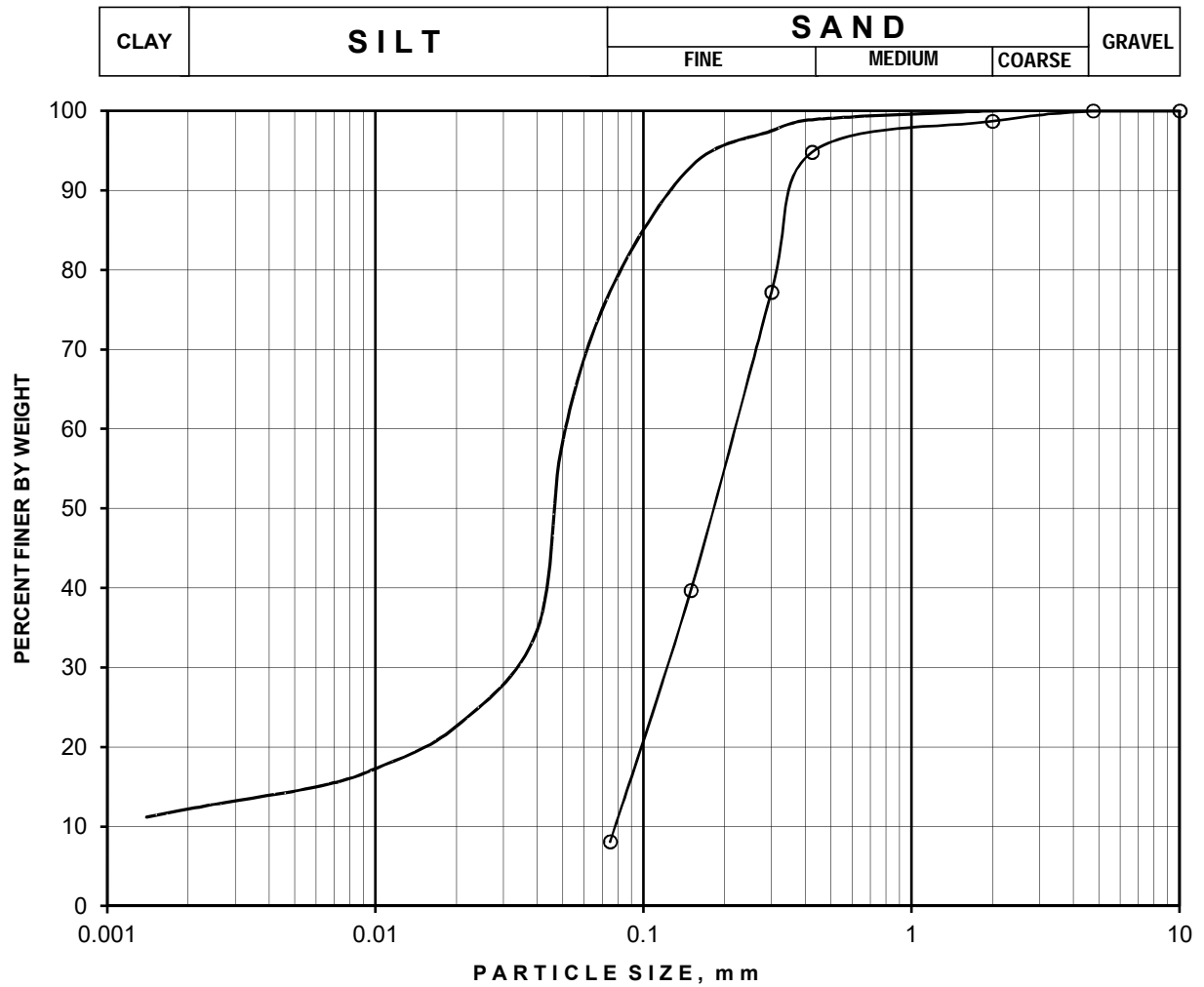
GRAIN SIZE ANALYSIS

GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



GRAIN SIZE ANALYSIS

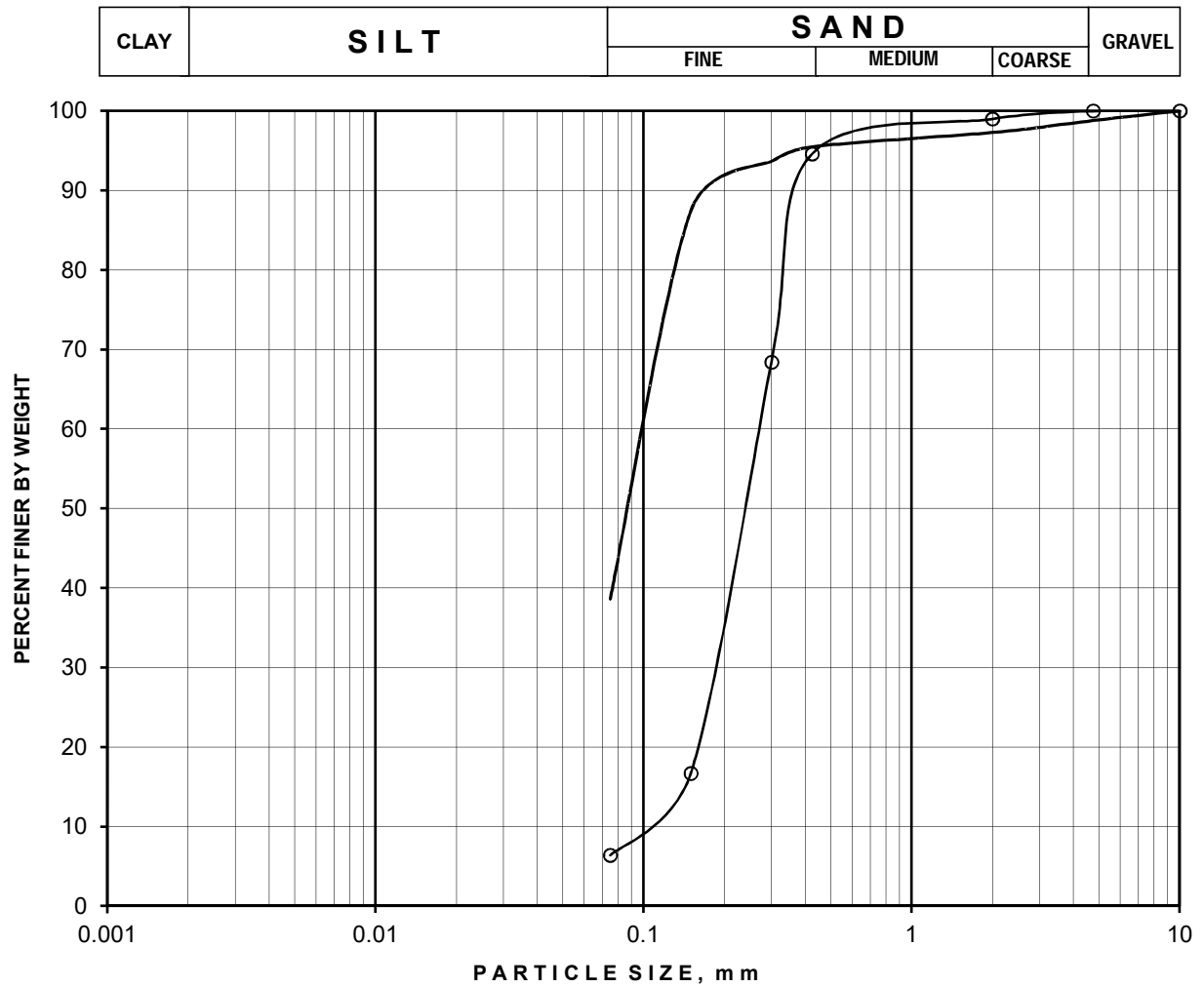
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-26/1.50	Sandy silt (CL)	0	23	65	12
—○—	B5-26/4.50	Fine sand (SP-SM)	0	92	8	0

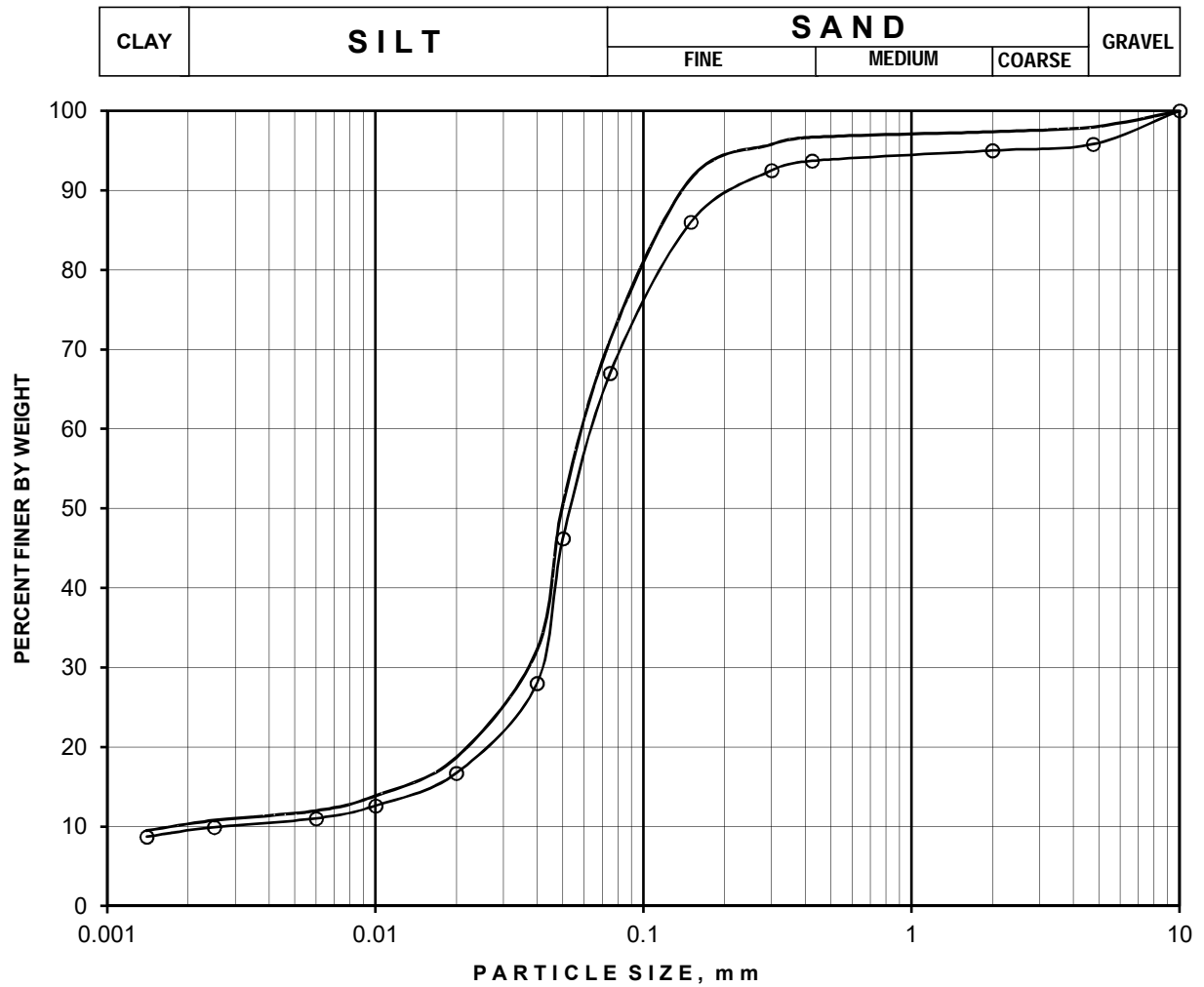
GRAIN SIZE ANALYSIS

GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



GRAIN SIZE ANALYSIS

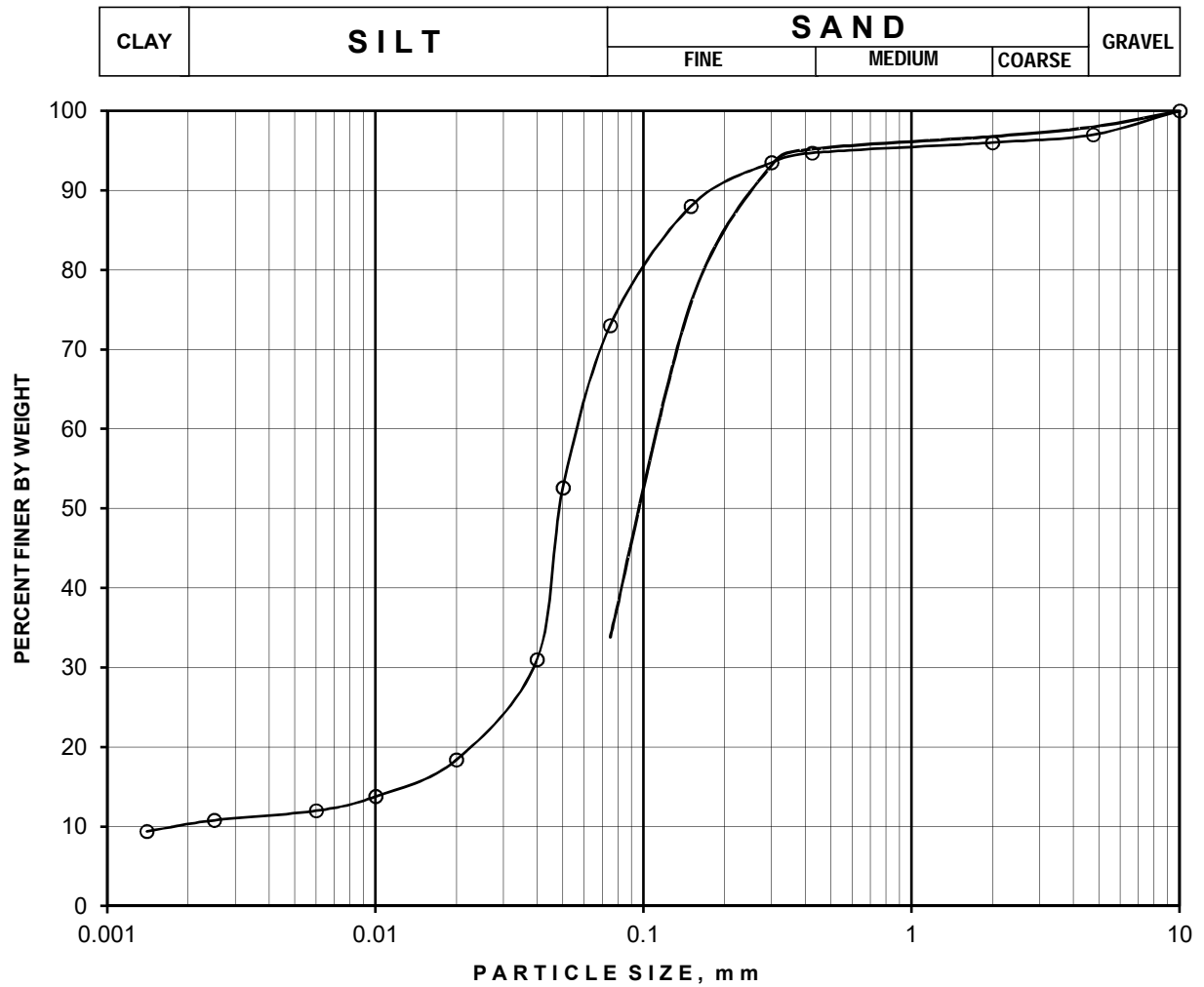
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-28/1.50	Sandy silt (CL)	2	27	61	10
○	B5-28/4.50	Sandy silt (CL)	4	29	58	9

GRAIN SIZE ANALYSIS

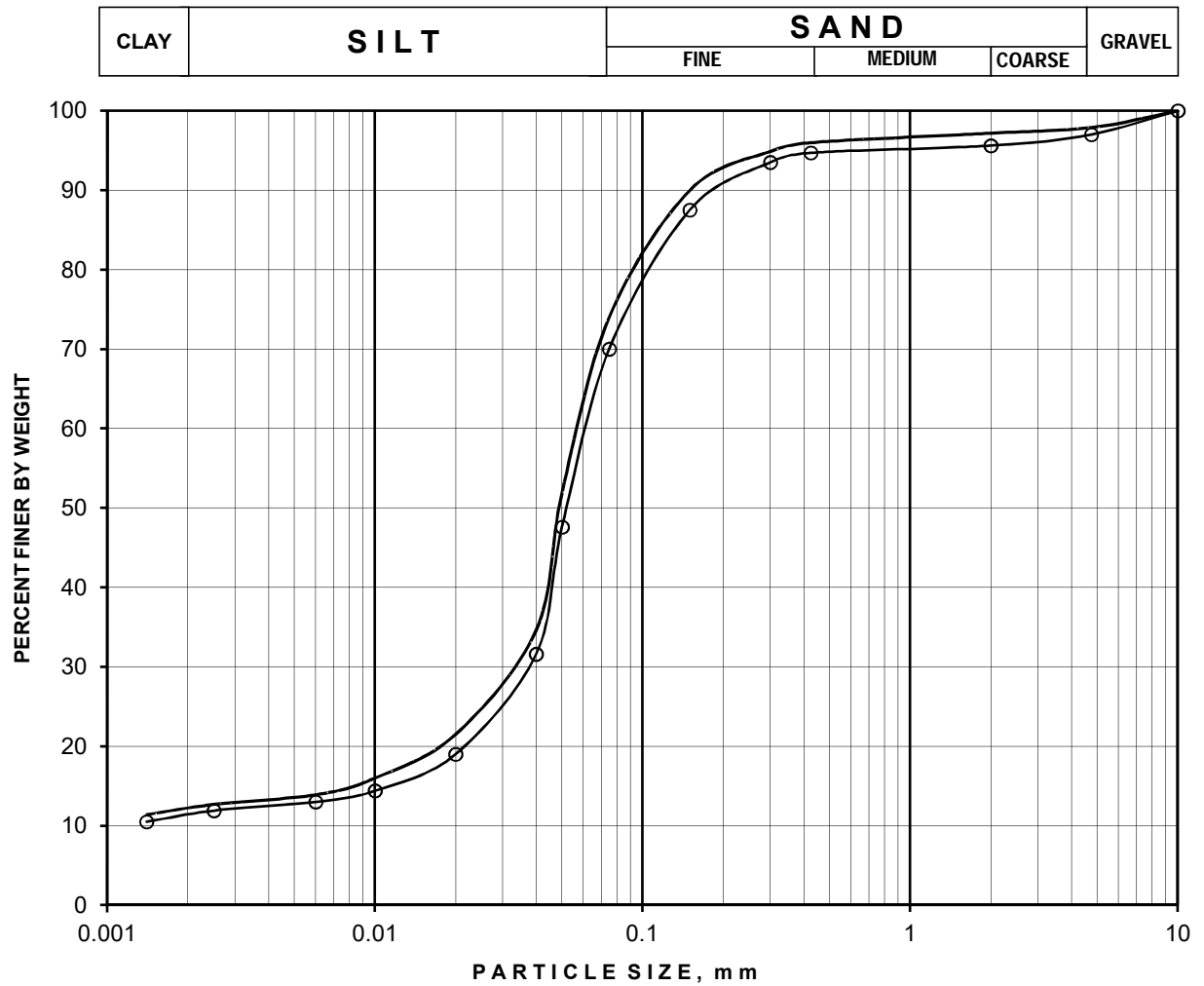
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-31/1.50	Silty sand (SM)	2	64	34	0
○	B5-31/4.50	Sandy silt (CL)	3	24	63	10

GRAIN SIZE ANALYSIS

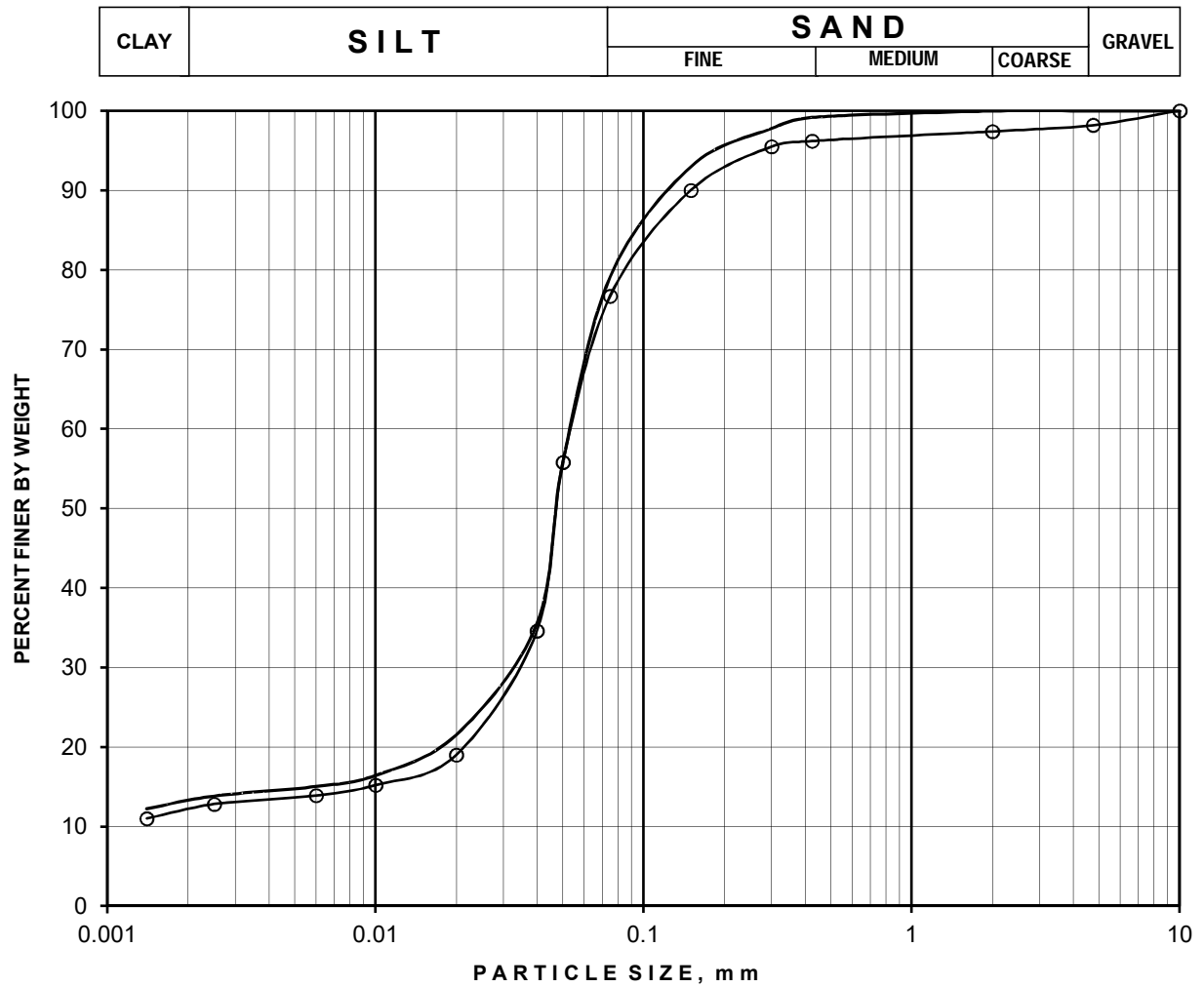
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-32/2.25	Sandy silt (CL)	2	24	62	12
○	B5-32/4.50	Sandy silt (CL)	3	27	59	11

GRAIN SIZE ANALYSIS

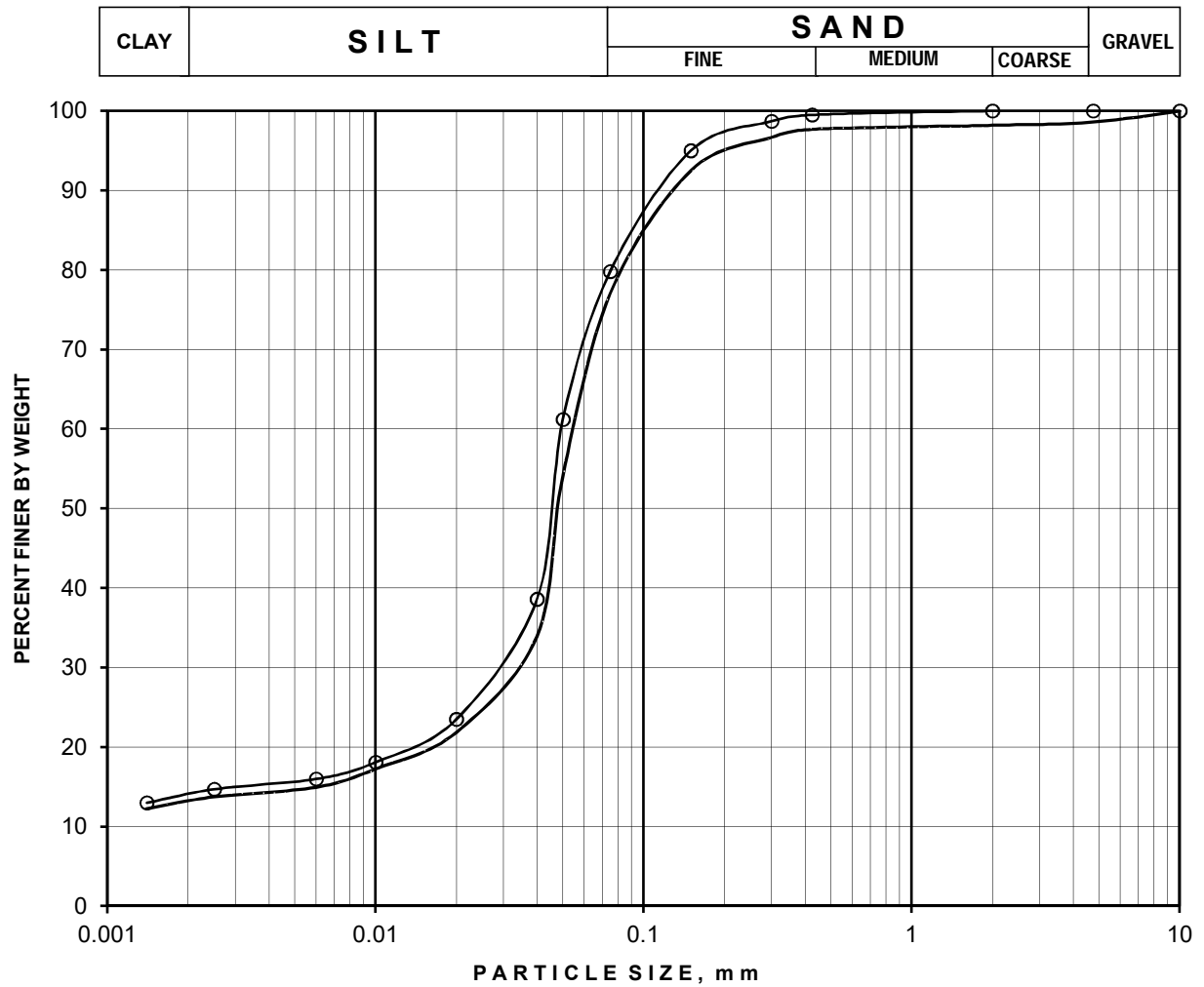
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-34/2.25	Sandy silt (CL)	0	23	64	13
○	B5-34/4.50	Sandy silt (CL)	2	21	65	12

GRAIN SIZE ANALYSIS

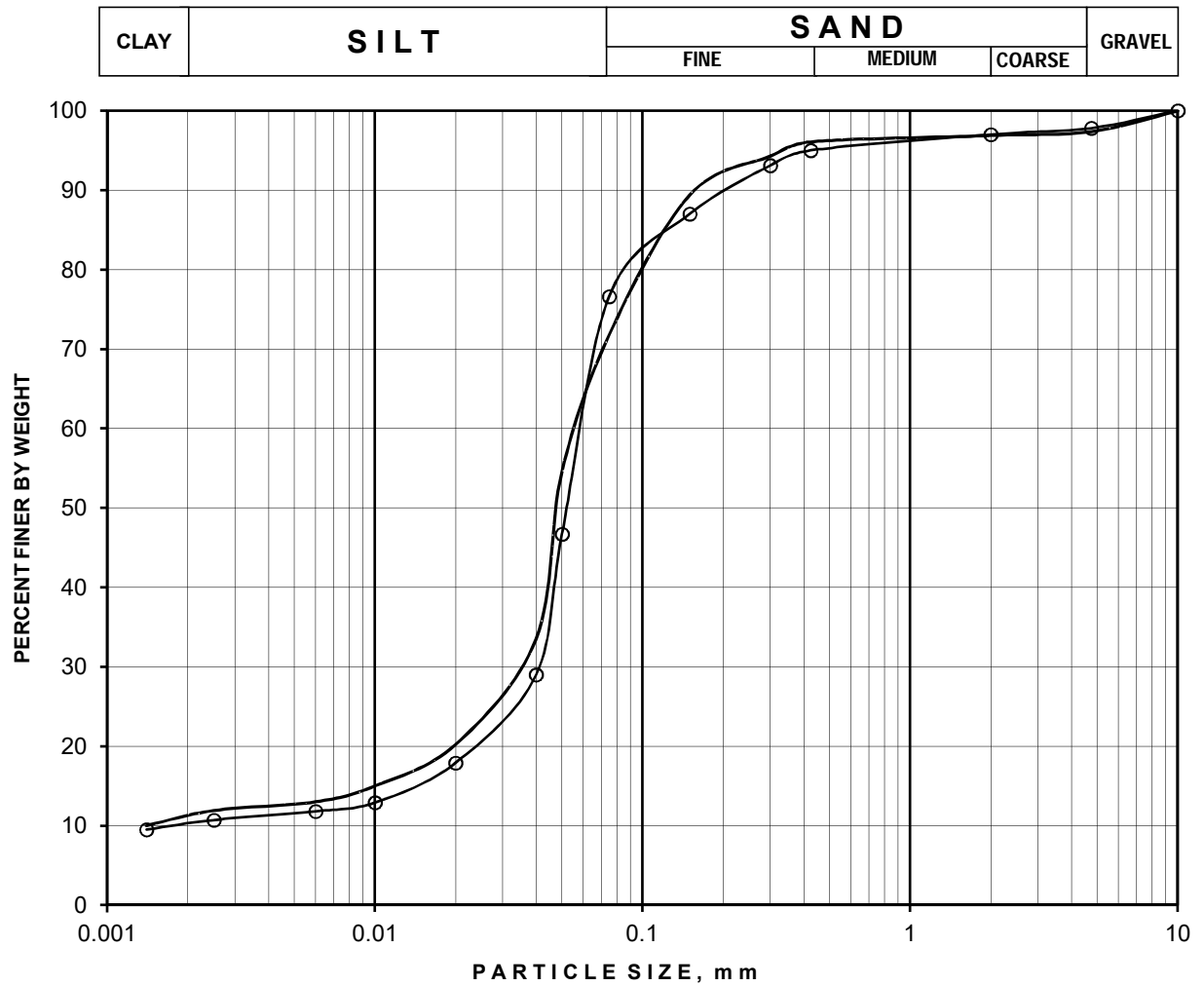
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-36/1.50	Sandy silt (CL)	1	22	64	13
○	B5-36/4.50	Sandy silt (CL)	0	20	66	14

GRAIN SIZE ANALYSIS

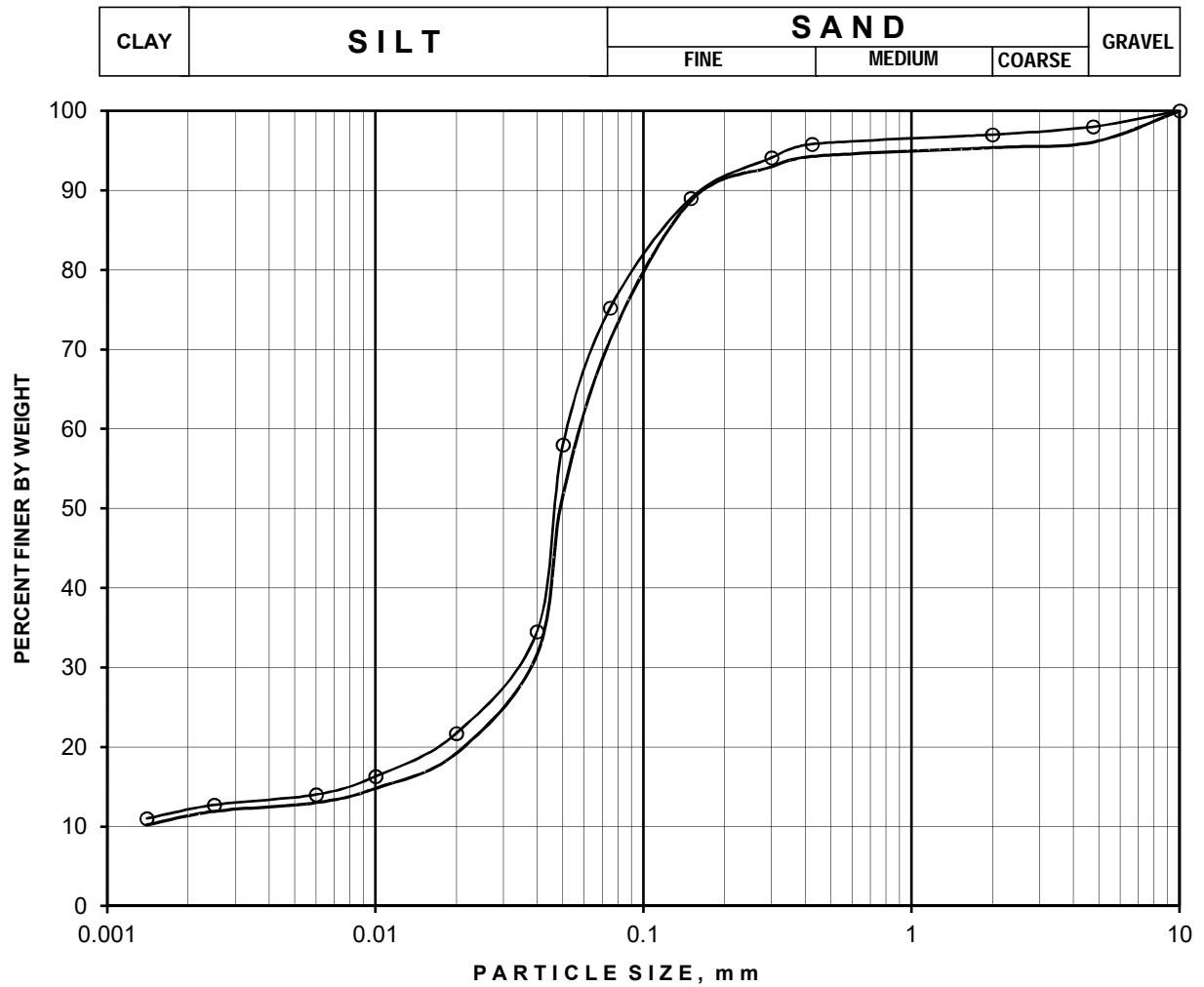
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-42/3.00	Sandy silt (CL)	3	25	61	11
—○—	B5-42/4.50	Sandy silt (CL)	2	21	67	10

GRAIN SIZE ANALYSIS

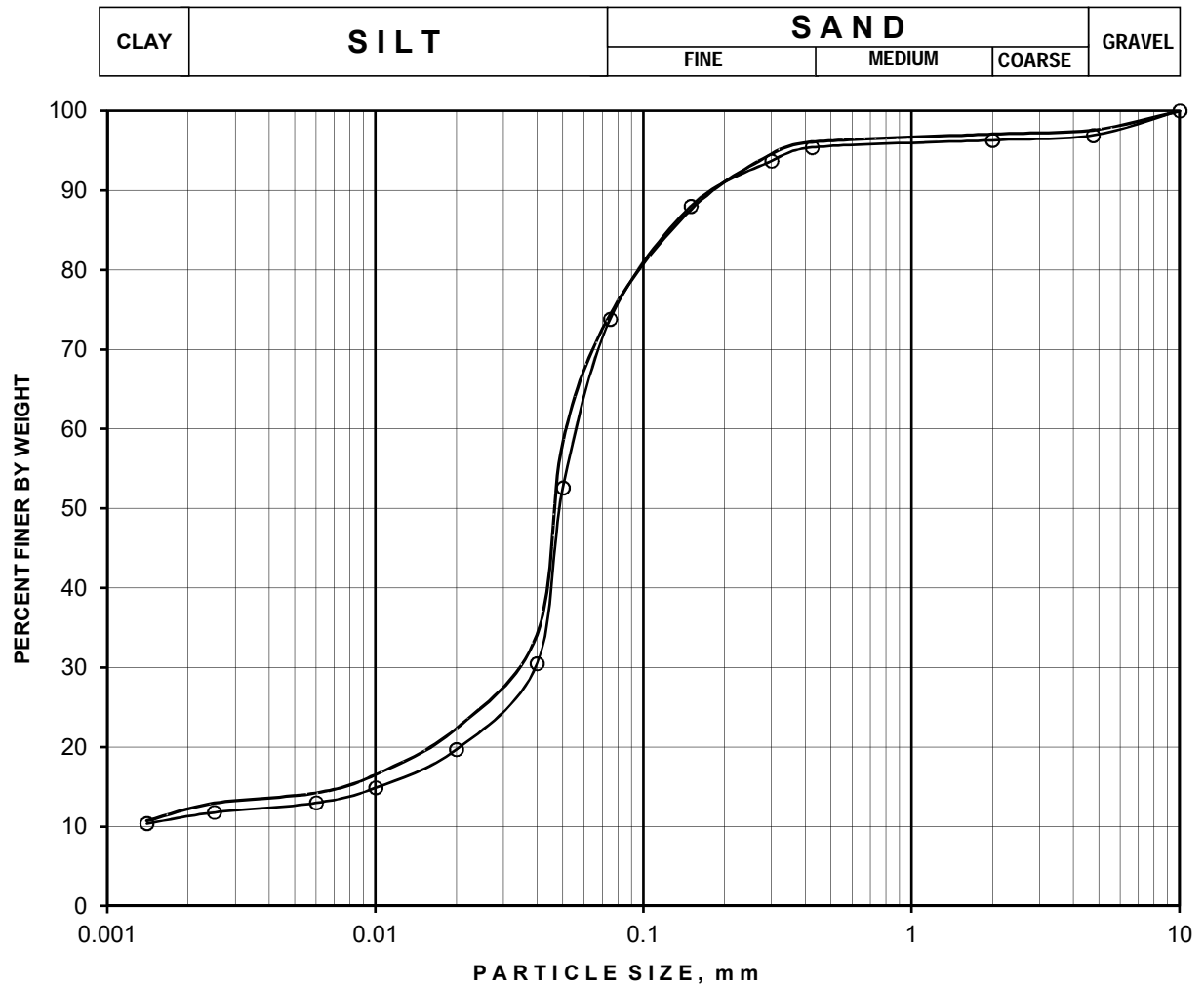
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-44/0.00	Sandy silt (CL)	4	25	60	11
○	B5-44/4.50	Sandy silt (CL)	2	23	63	12

GRAIN SIZE ANALYSIS

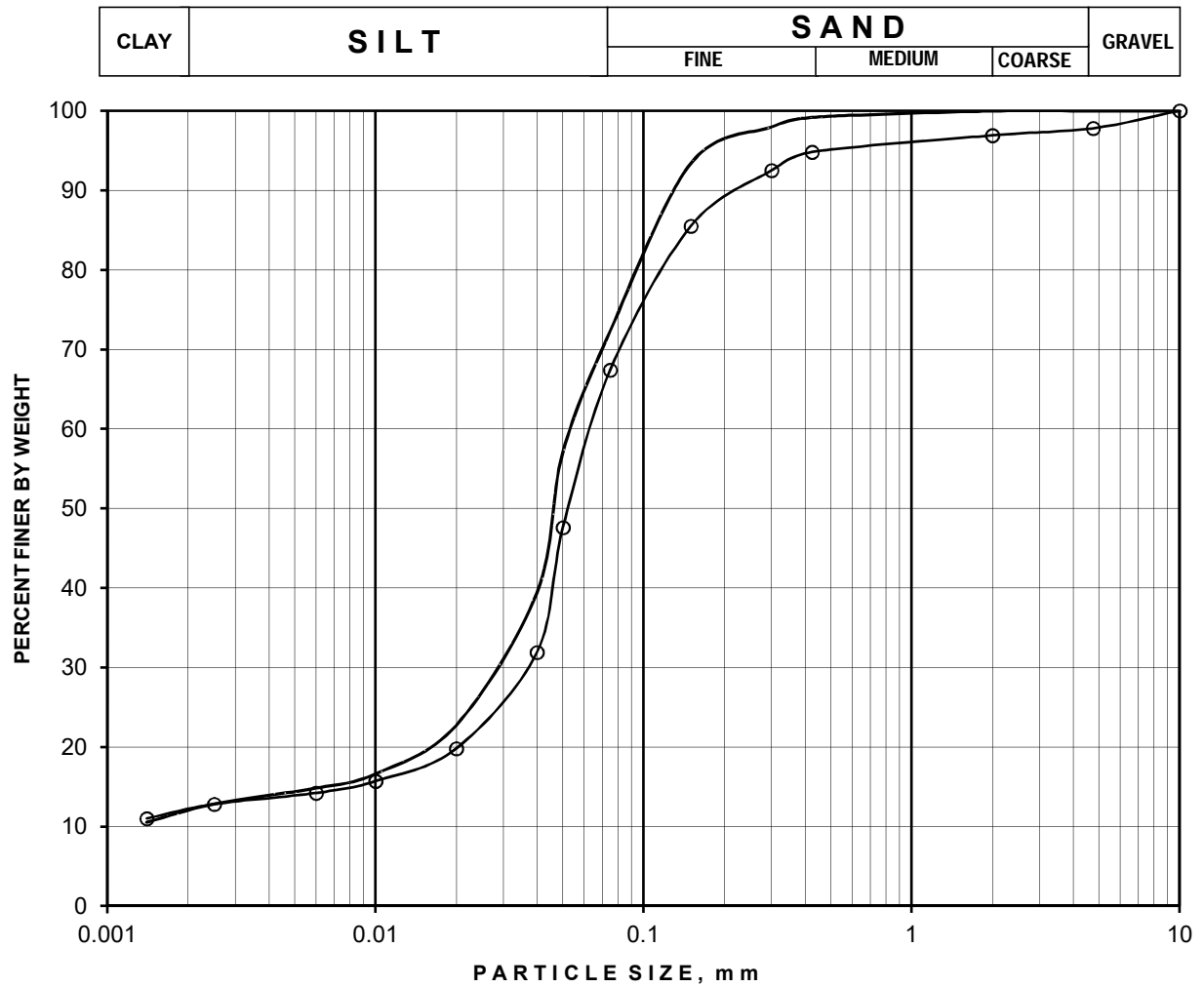
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B5-45/2.25	Sandy silt (CL)	2	24	62	12
—○—	B5-45/4.50	Sandy silt (CL)	3	23	63	11

GRAIN SIZE ANALYSIS

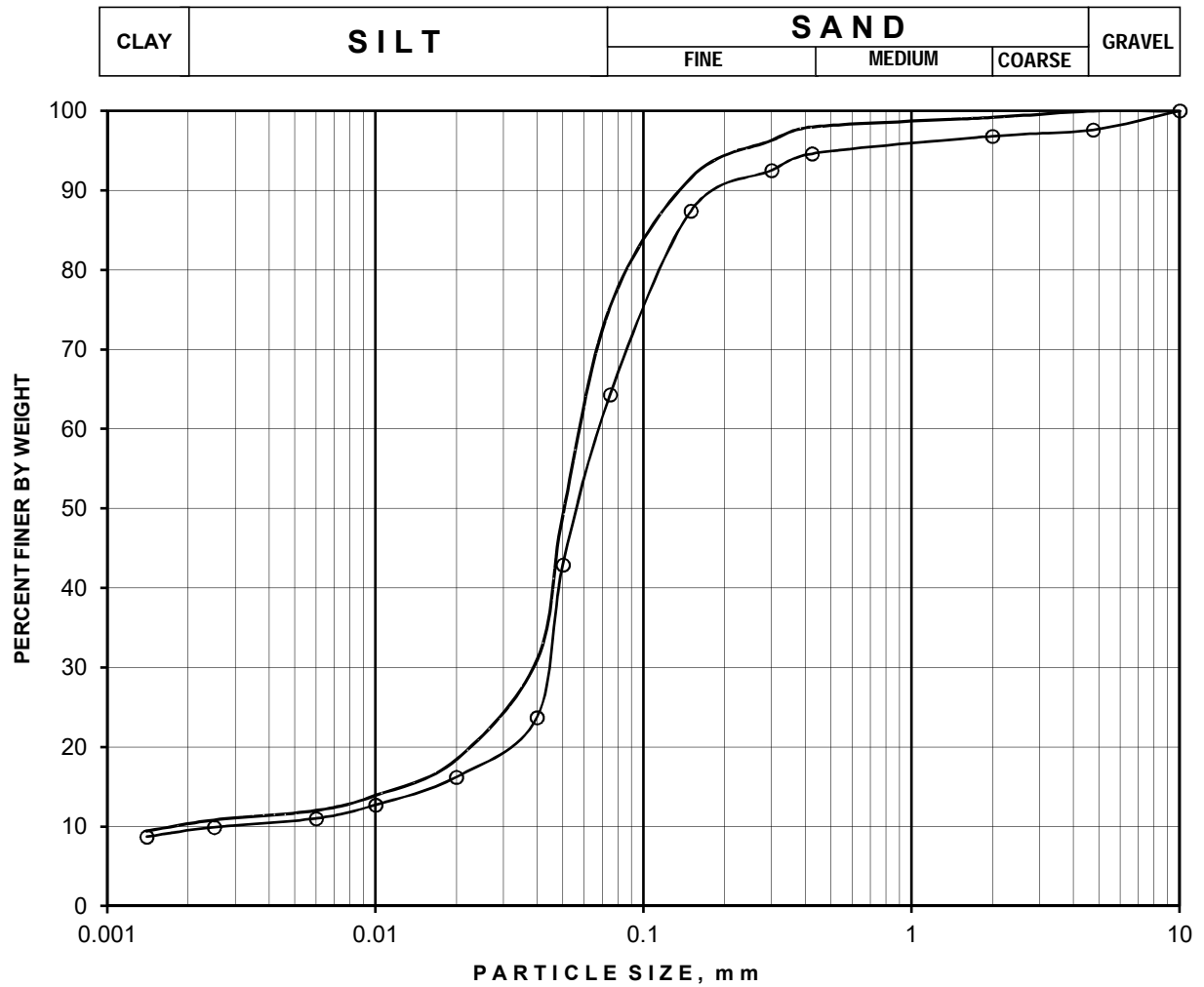
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-46/1.50	Sandy silt (CL)	0	28	60	12
○	B5-46/4.50	Sandy silt (CL)	2	31	55	12

GRAIN SIZE ANALYSIS

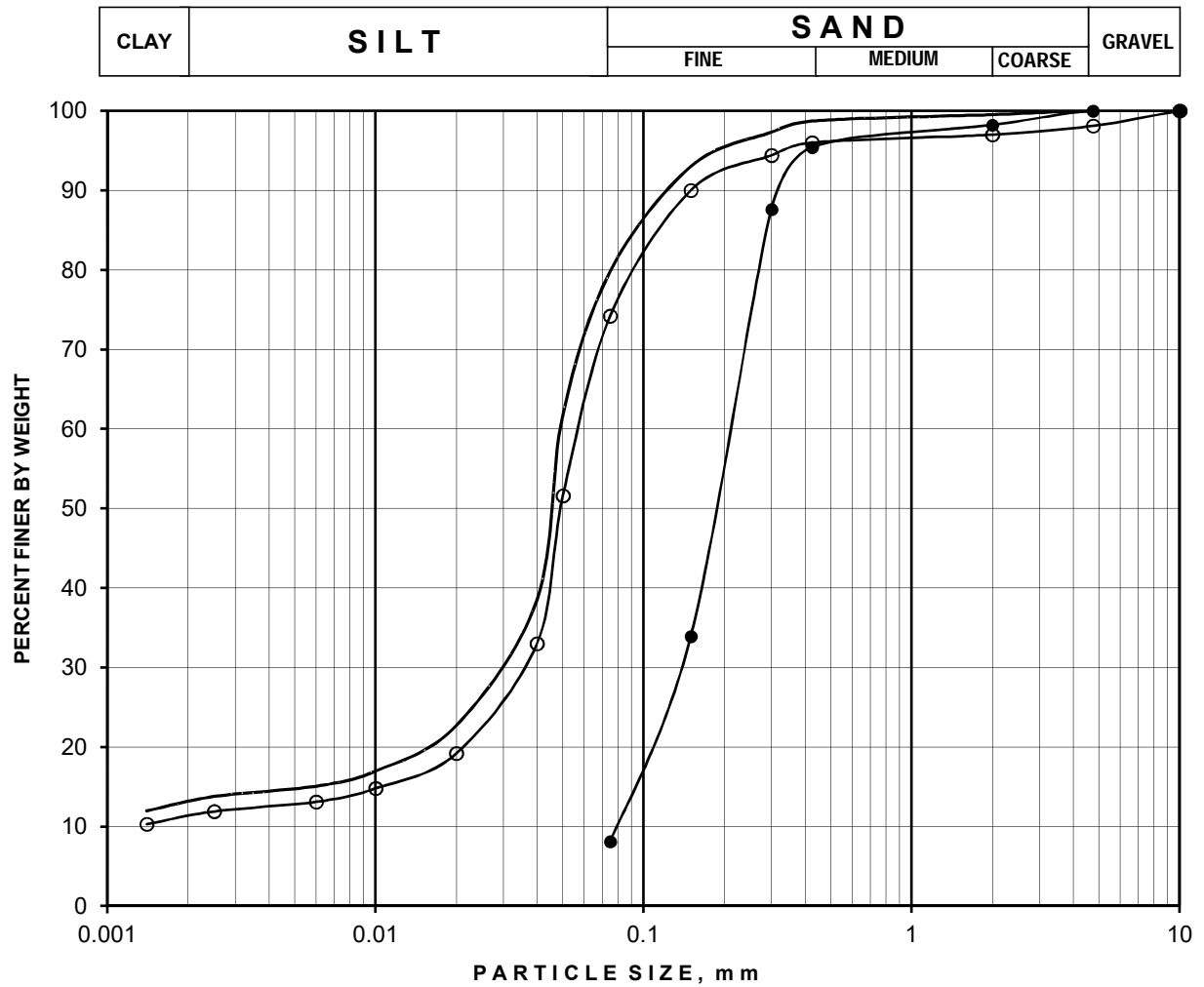
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B5-48/1.50	Sandy silt (CL)	0	25	65	10
○	B5-48/4.50	Sandy silt (CL)	2	34	55	9

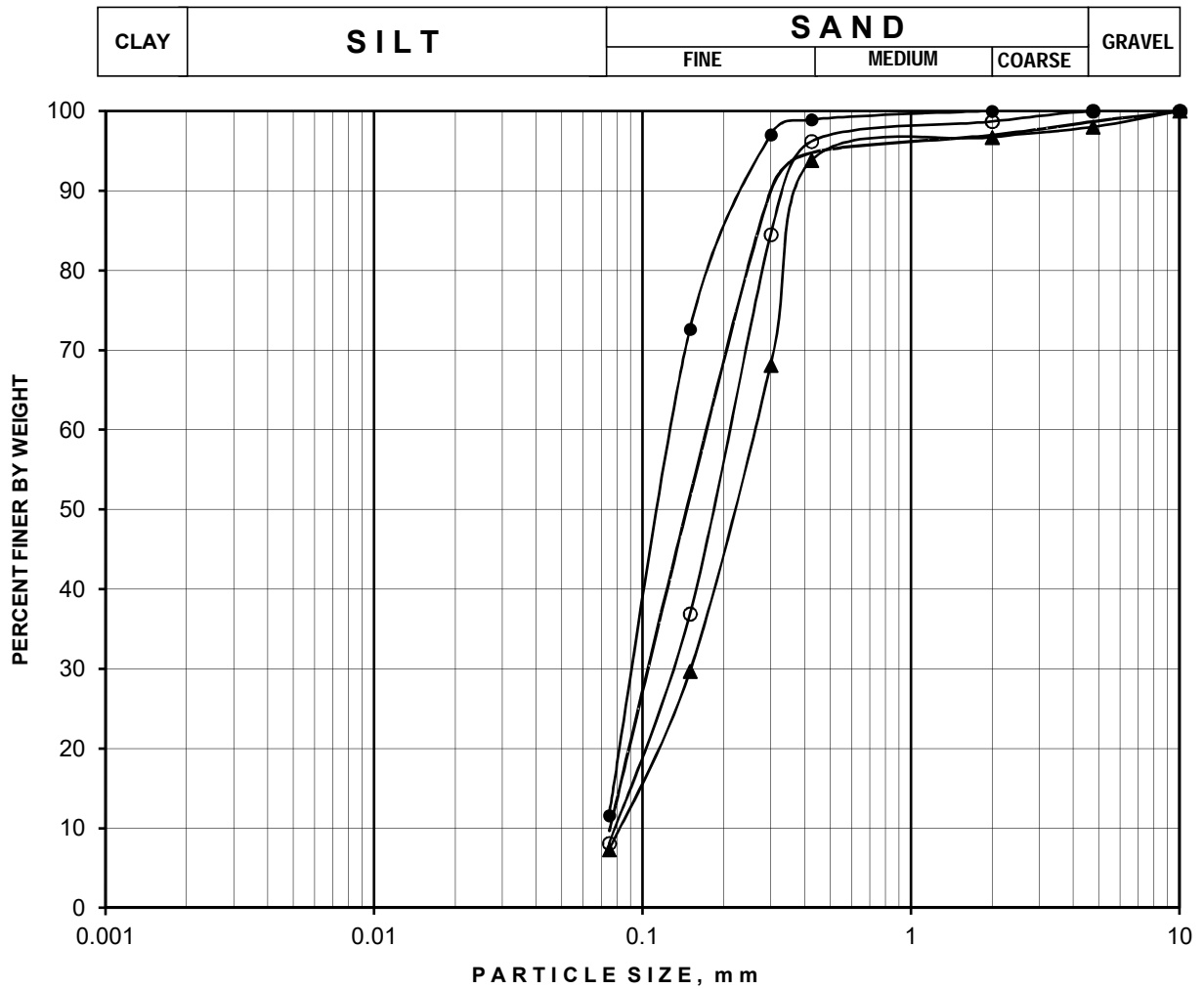
GRAIN SIZE ANALYSIS

GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



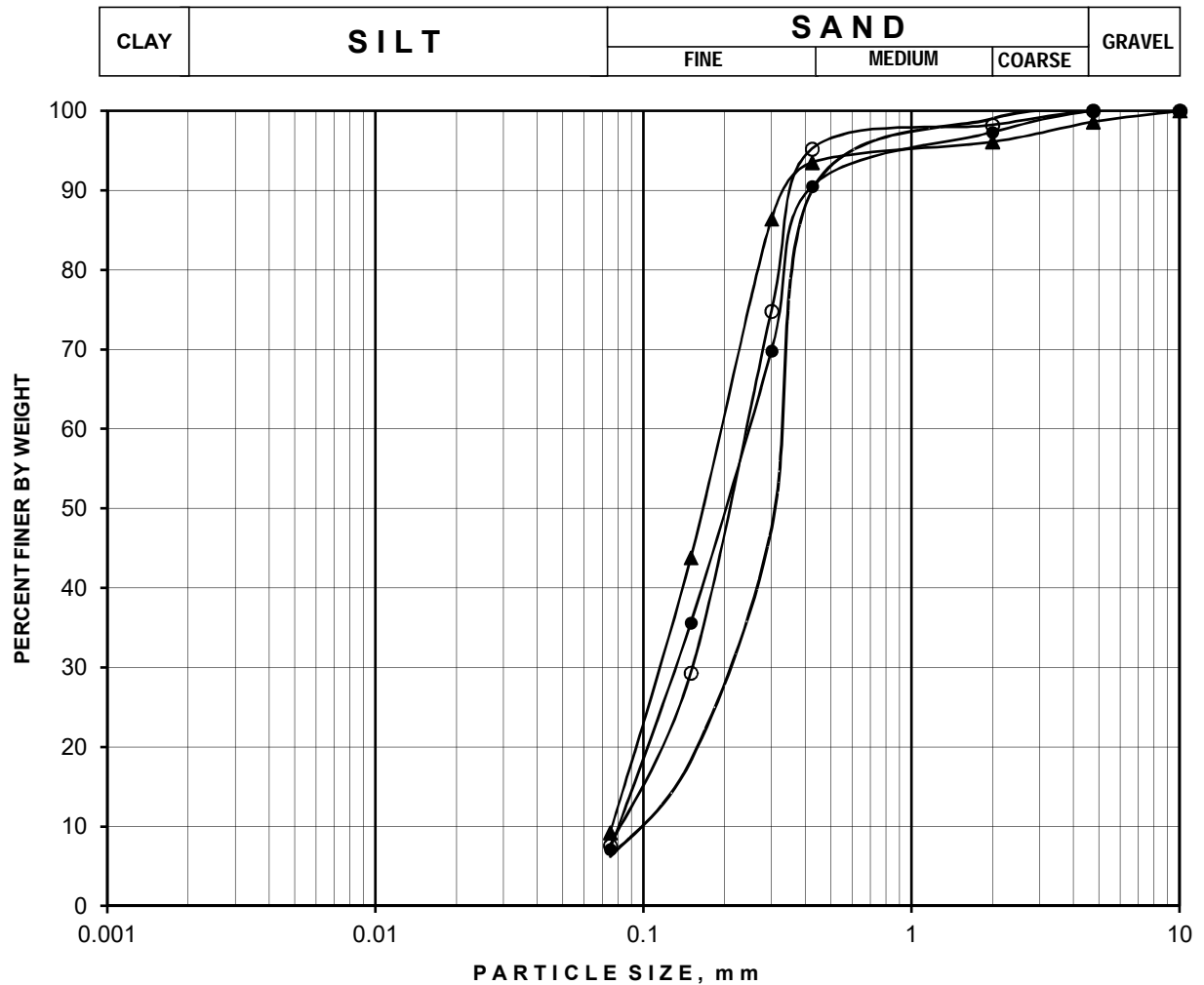
SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B10-01/1.50	Sandy silt (CL)	0	20	67	13
○	B10-01/5.25	Sandy silt (CL)	2	24	63	11
●	B10-01/9.00	Fine sand (SP-SM)	0	92	8	0

GRAIN SIZE ANALYSIS



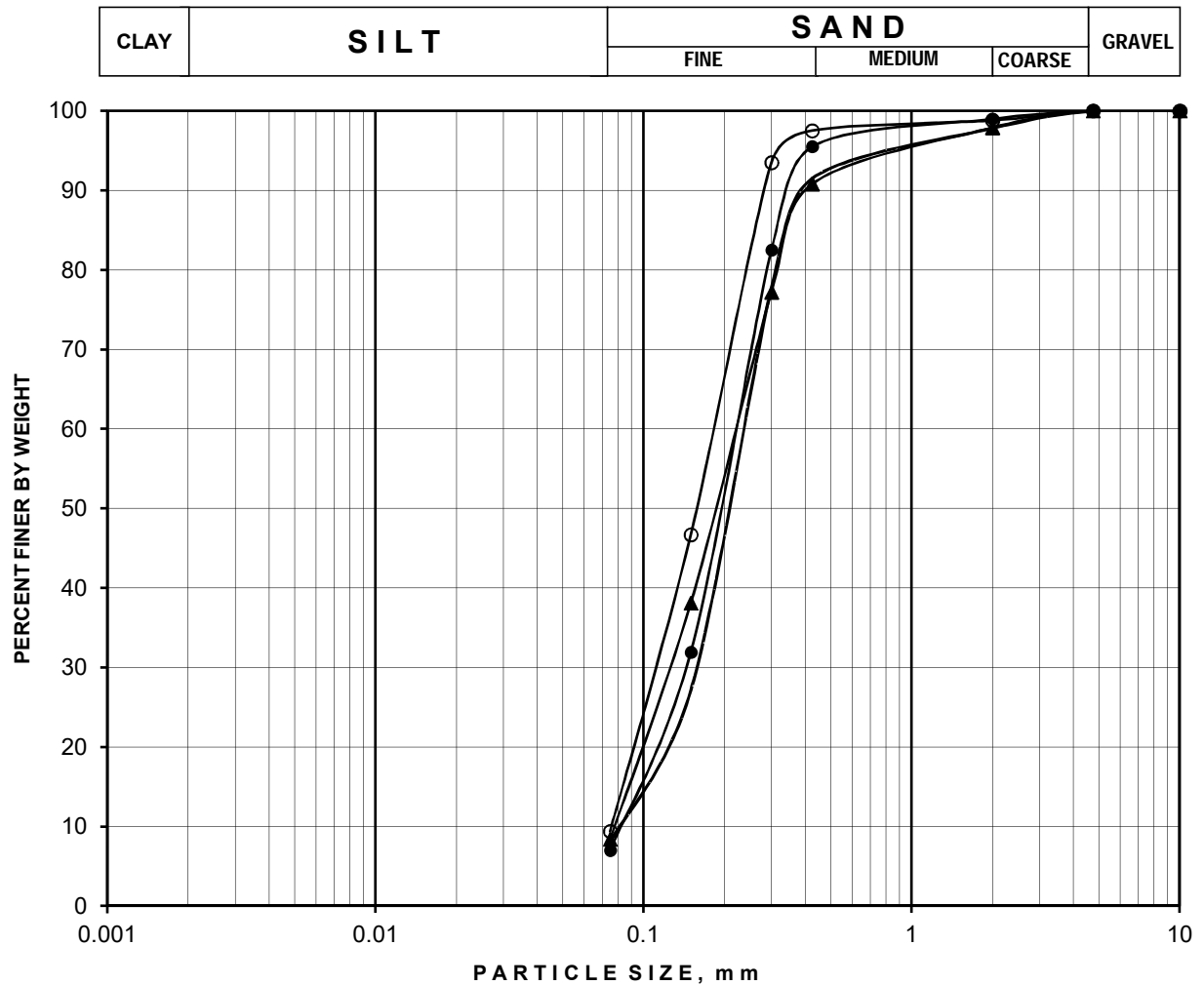
SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B15-01/2.25	Fine sand (SP-SM)	1	89	10	0
○	B15-01/7.50	Fine sand (SP-SM)	0	92	8	0
●	B15-01/11.25	Fine sand (SP-SM)	0	88	12	0
▲	B15-01/15.00	Fine sand (SP-SM)	2	91	7	0

GRAIN SIZE ANALYSIS

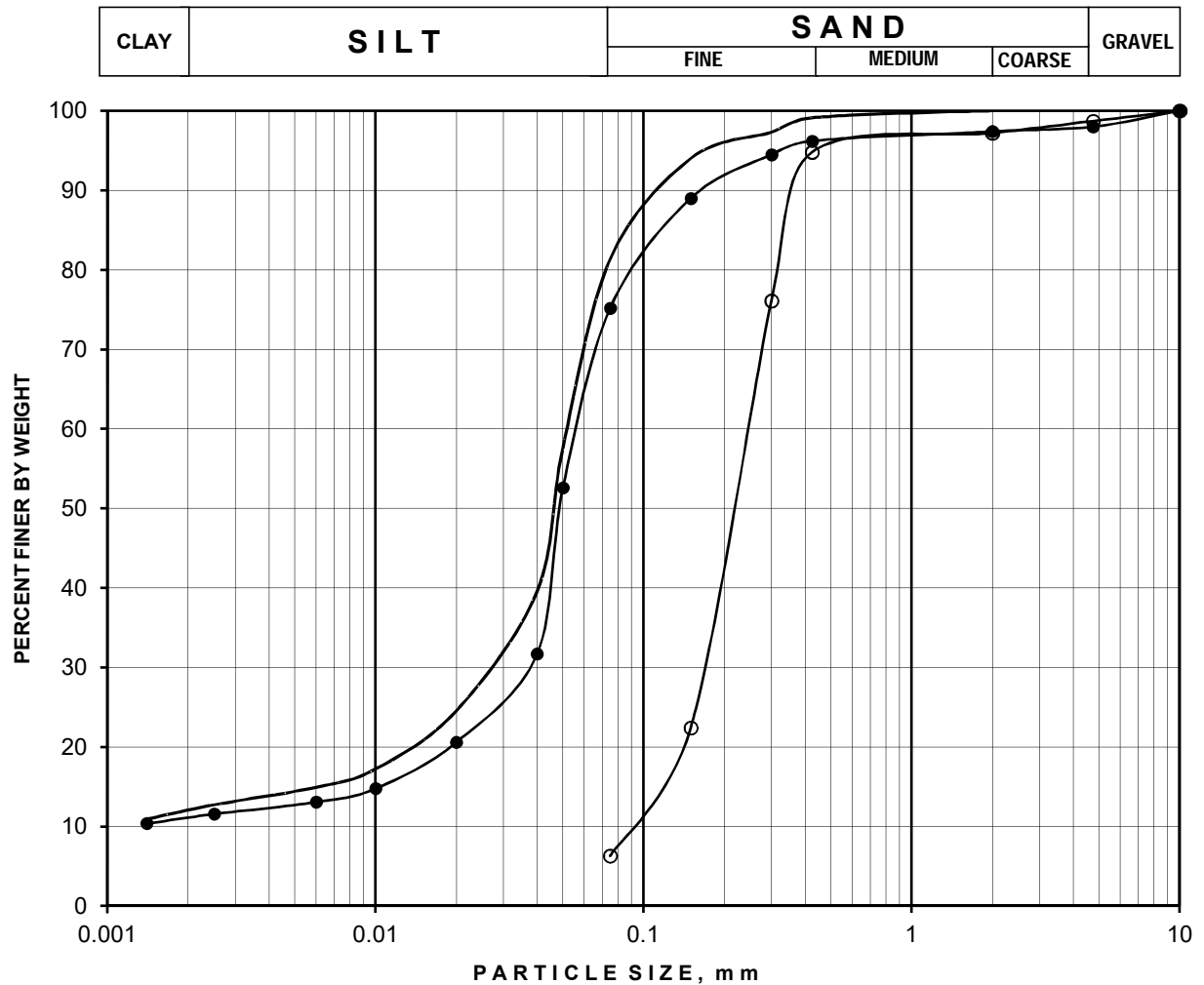


SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
—	B15-02/3.00	Fine sand (SP-SM)	0	94	6	0
○	B15-02/8.25	Fine sand (SP-SM)	0	92	8	0
●	B15-02/10.50	Fine sand (SP-SM)	0	93	7	0
▲	B15-02/13.50	Fine sand (SP-SM)	1	90	9	0

GRAIN SIZE ANALYSIS

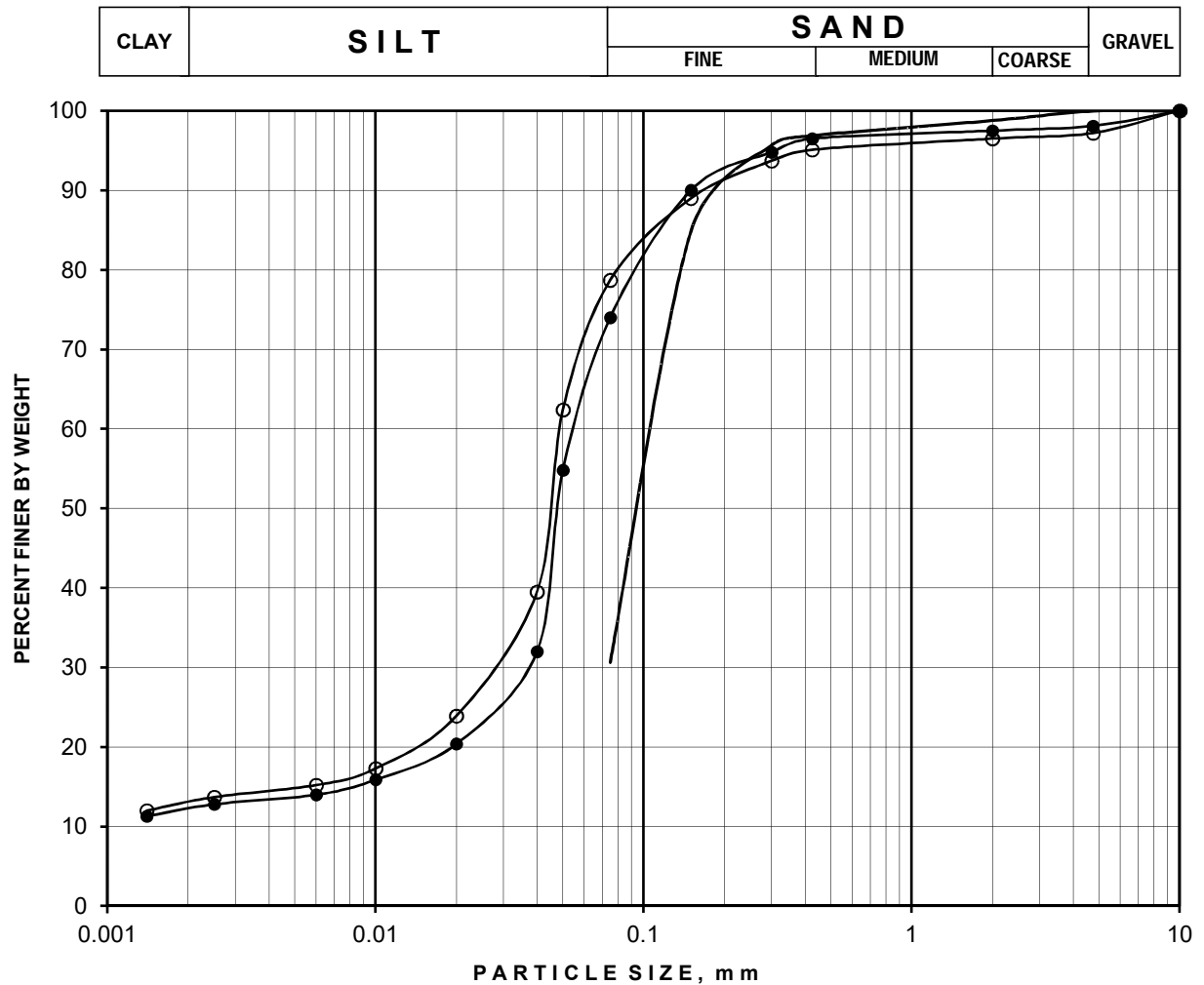


GRAIN SIZE ANALYSIS



GRAIN SIZE ANALYSIS

GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



SYMBOL	BH.NO / DEPTH.	DESCRIPTION	GRAVEL %	SAND %	SILT %	CLAY %
	B30-01/14.25	Silty sand (SM)	0	69	31	0
○	B30-01/21.00	Sandy silt (CL)	3	18	66	13
●	B30-01/27.00	Sandy silt (CL)	2	24	62	12

GRAIN SIZE ANALYSIS

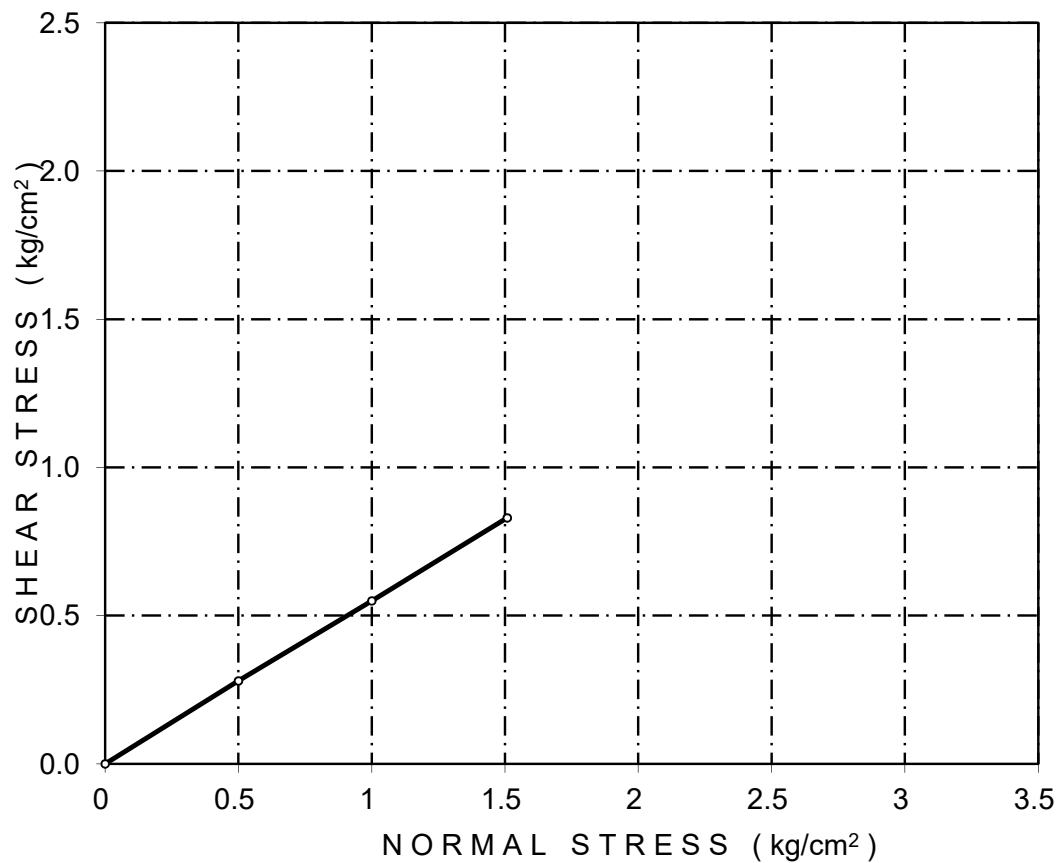
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



DRAINED DIRECT SHEAR TEST

Borehole No : B5-01
Depth : 2.25m
Type of Test : Drained Direct Shear
Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.54	0	29

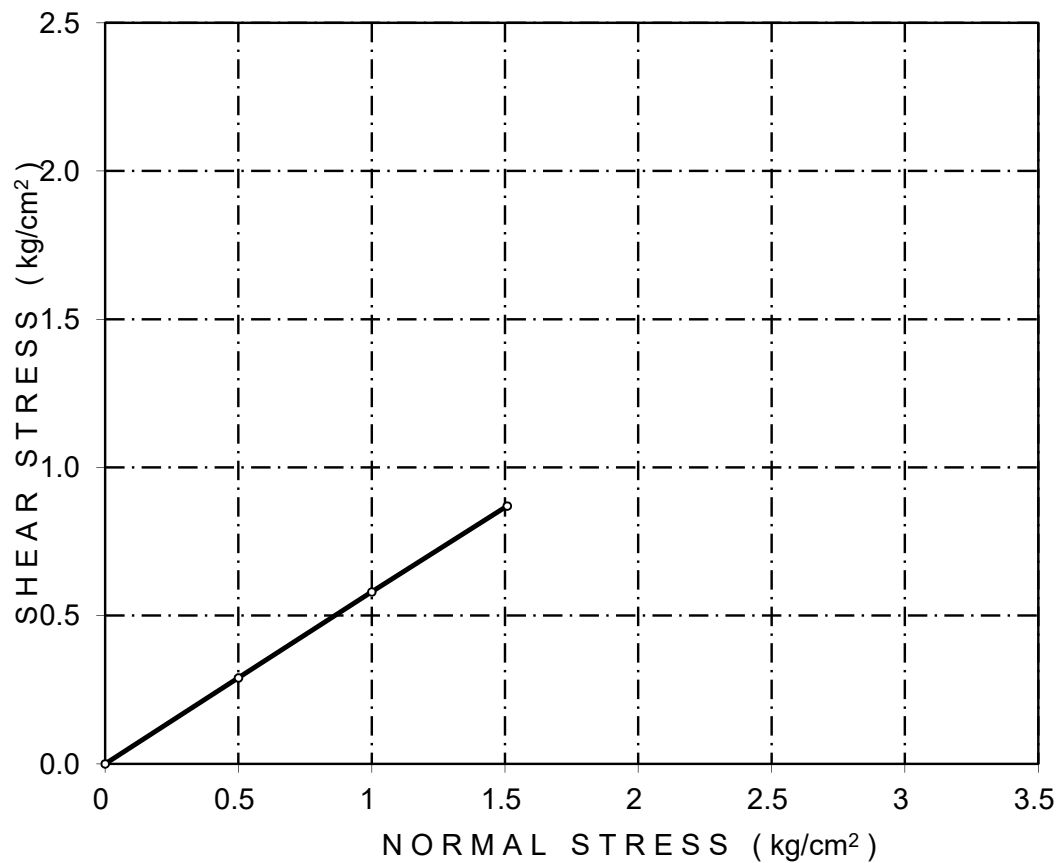




DRAINED DIRECT SHEAR TEST

Borehole No : B5-02
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.56	0	30



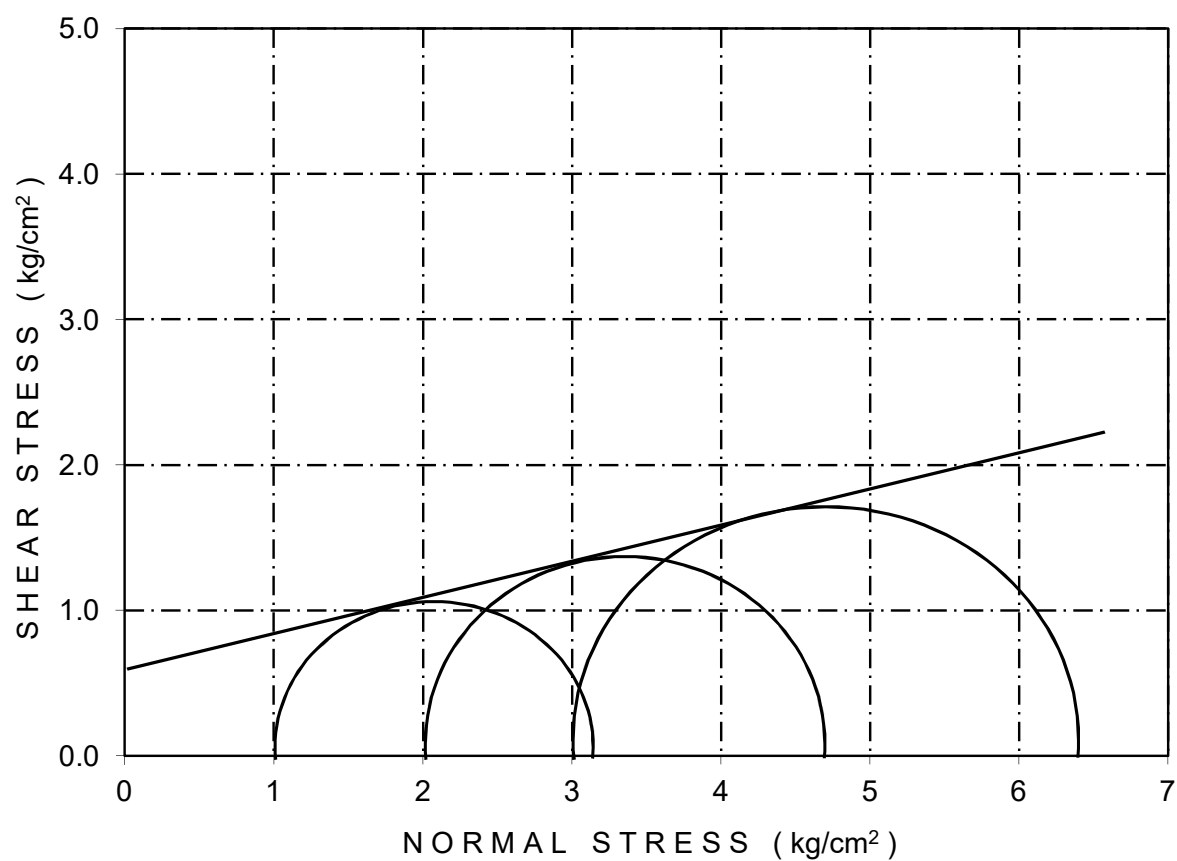


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-03
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.68	1.52	10.7

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	11



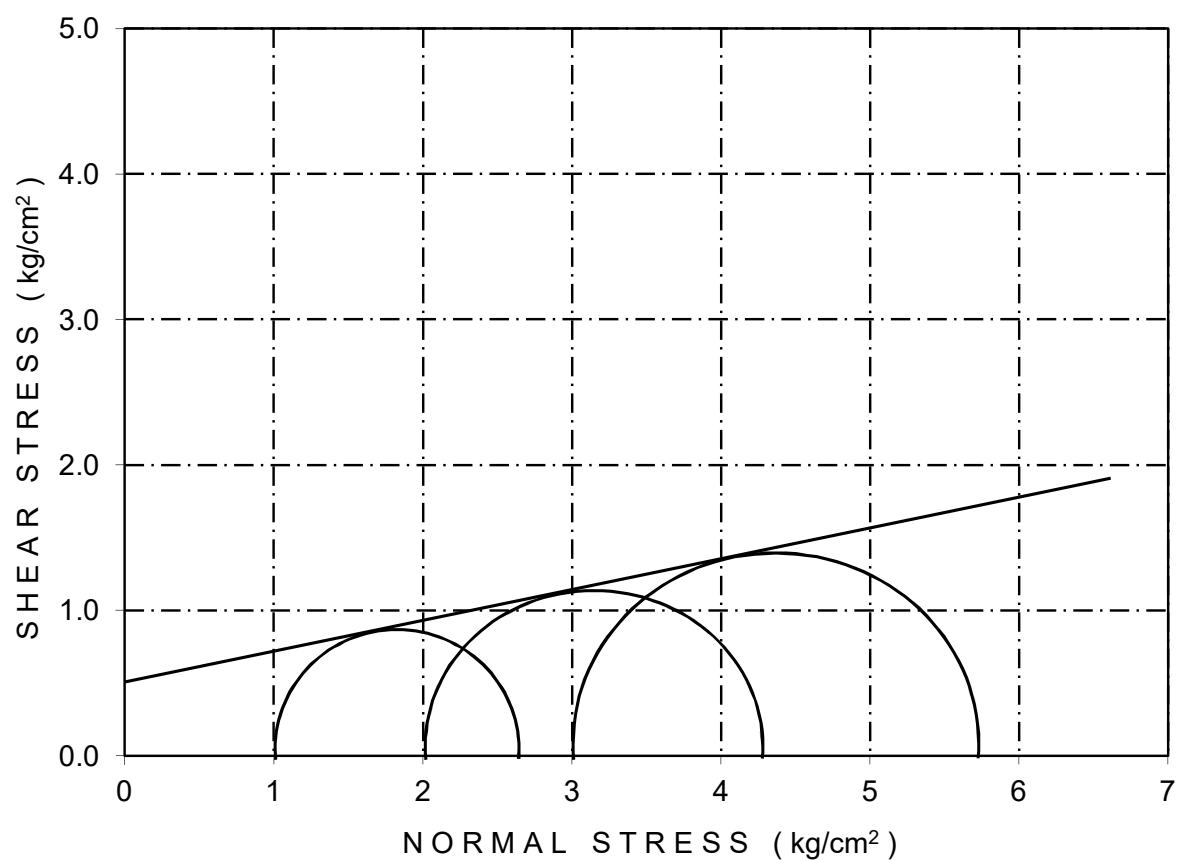


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-04
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.66	1.50	10.8

"c" Value kg/cm ²	"φ" Value DEGREE
0.50	9



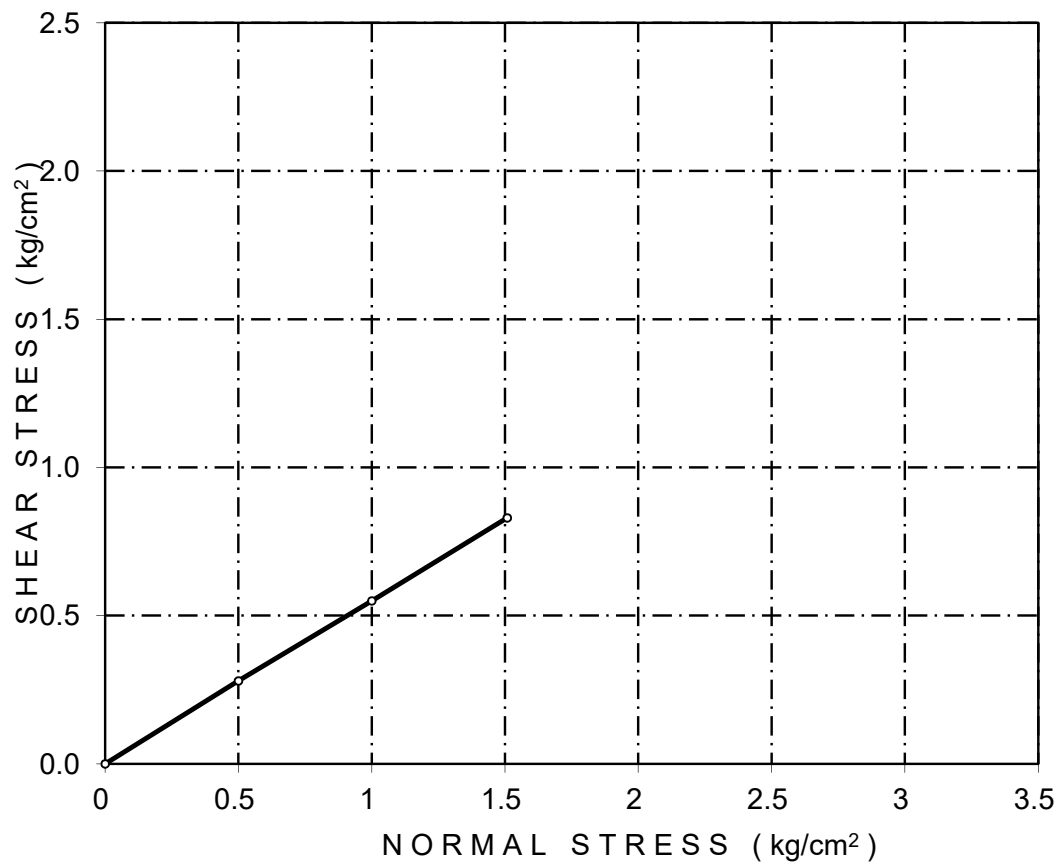
GEOTECHNICAL INVESTIGATION FOR PACKAGE DWSIIP 04



DRAINED DIRECT SHEAR TEST

Borehole No : B5-05
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.55	0	29



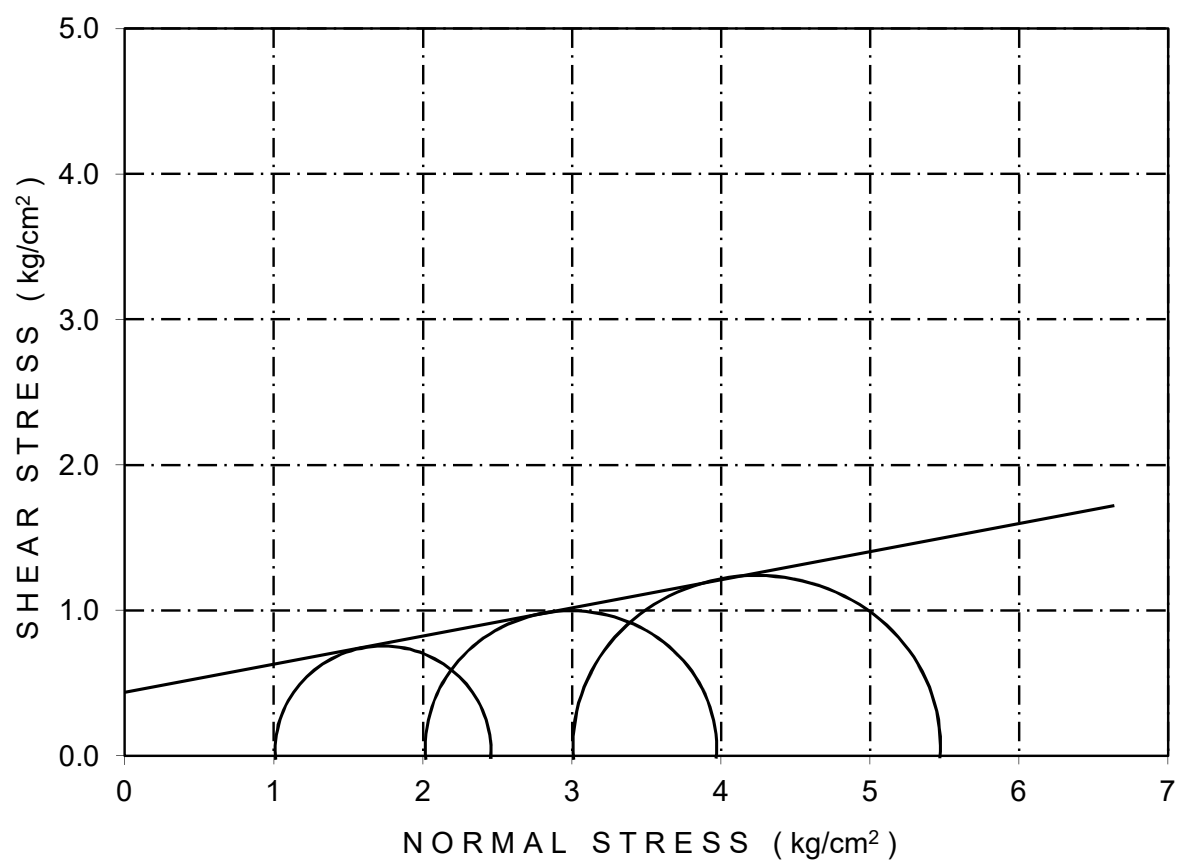


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-06
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.67	1.50	11.6

"c" Value kg/cm ²	"φ" Value DEGREE
0.45	8



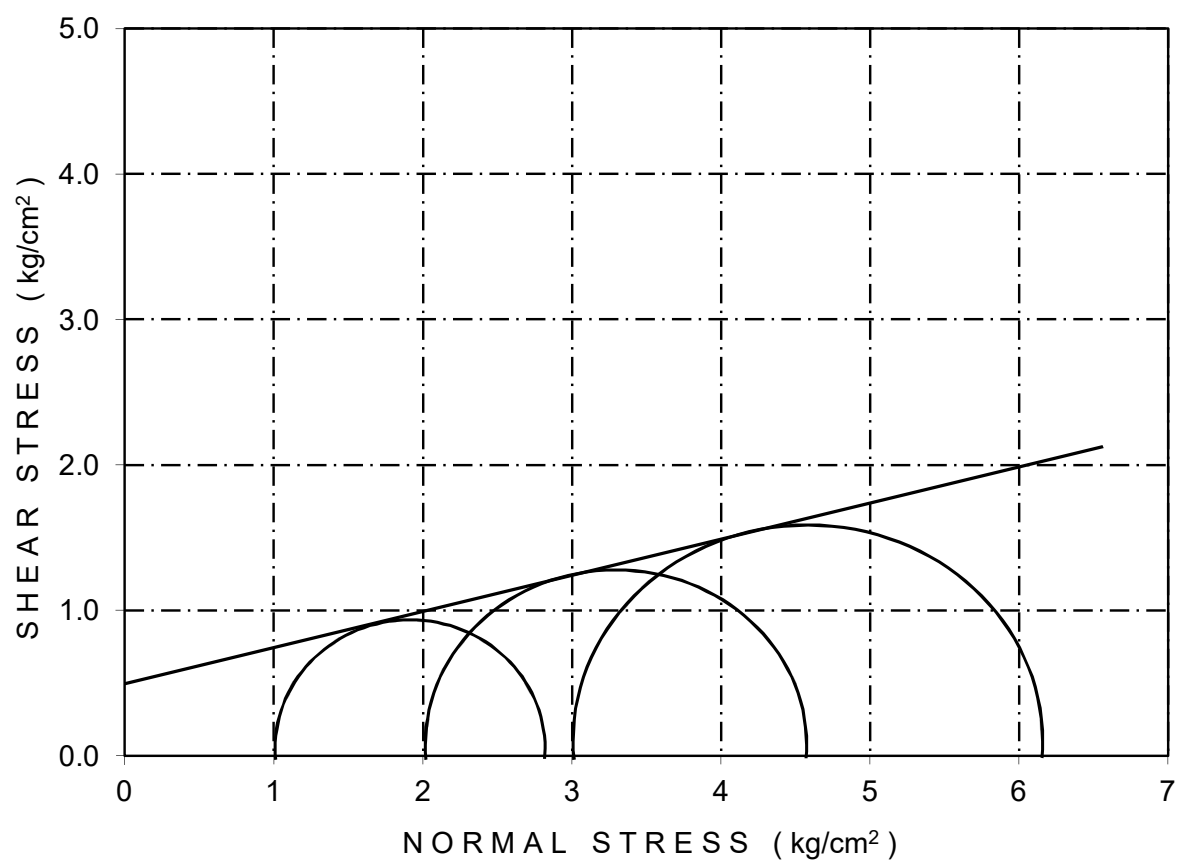


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-07
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.71	1.54	11.2

"c" Value kg/cm ²	"φ" Value DEGREE
0.50	11



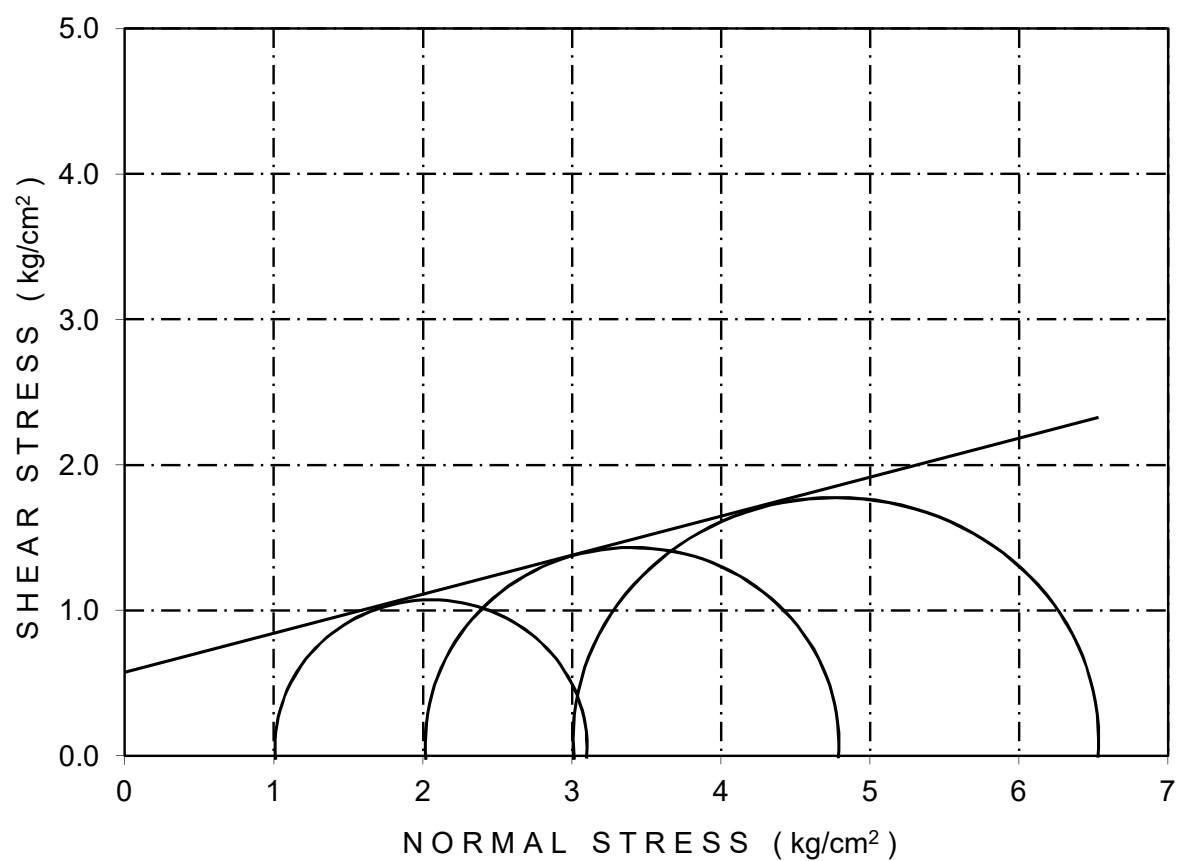


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-08
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.72	1.55	10.7

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	12



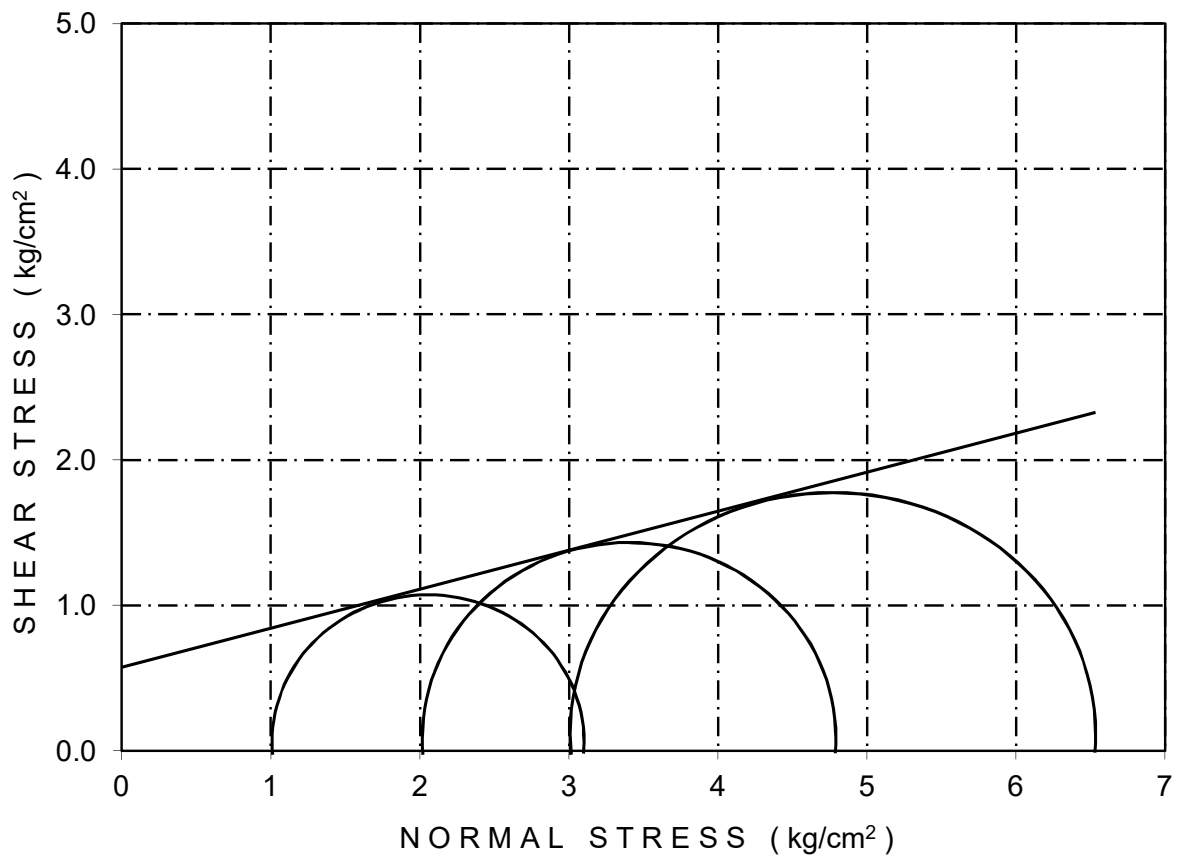


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-09
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.68	1.53	10.1

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	12



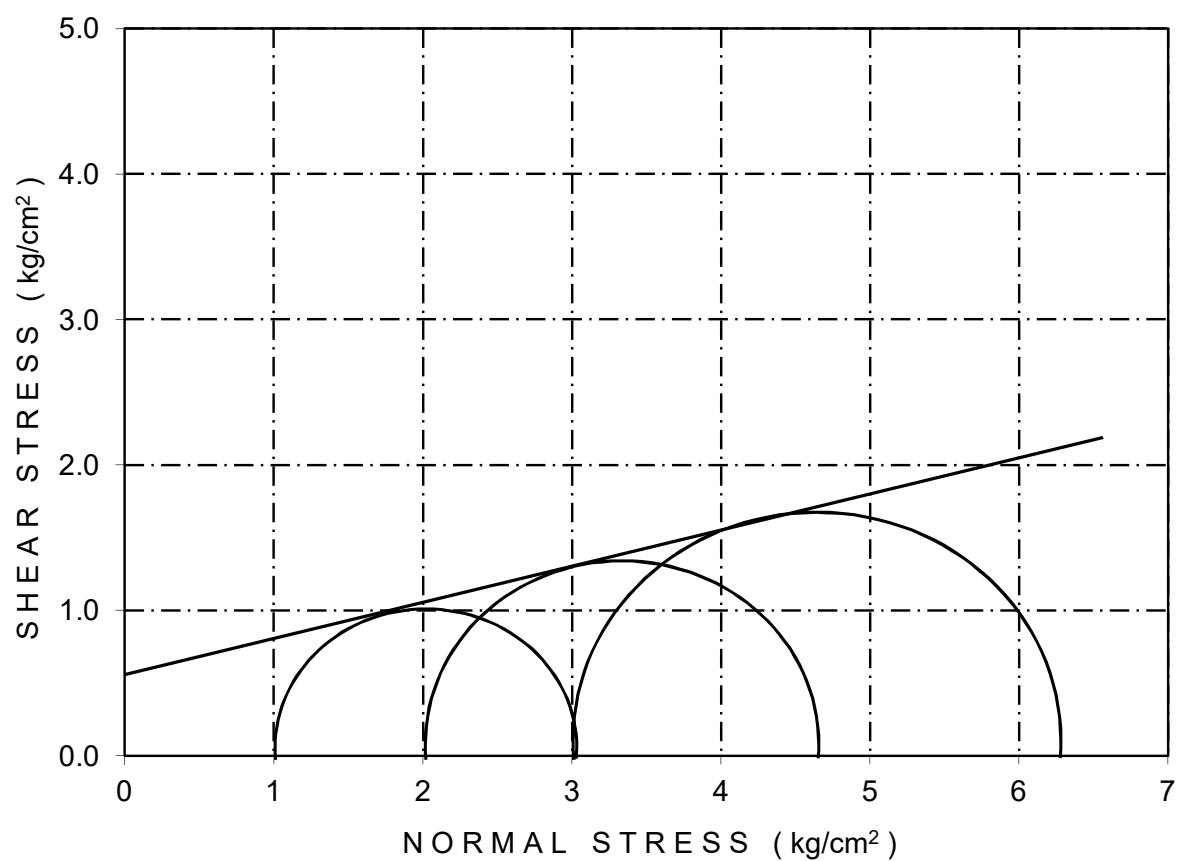


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-10
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.70	1.55	9.8

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	11



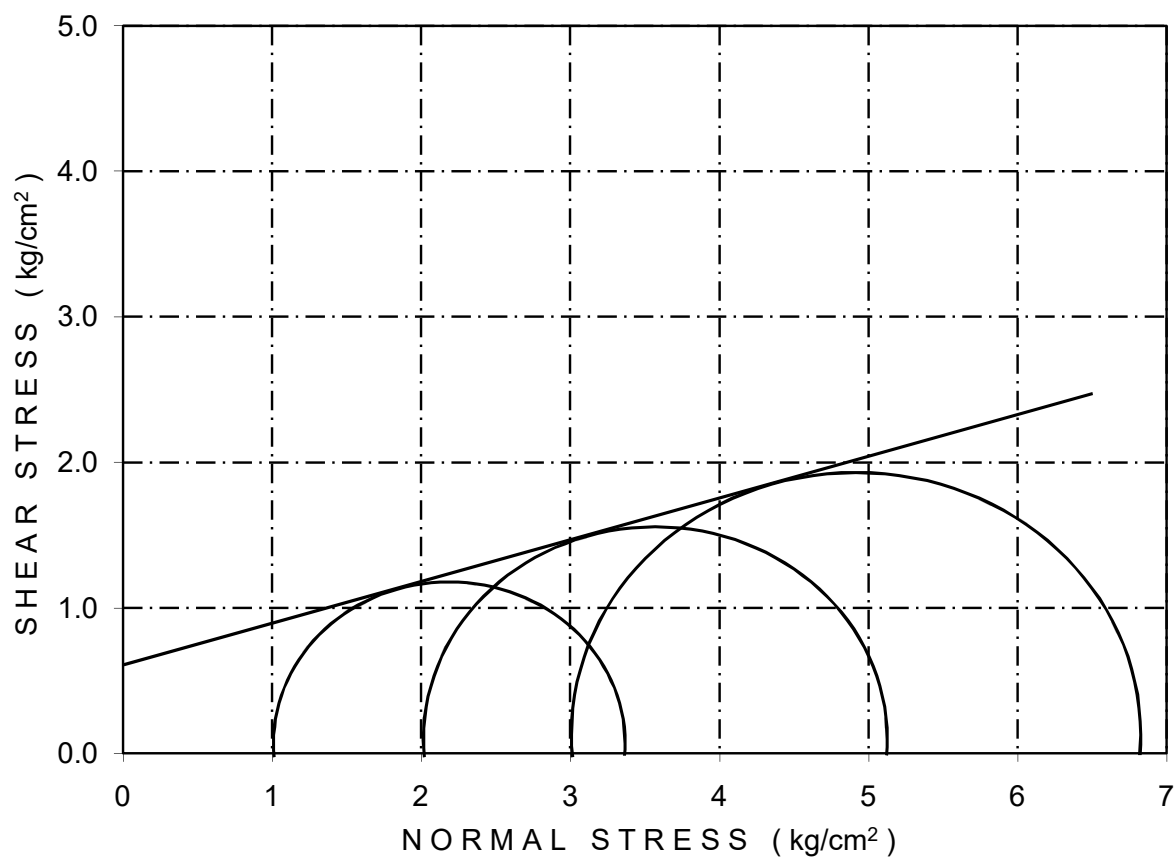


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-11
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.71	1.55	10.2

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	13

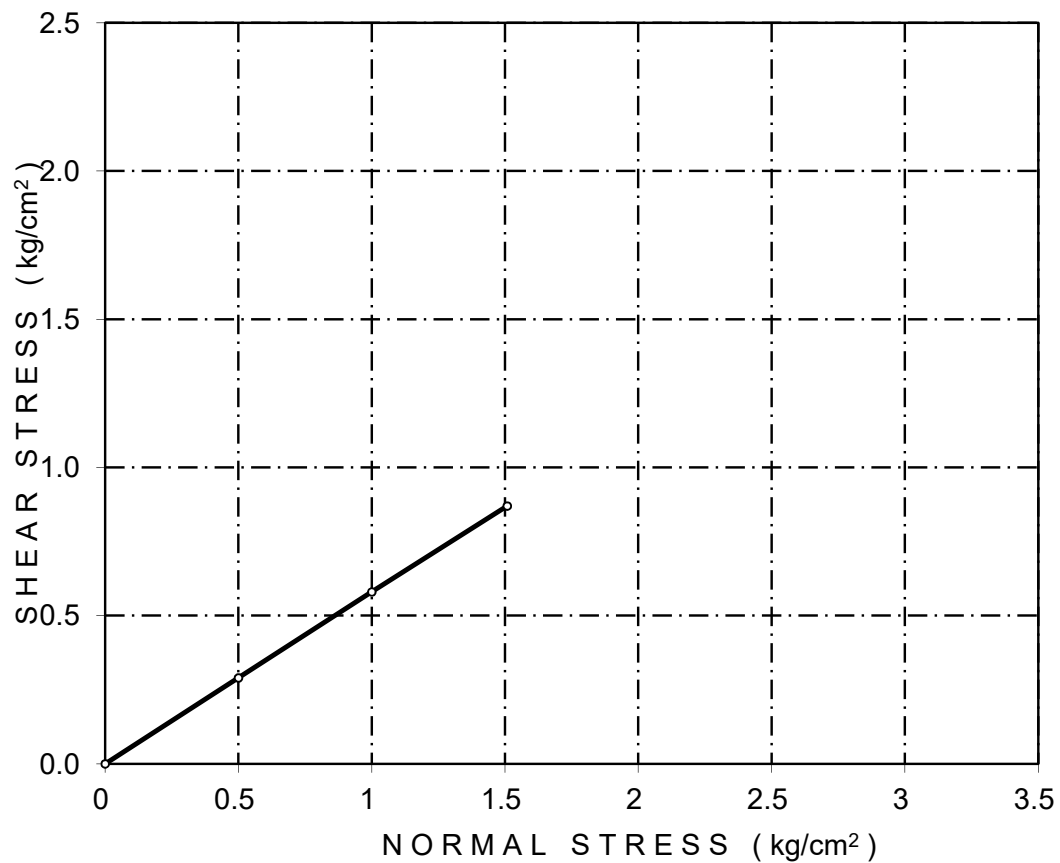




DRAINED DIRECT SHEAR TEST

Borehole No : B5-12
Depth : 3.50m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.56	0	30

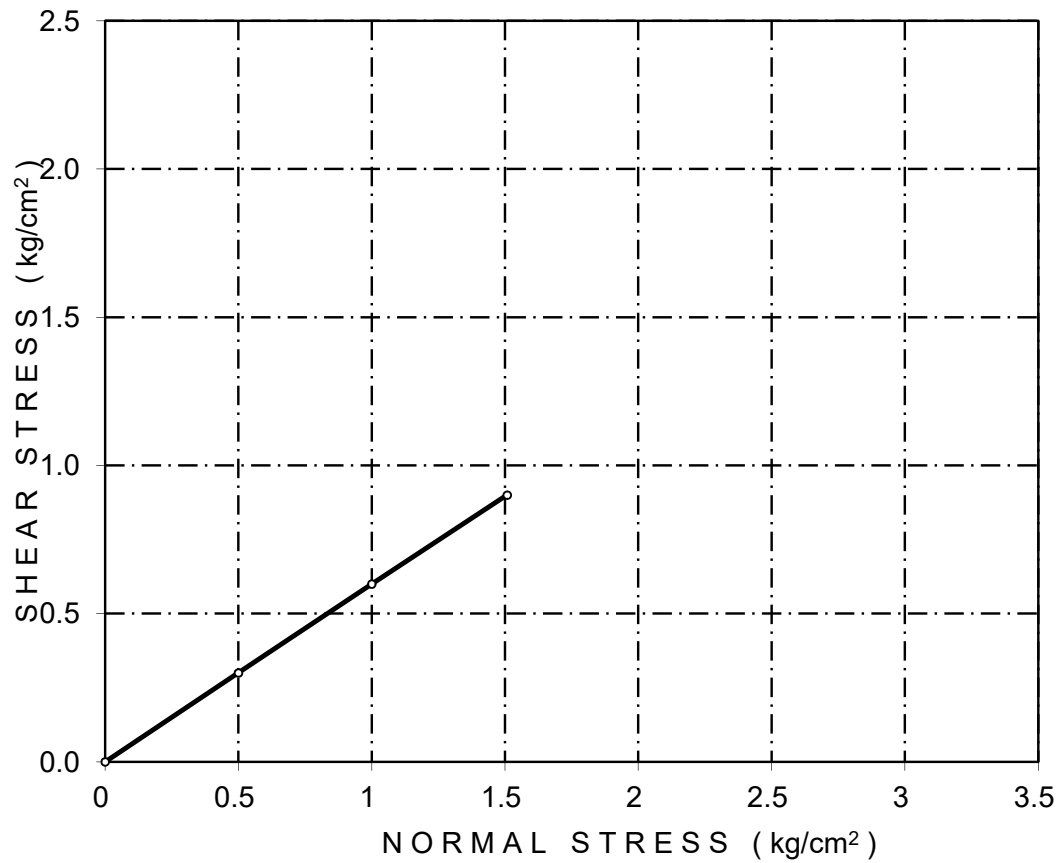




DRAINED DIRECT SHEAR TEST

Borehole No : B5-13
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.55	0	31



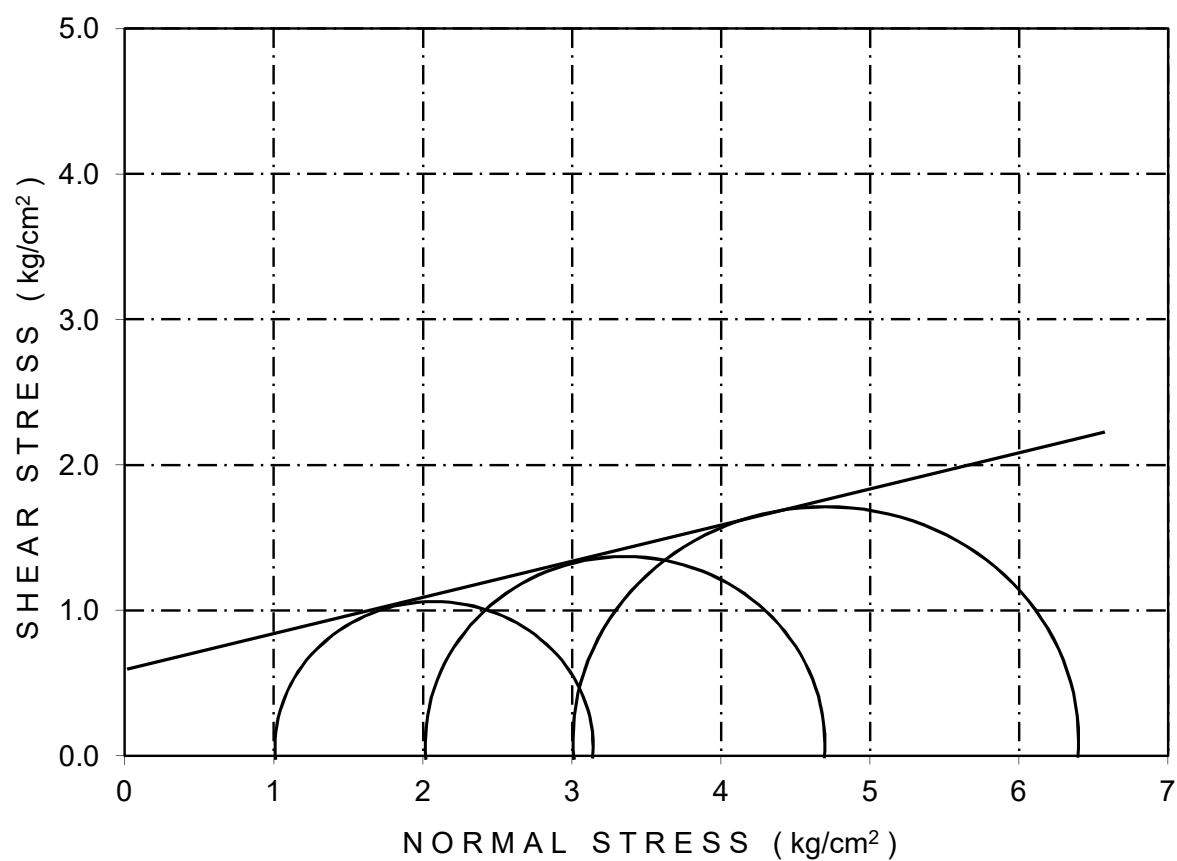


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-14
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.75	1.53	14.6

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	11

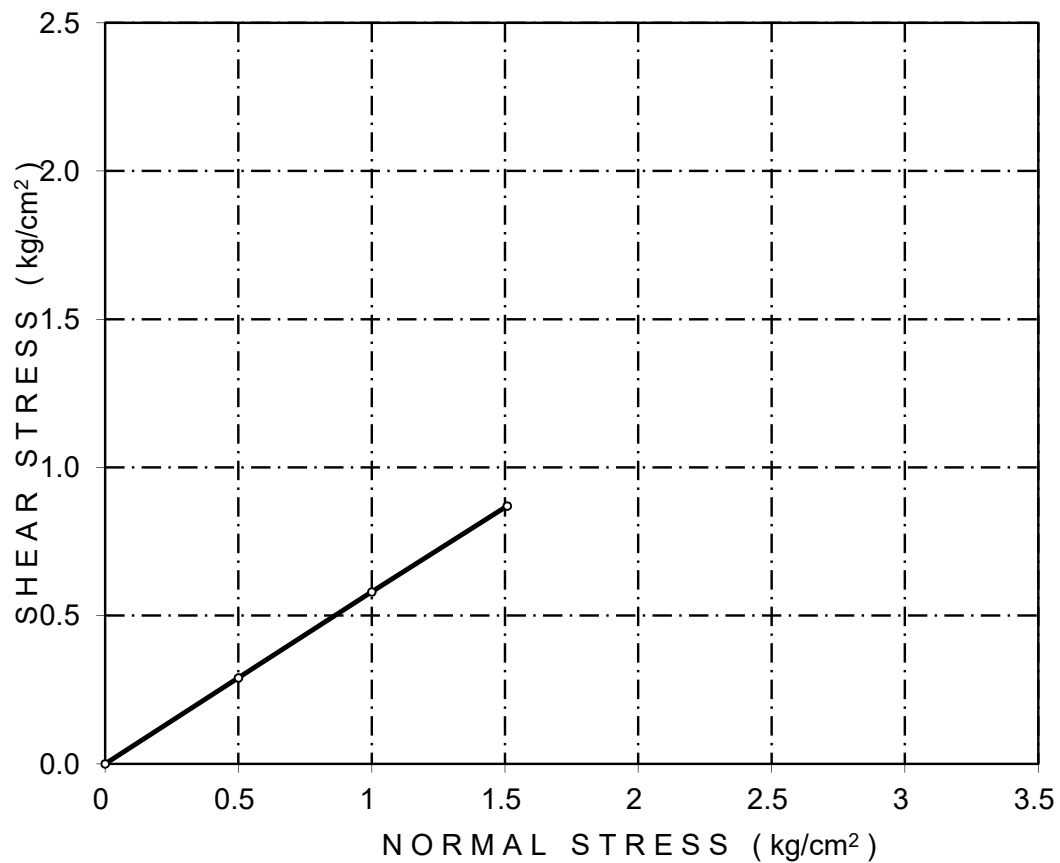




DRAINED DIRECT SHEAR TEST

Borehole No : B5-15
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.54	0	30



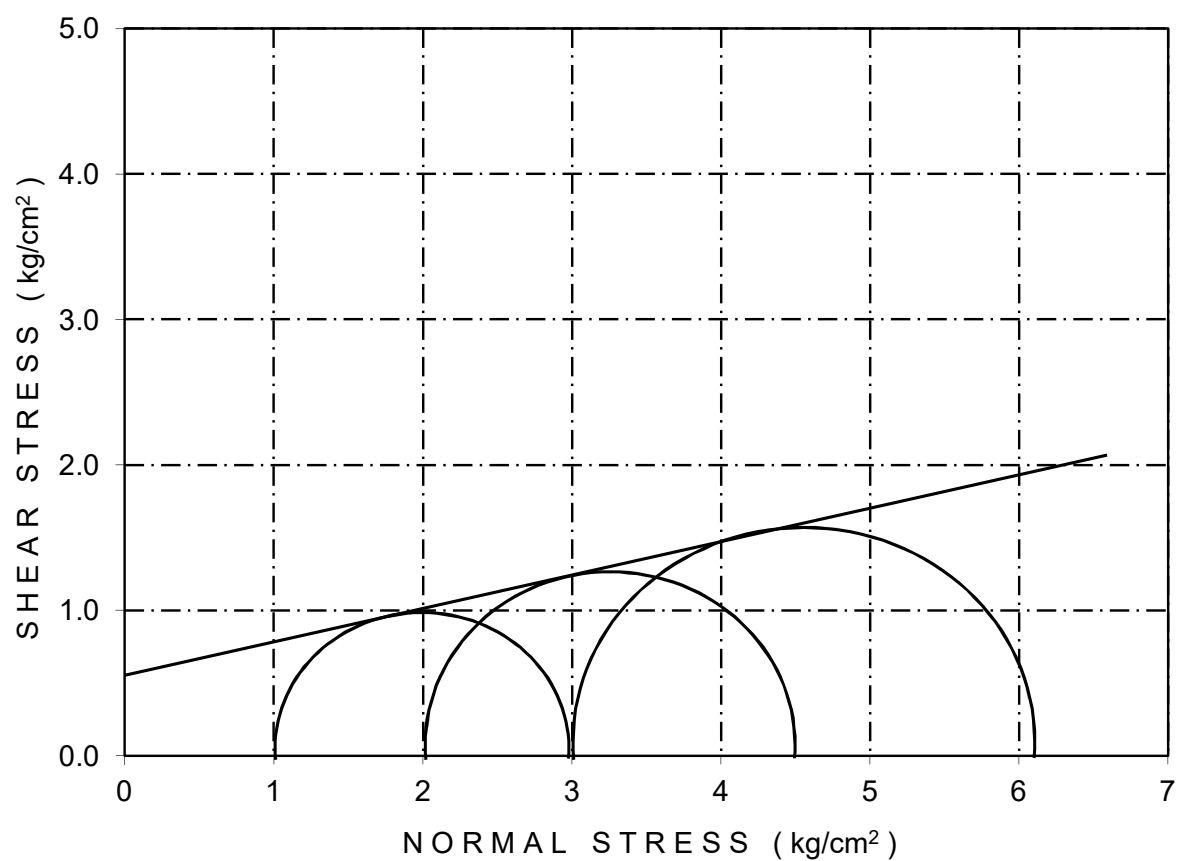


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-16
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.70	1.53	10.8

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	10



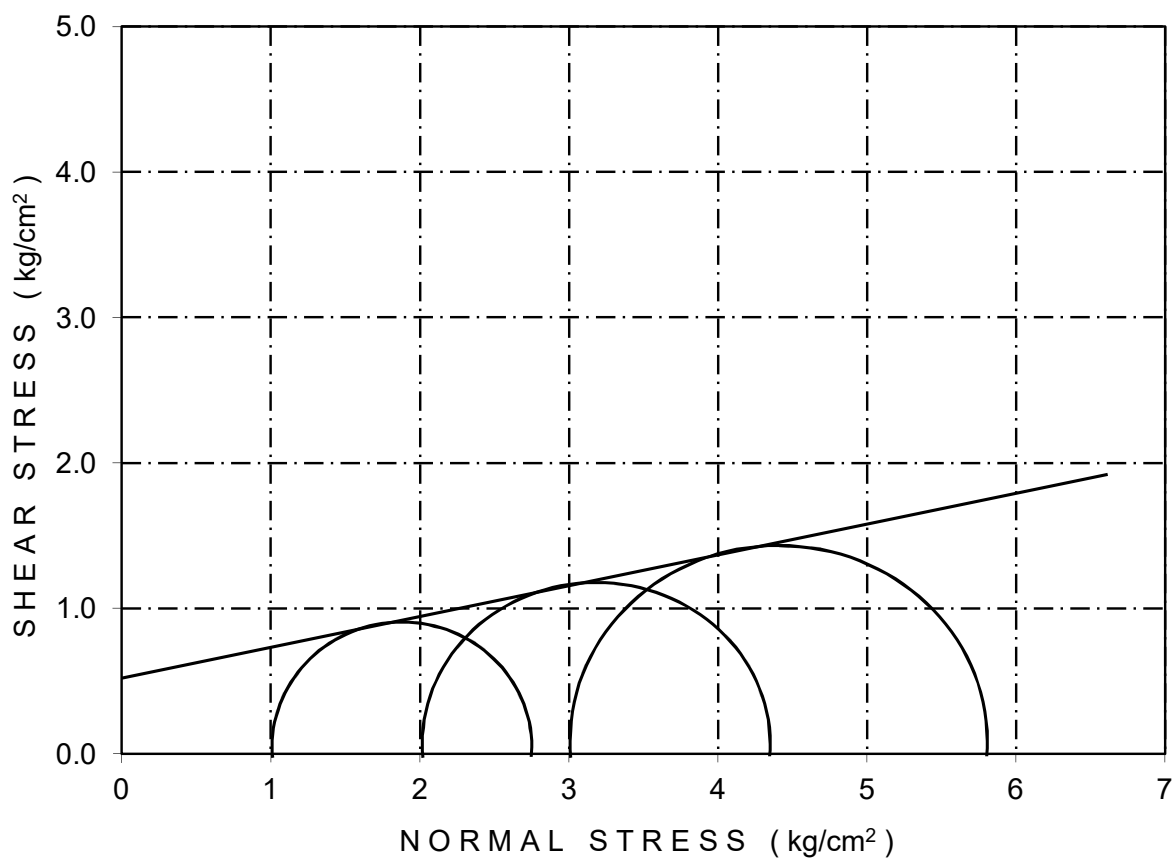


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-17
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.66	1.50	10.6

"c" Value kg/cm ²	"φ" Value DEGREE
0.50	9

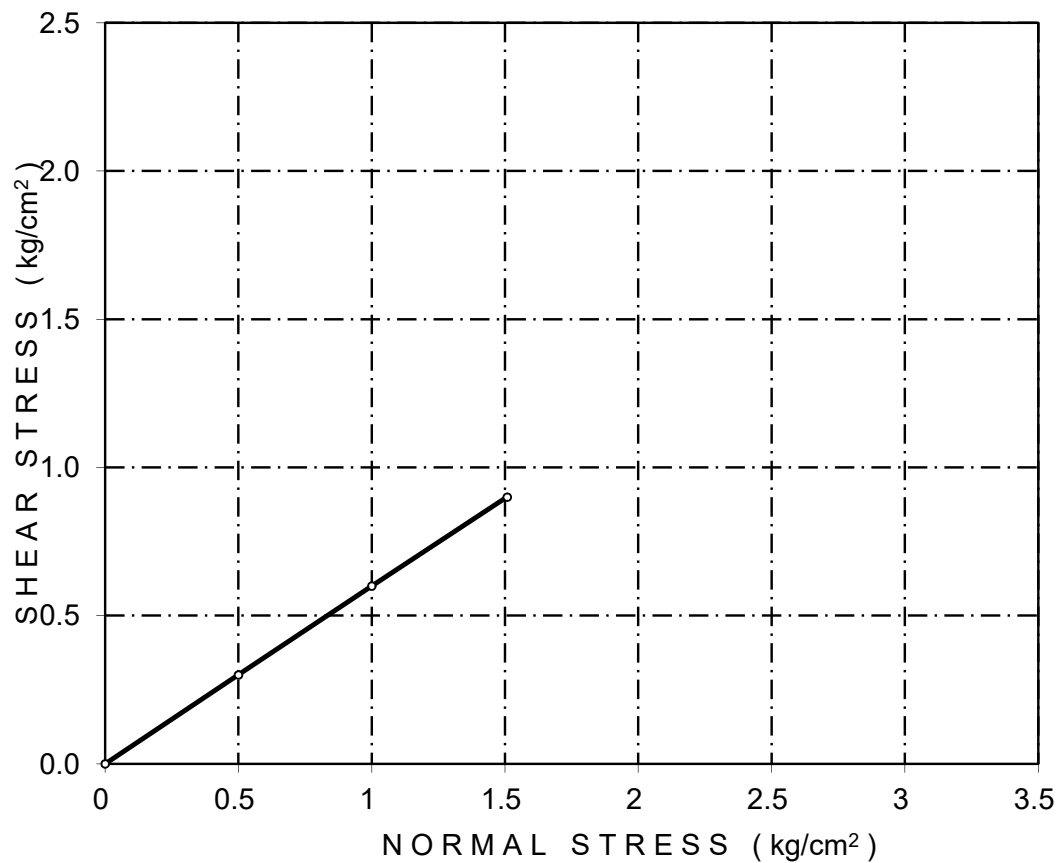




DRAINED DIRECT SHEAR TEST

Borehole No : B5-18
Depth : 3.50m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.57	0	31



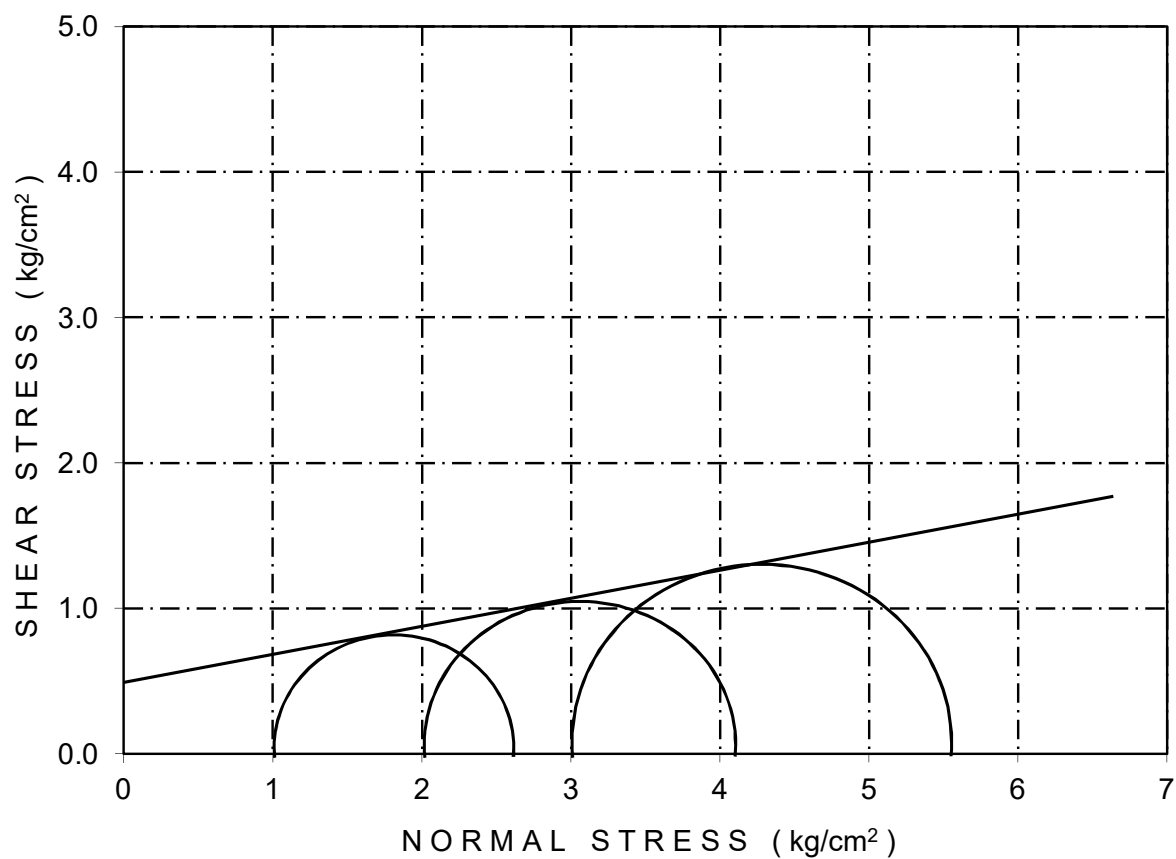


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-19
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.71	1.50	14.1

"c" Value kg/cm ²	"φ" Value DEGREE
0.50	8



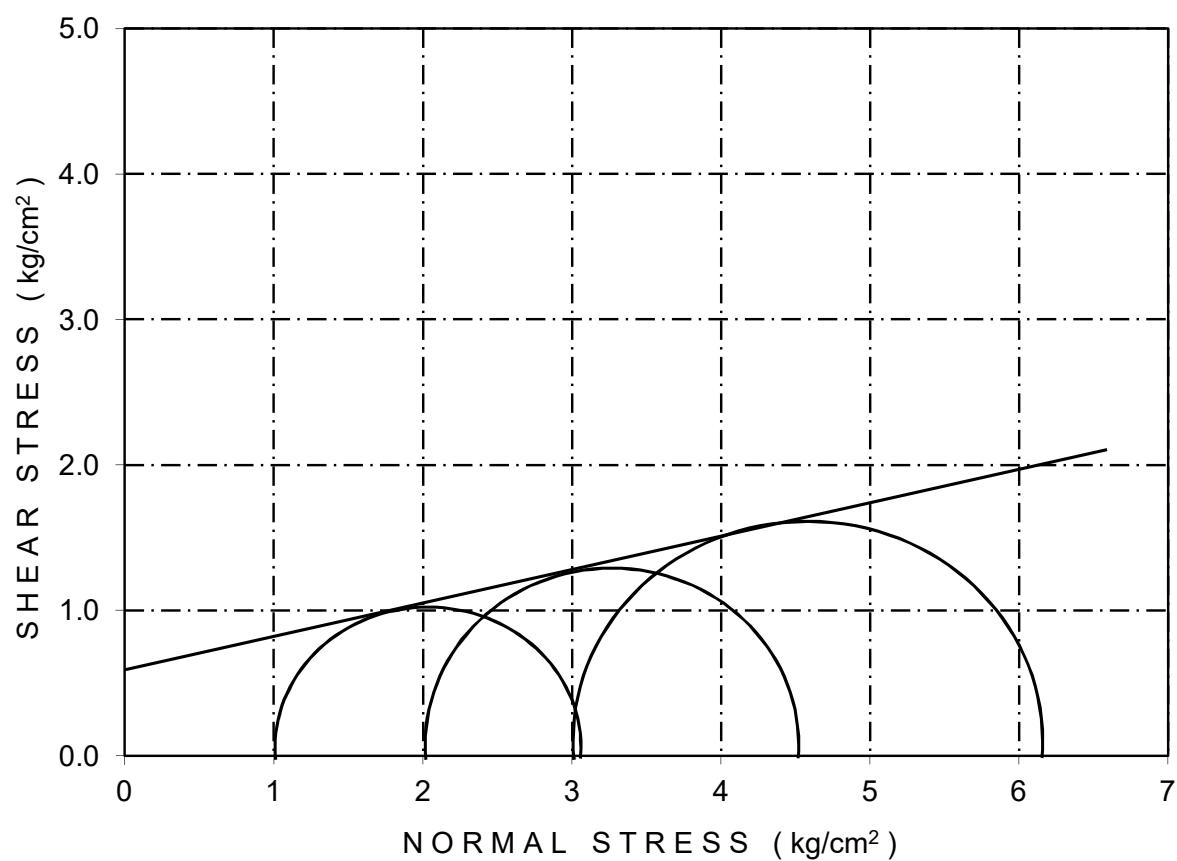


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-20
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.74	1.52	14.6

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	10



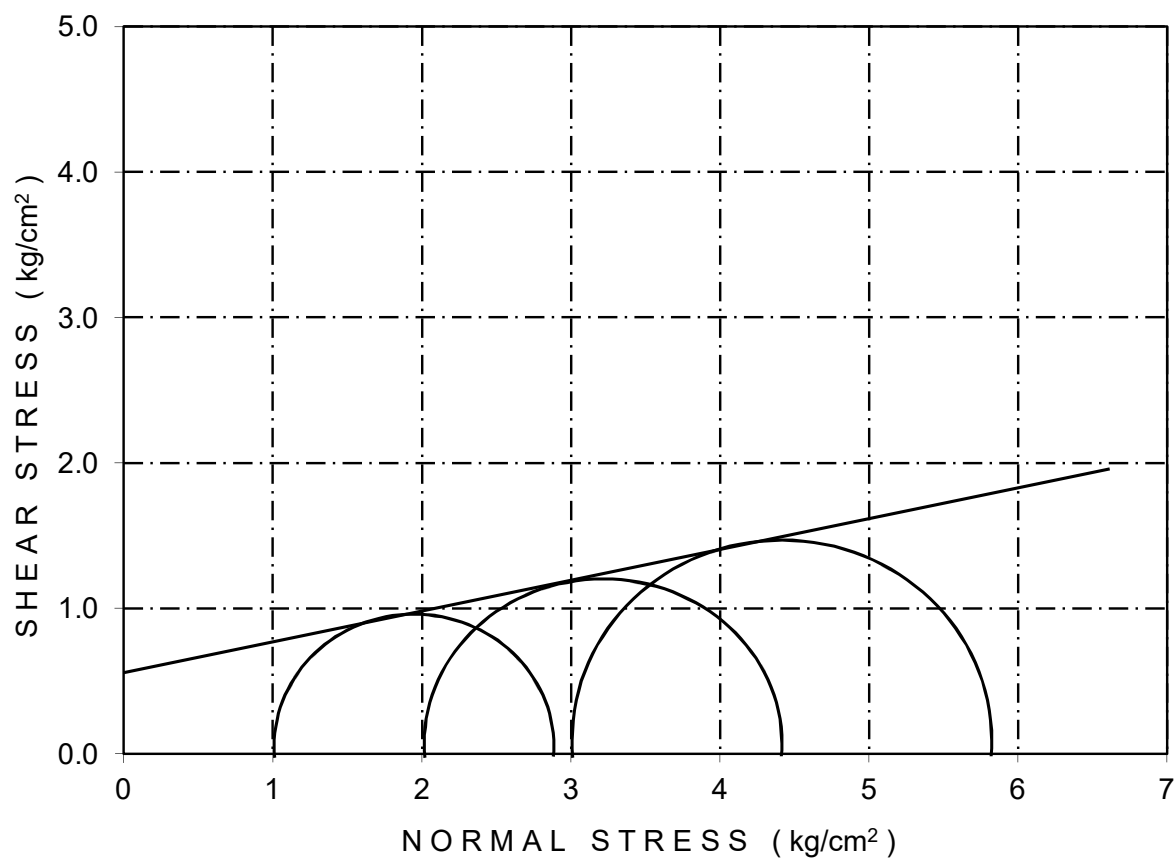


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-21
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.70	1.52	13.2

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	9

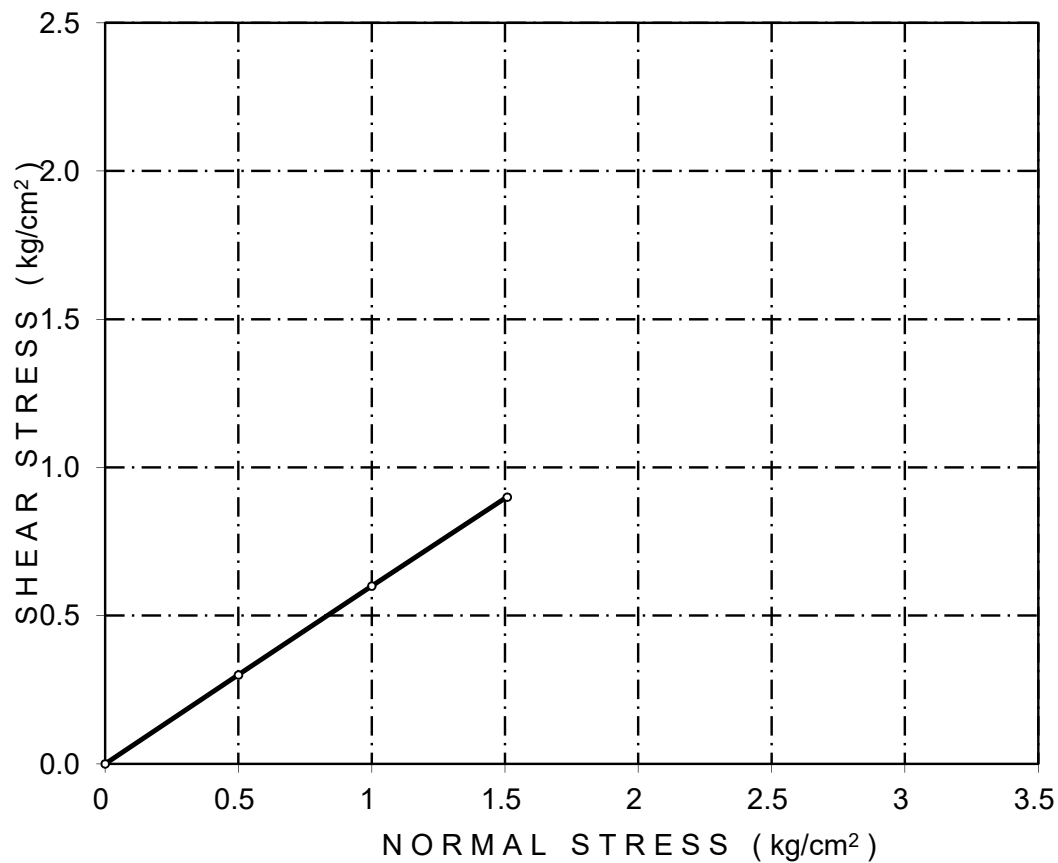




DRAINED DIRECT SHEAR TEST

Borehole No : B5-22
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.54	0	31



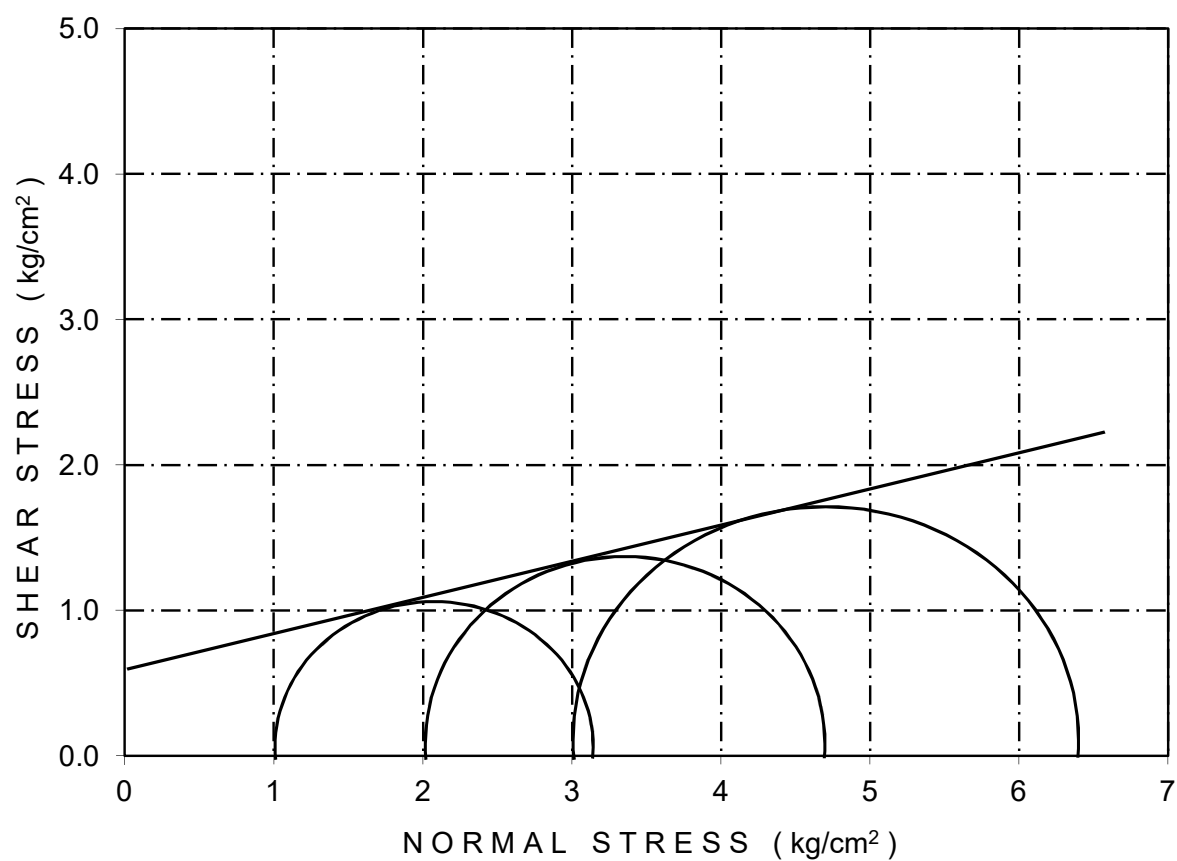


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-23
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.73	1.53	12.9

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	11

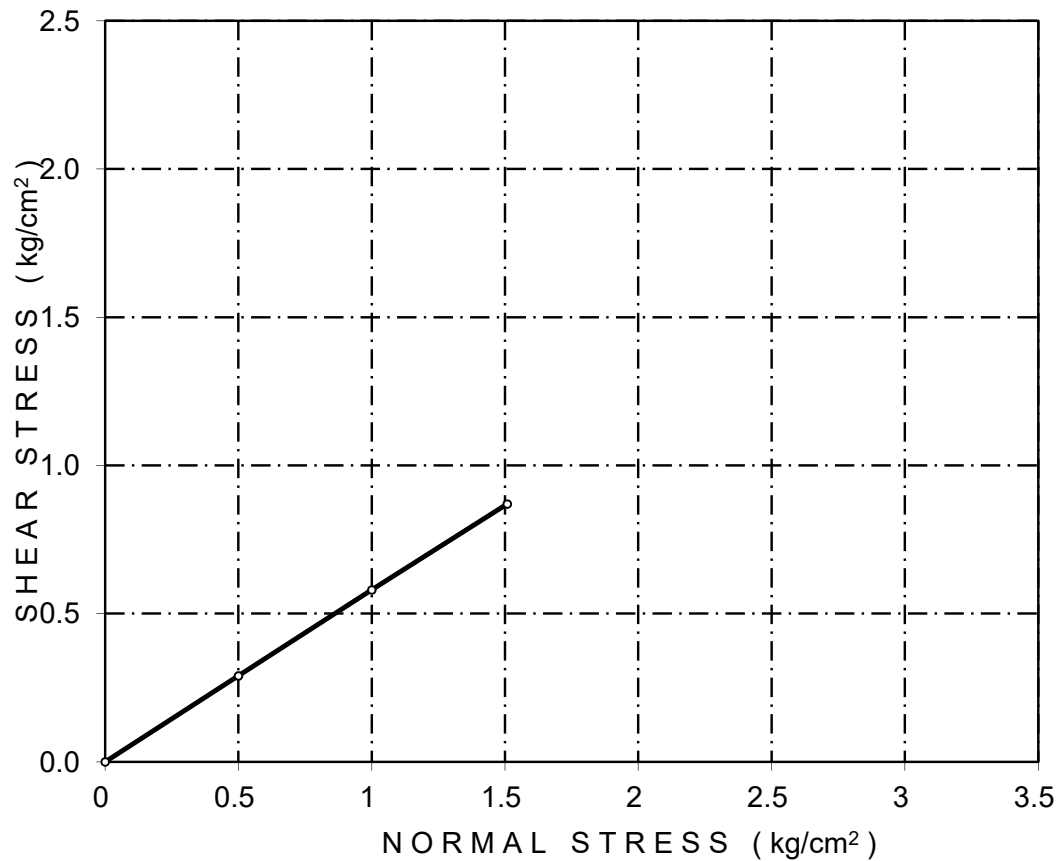




DRAINED DIRECT SHEAR TEST

Borehole No : B5-24
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.56	0	30



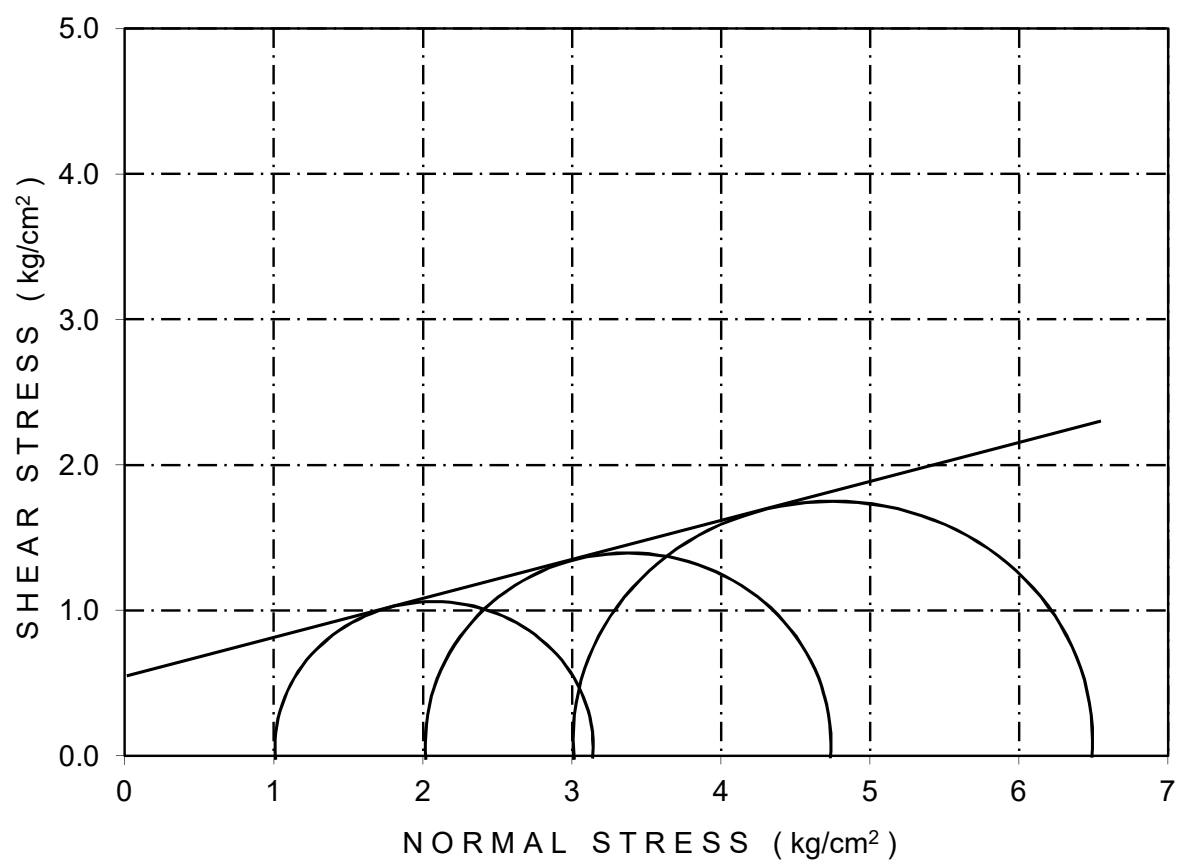


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-25
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.73	1.55	11.5

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	12



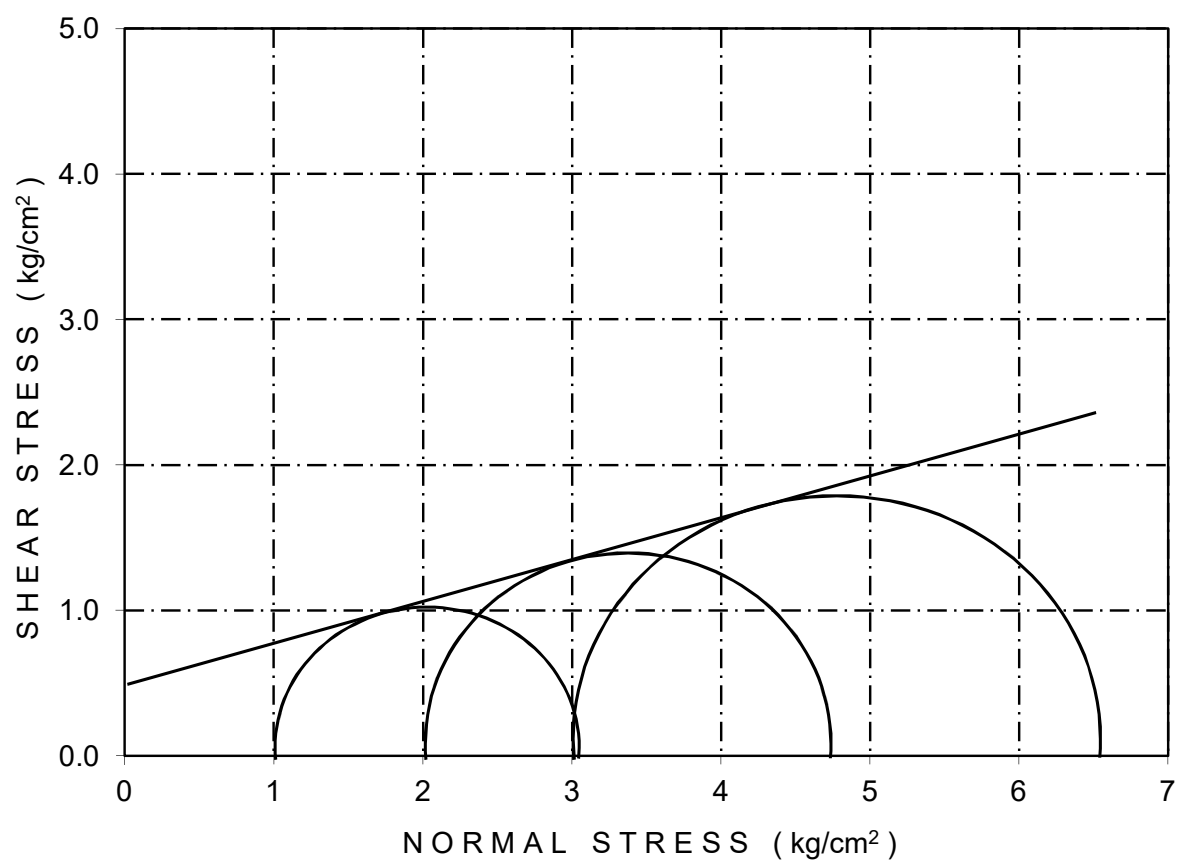


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-26
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.74	1.54	12.8

"c" Value kg/cm ²	"φ" Value DEGREE
0.50	13

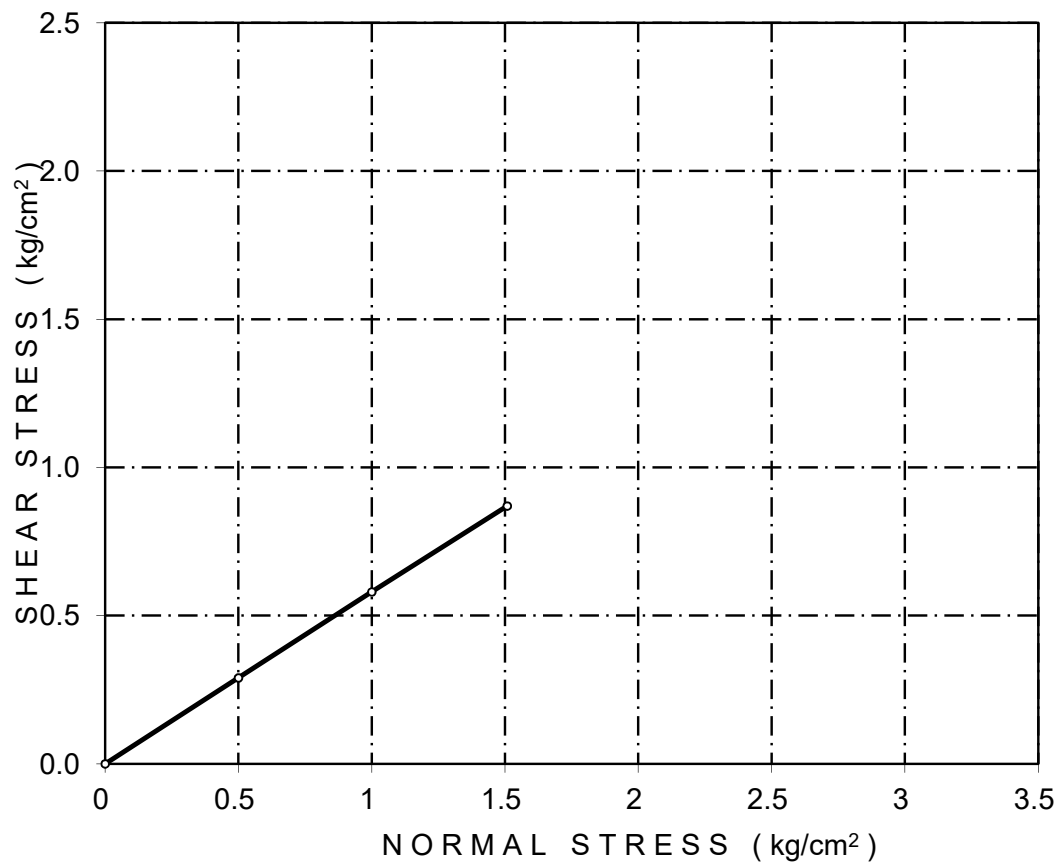




DRAINED DIRECT SHEAR TEST

Borehole No : B5-27
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.56	0	30



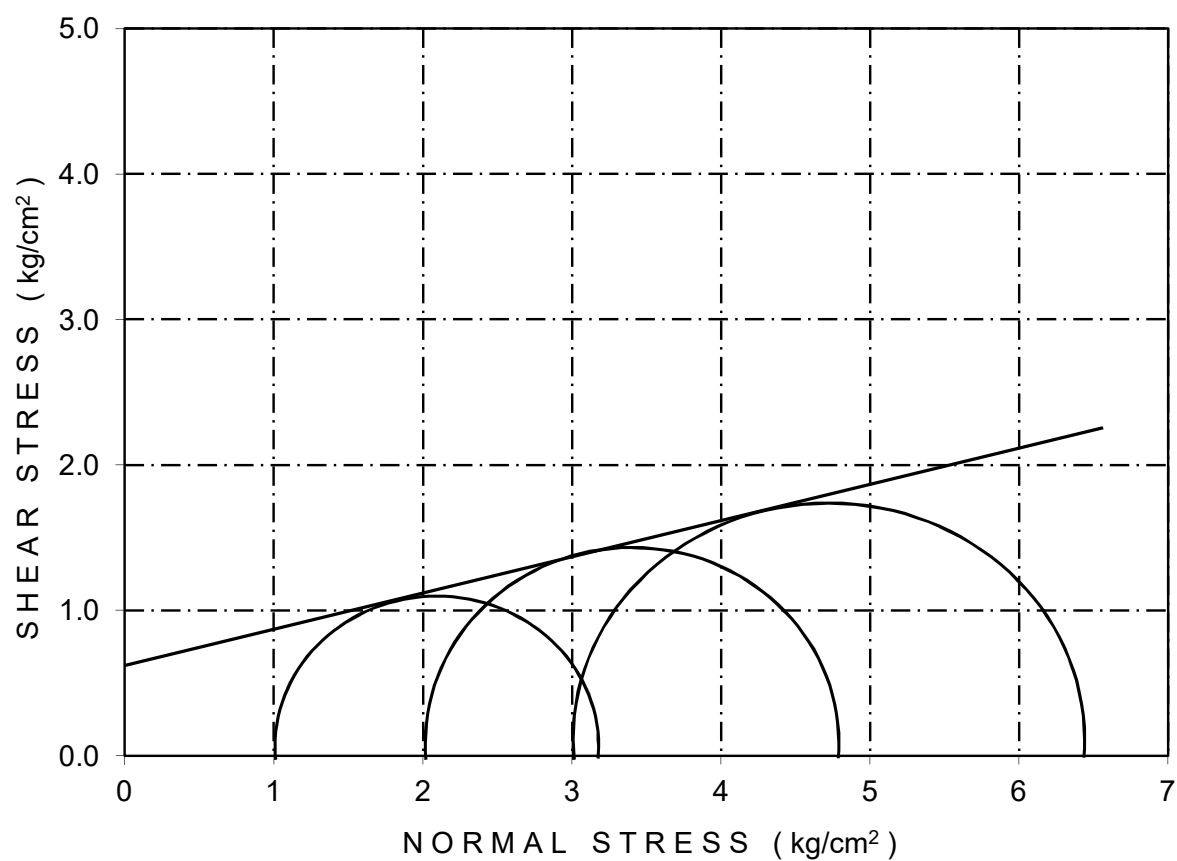


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-28
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.70	1.54	10.3

"c" Value kg/cm ²	"φ" Value DEGREE
0.65	11

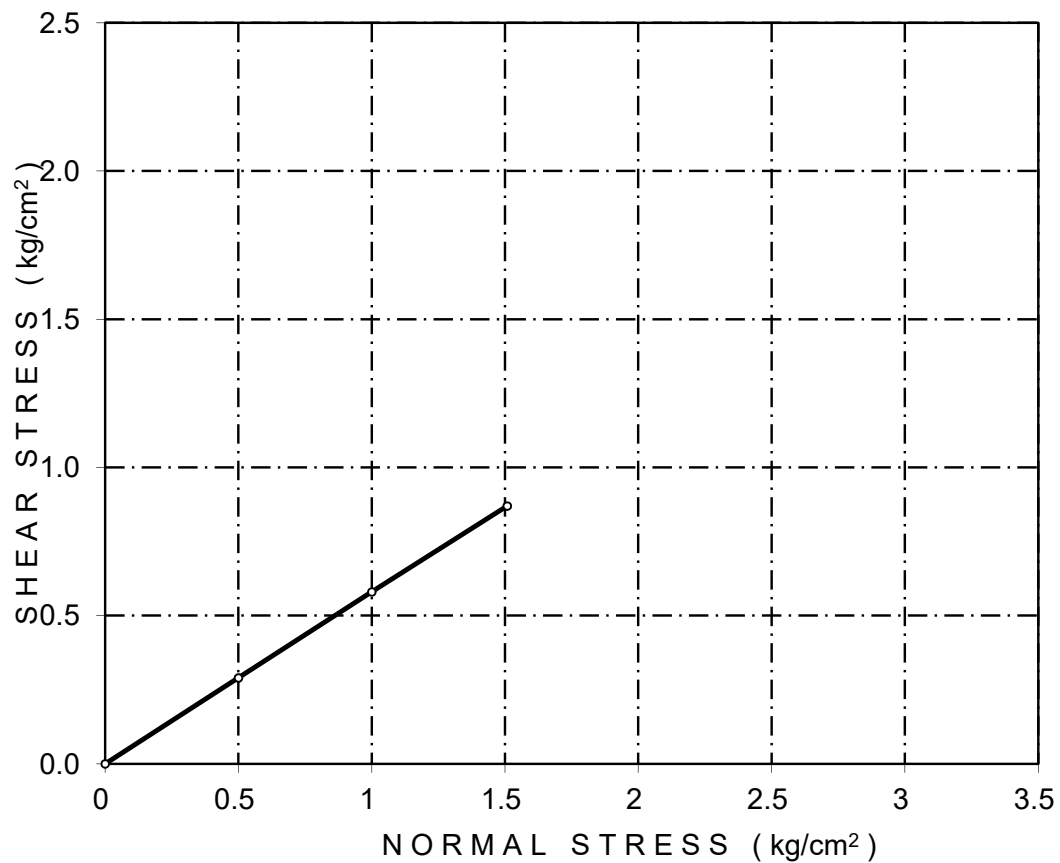




DRAINED DIRECT SHEAR TEST

Borehole No : B5-31
Depth : 2.25m
Type of Test : Drained Direct Shear
Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.55	0	30



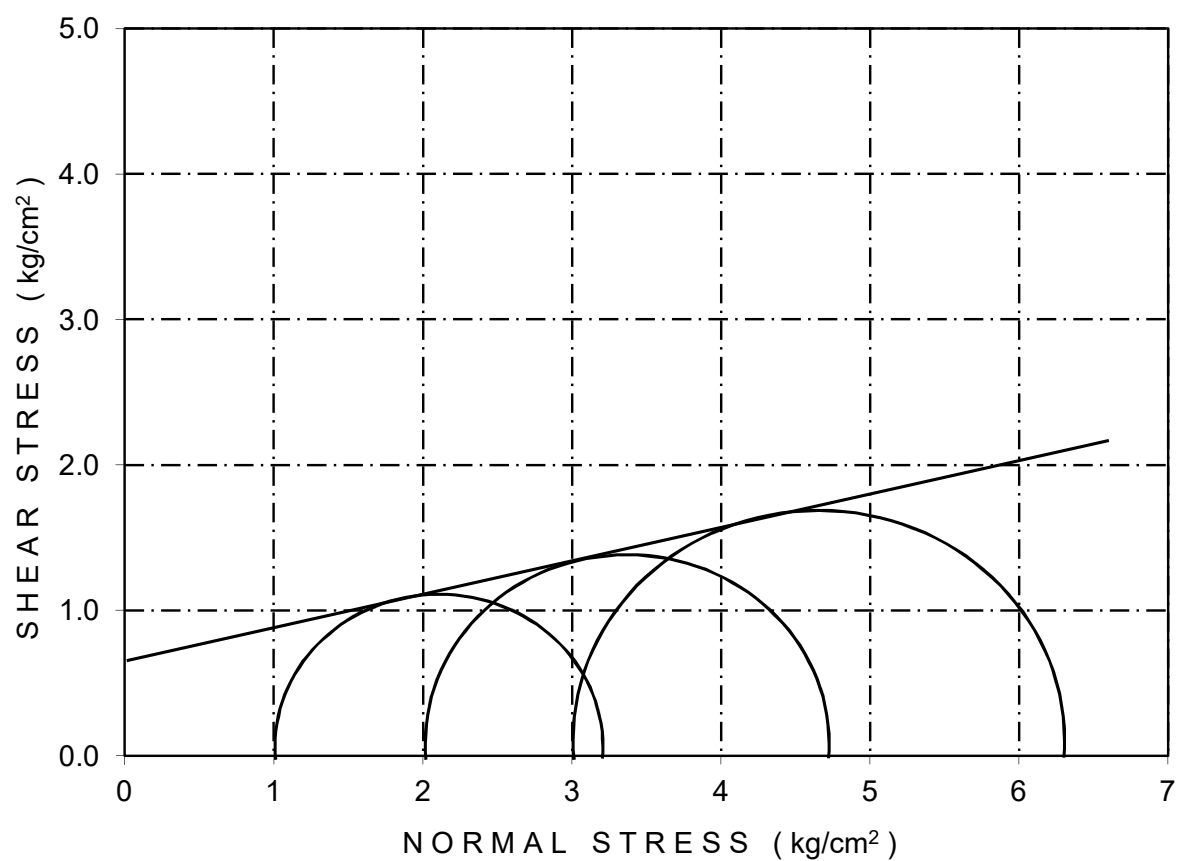


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-32
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.71	1.54	10.9

"c" Value kg/cm ²	"φ" Value DEGREE
0.65	10



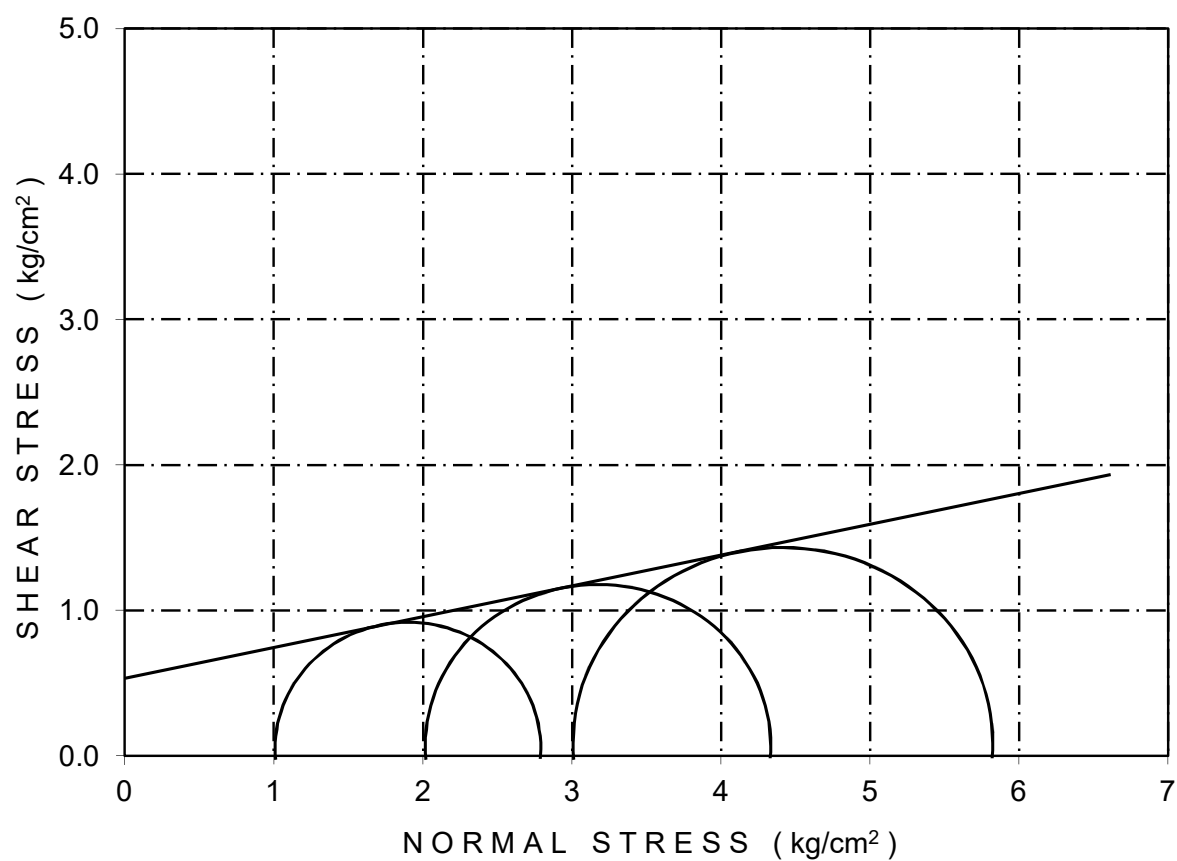


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-34
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.71	1.53	11.5

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	9



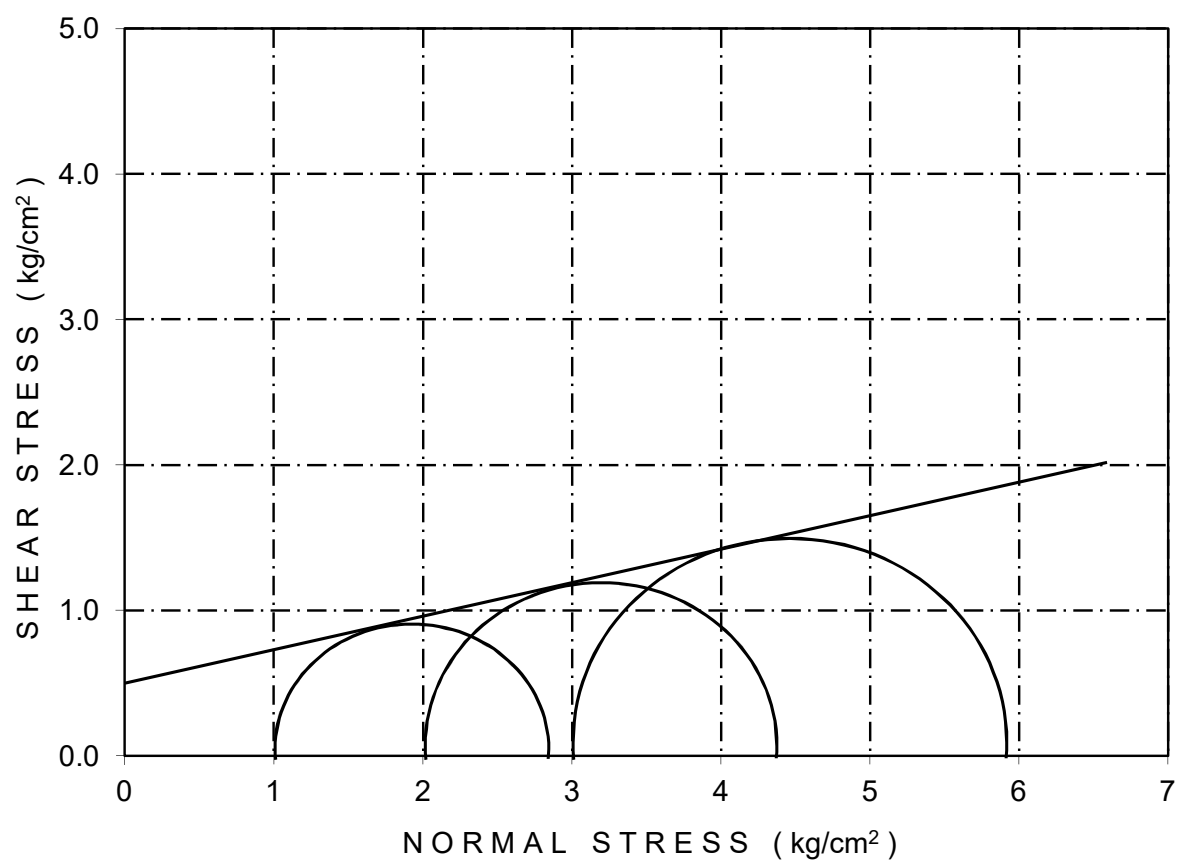


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-36
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.70	1.53	10.8

"c" Value kg/cm ²	"φ" Value DEGREE
0.50	10



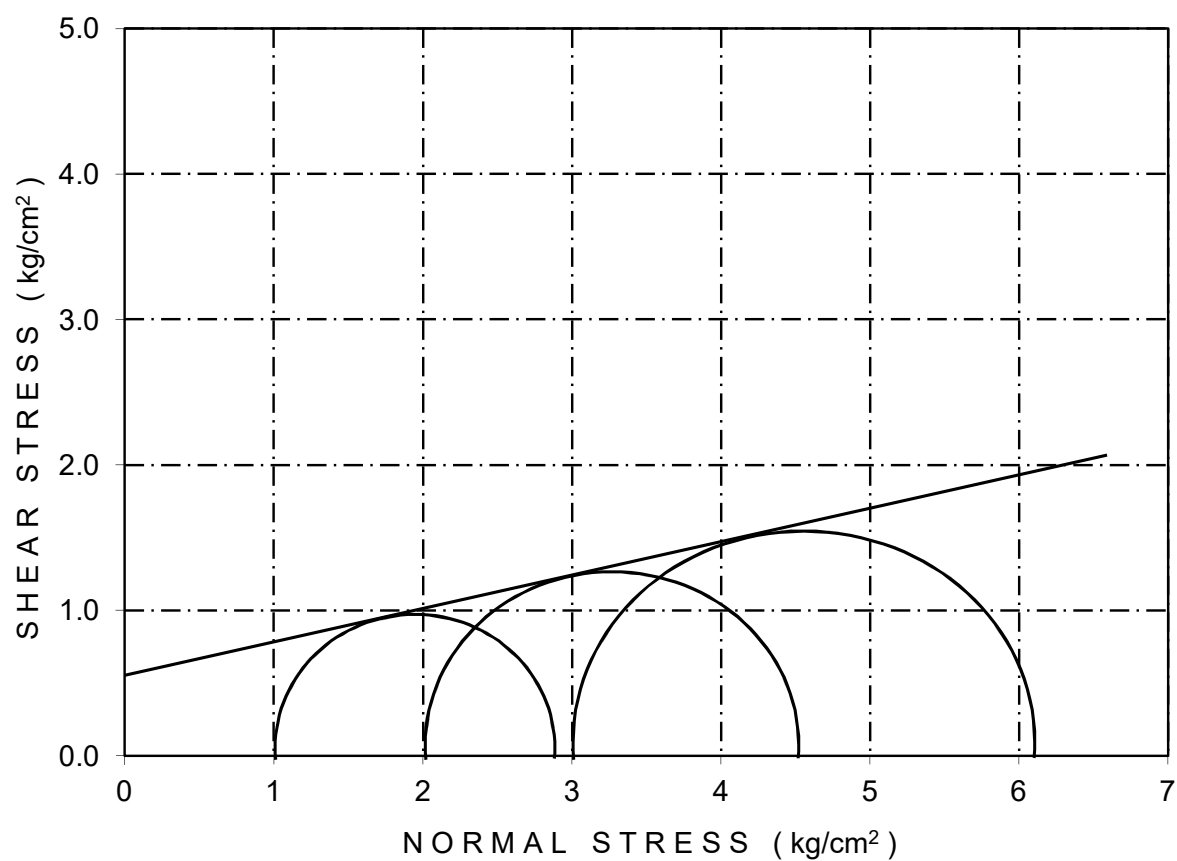


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-42
Depth	:	3.50m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.68	1.52	10.8

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	10



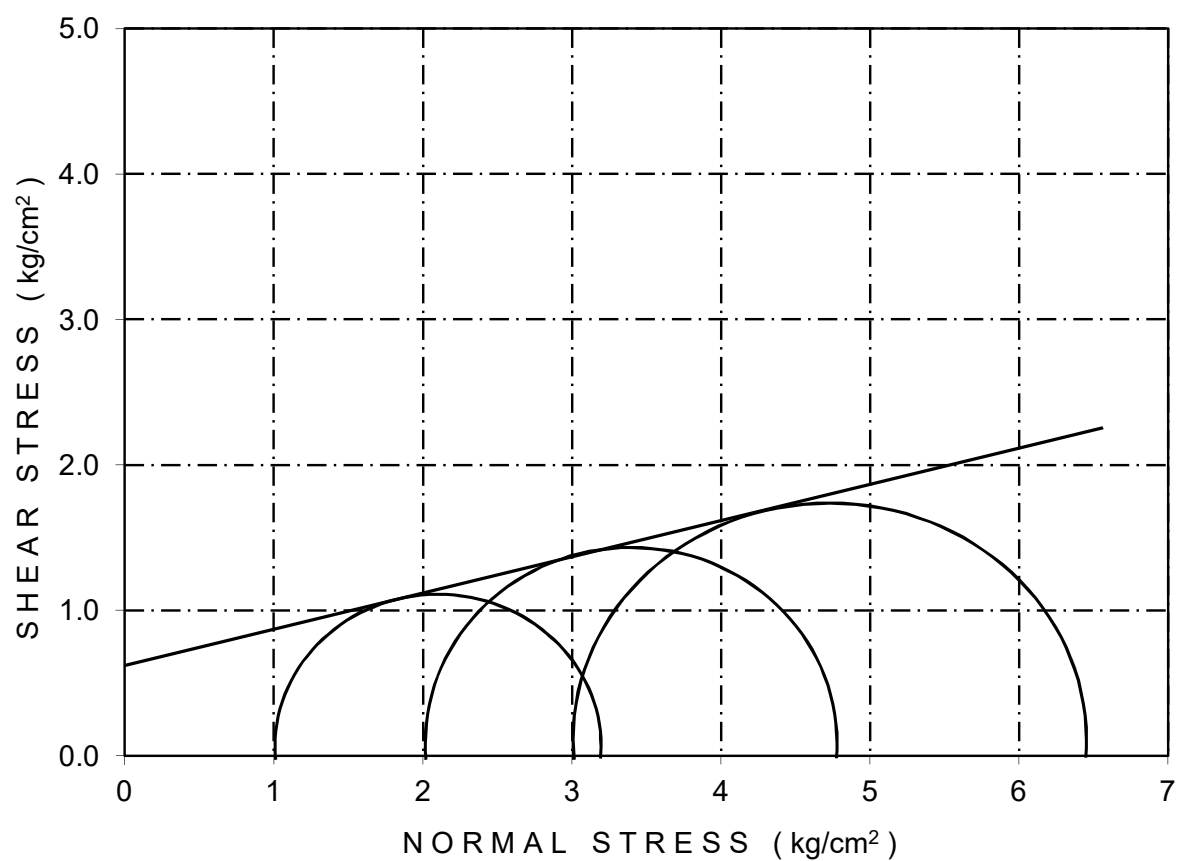


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-44
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.72	1.55	10.7

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	11



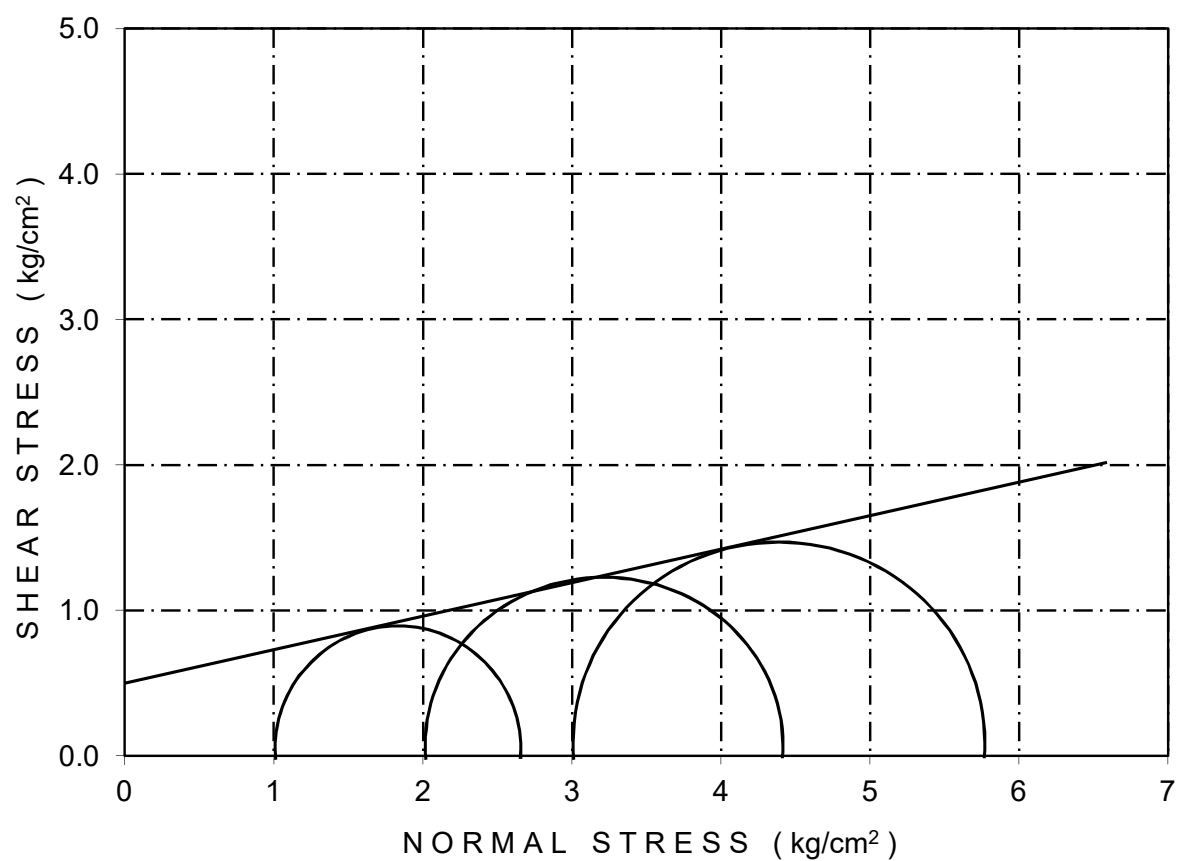


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-45
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.71	1.54	11.0

"c" Value kg/cm ²	"φ" Value DEGREE
0.50	10



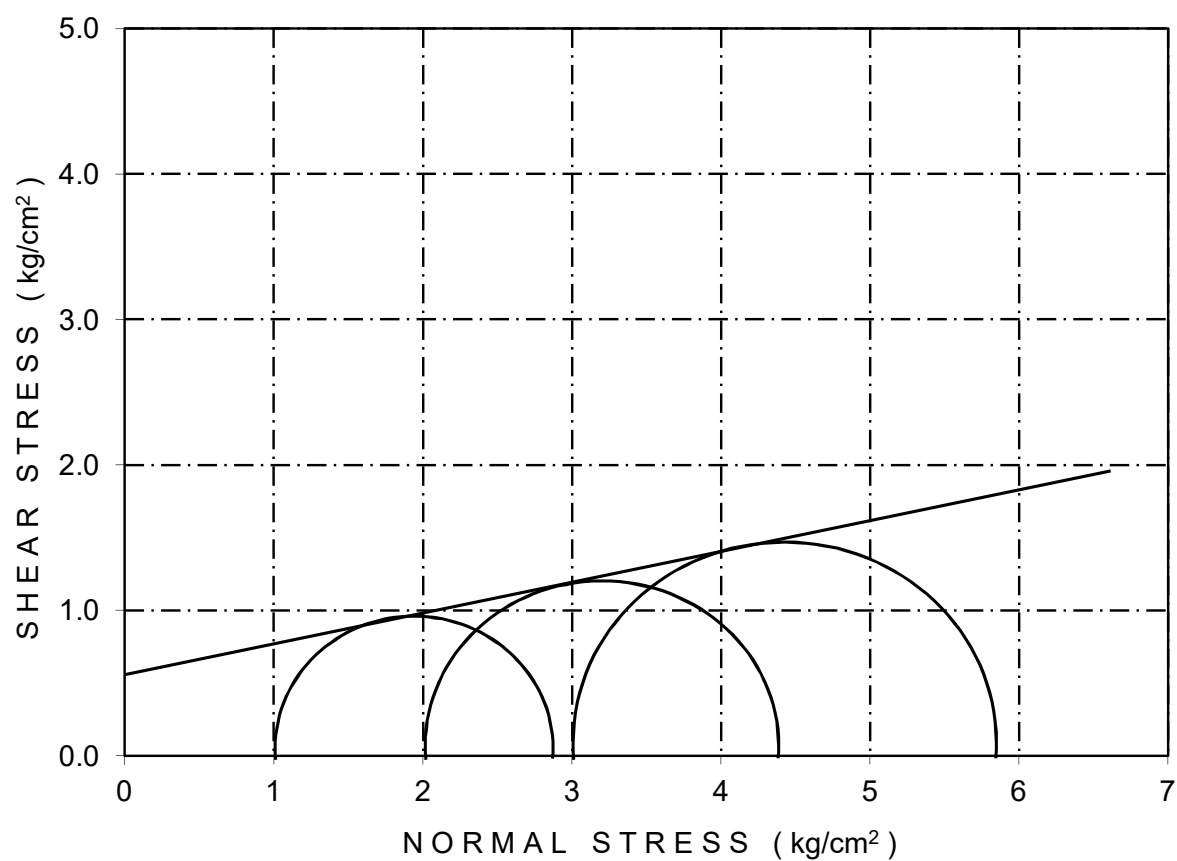


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	:	B5-46
Depth	:	2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.69	1.52	10.9

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	9



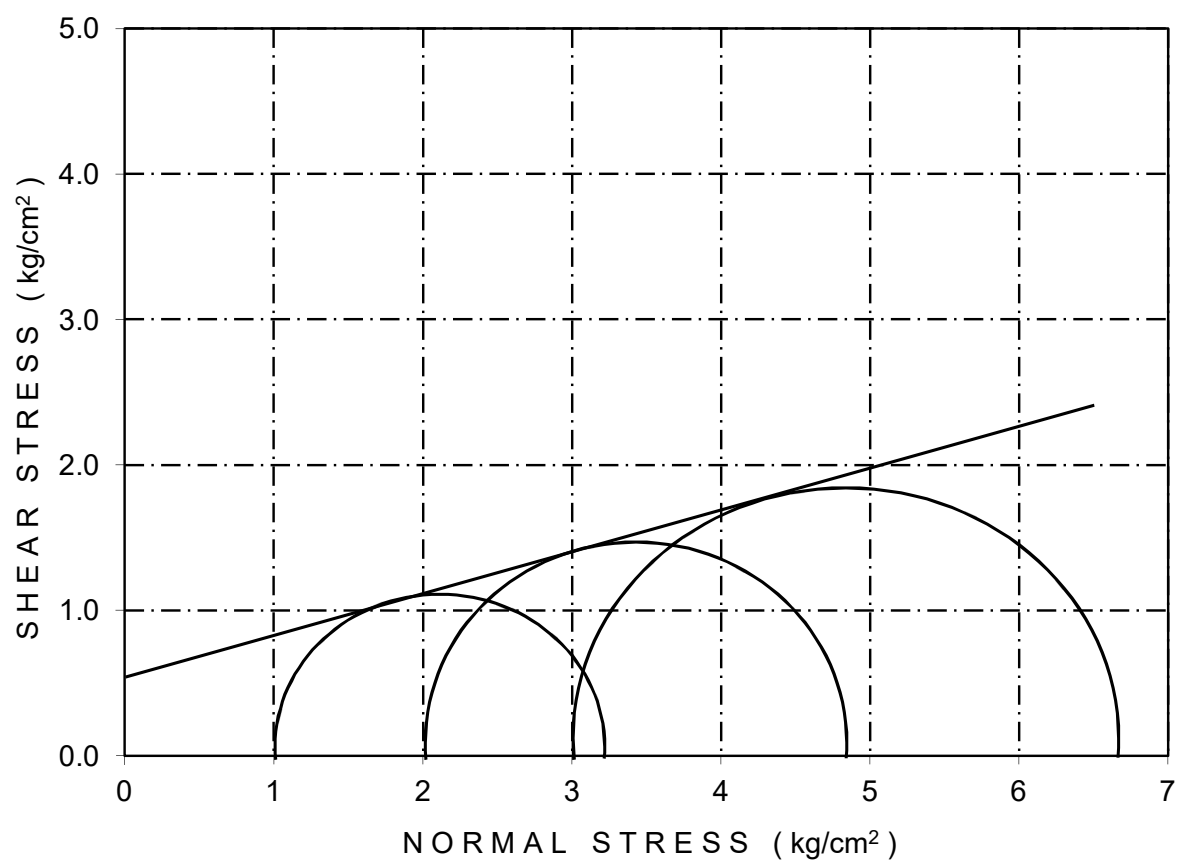


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B5-48
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.69	1.53	10.7

"c" Value kg/cm ²	"φ" Value DEGREE
0.55	13



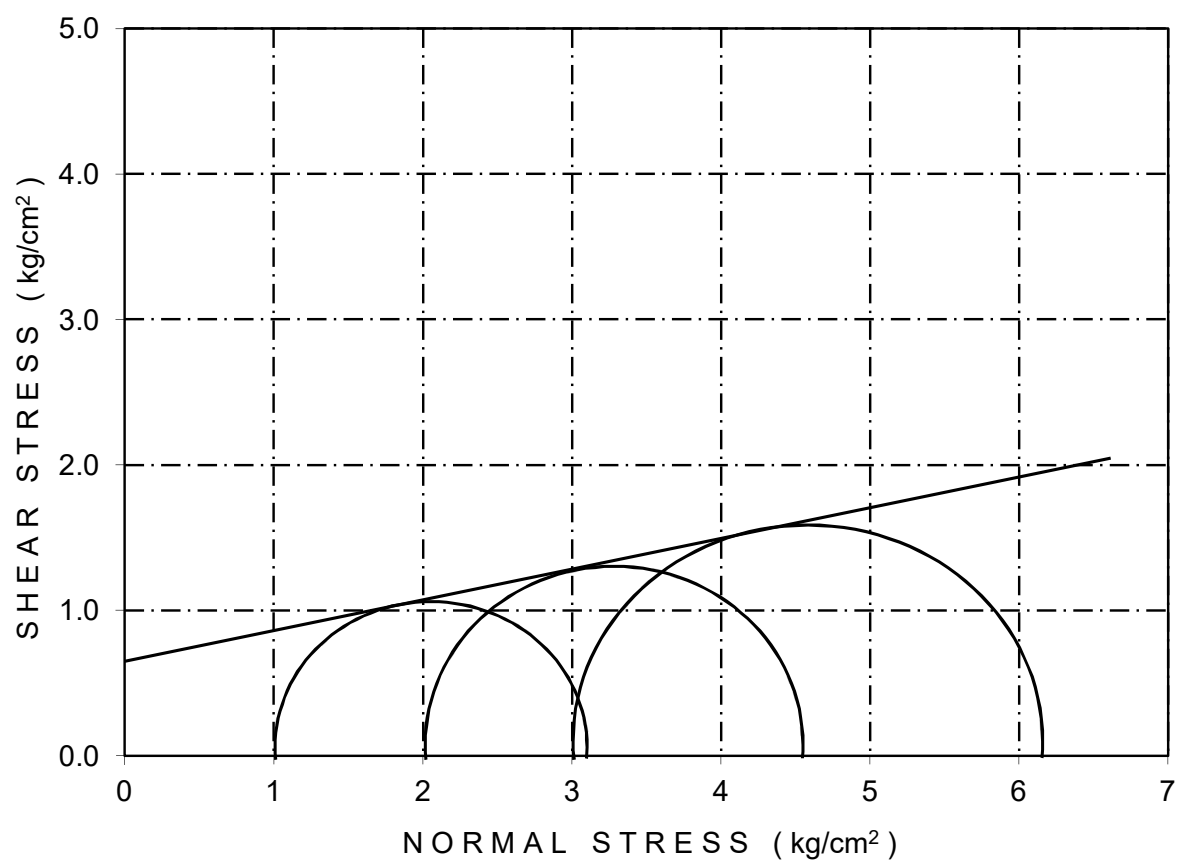


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B10-01
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.73	1.55	11.3

"c" Value kg/cm ²	"φ" Value DEGREE
0.65	9

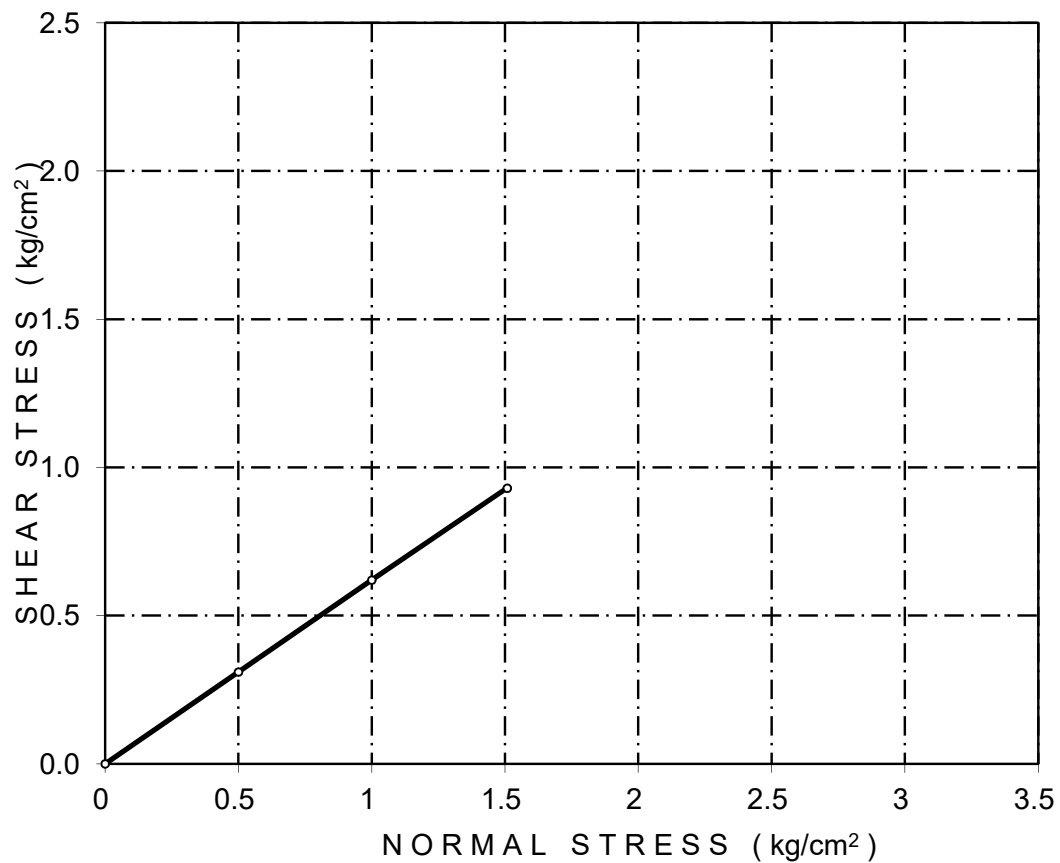




DRAINED DIRECT SHEAR TEST

Borehole No : B10-01
Depth : 8.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.59	0	32

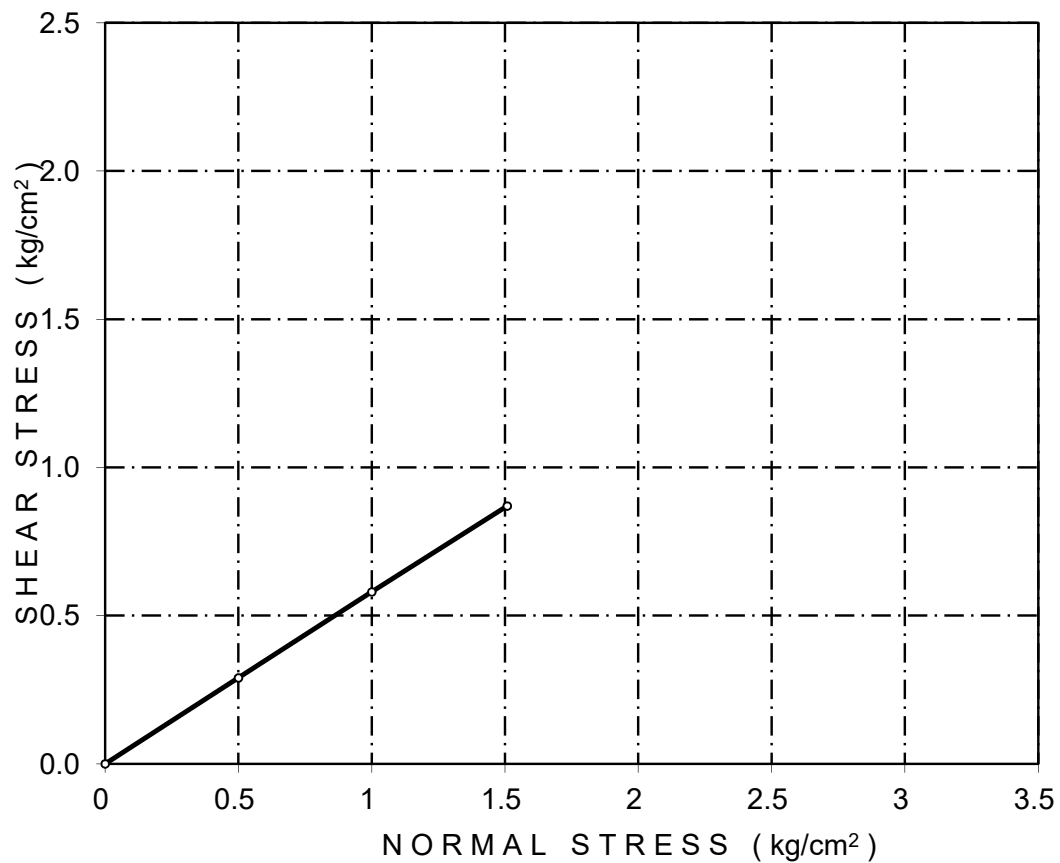




DRAINED DIRECT SHEAR TEST

Borehole No : B15-01
Depth : 2.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.55	0	30

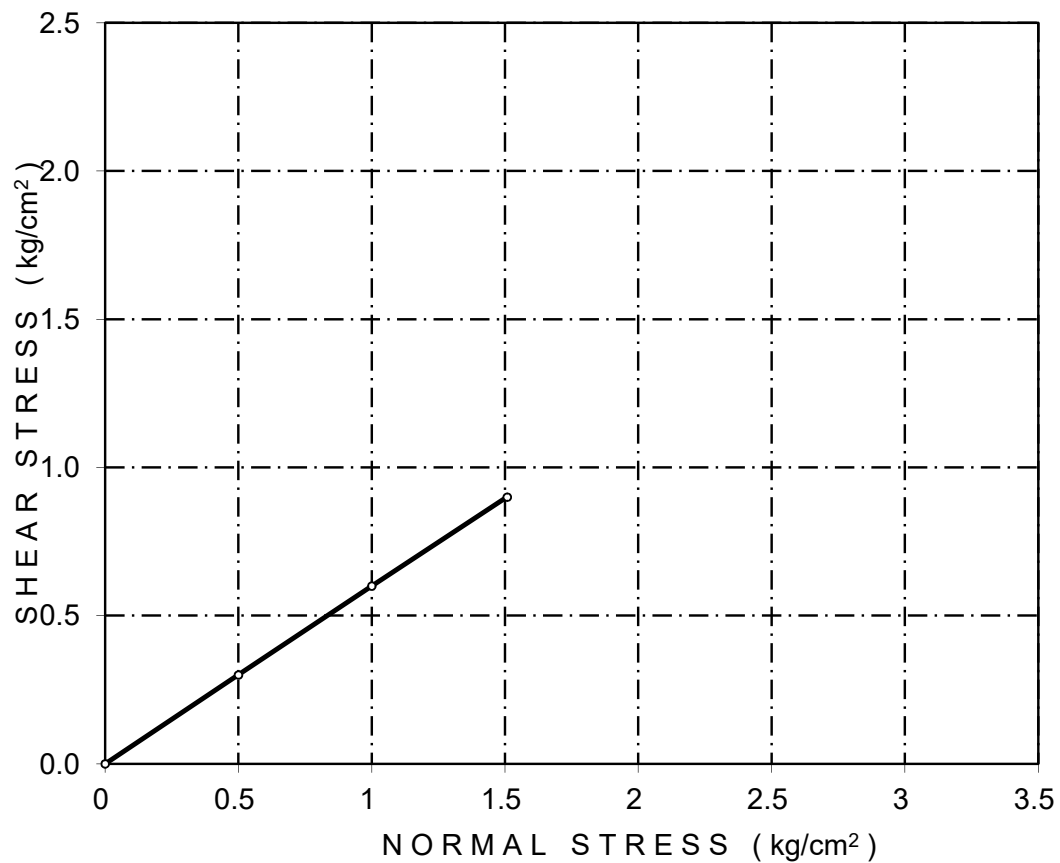




DRAINED DIRECT SHEAR TEST

Borehole No : B15-01
Depth : 5.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.58	0	31

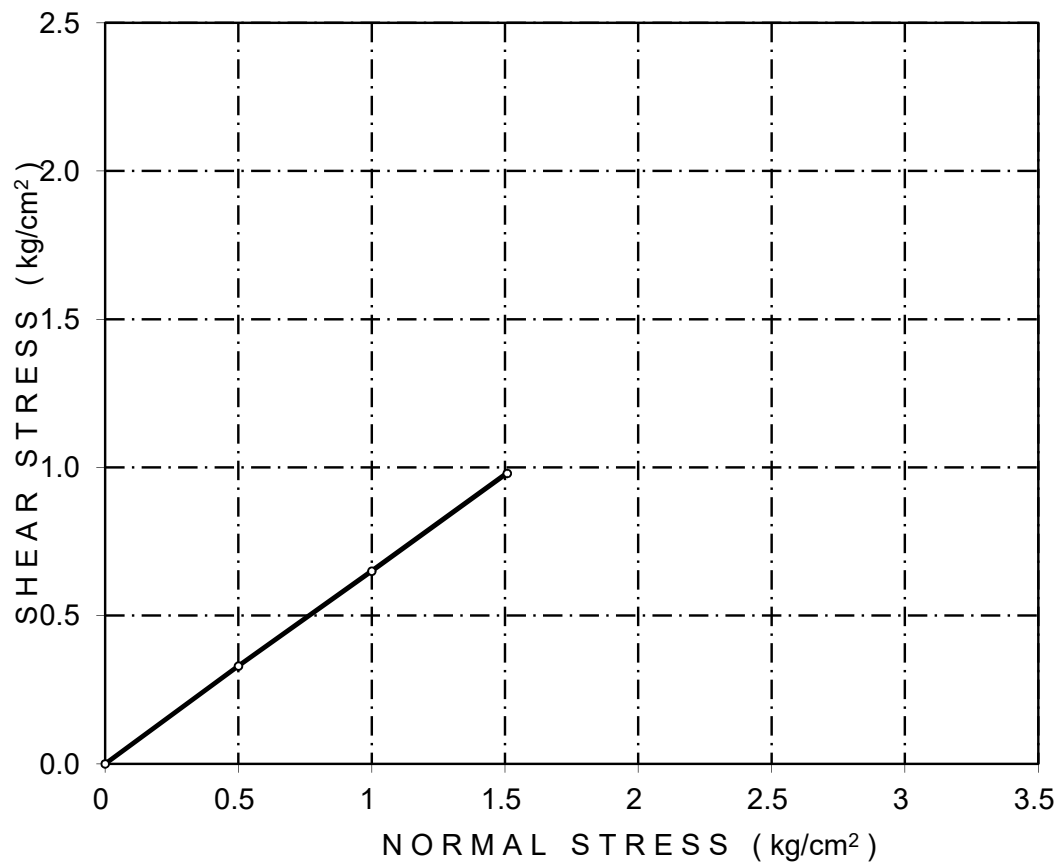




DRAINED DIRECT SHEAR TEST

Borehole No : B15-01
Depth : 11.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.65	0	33

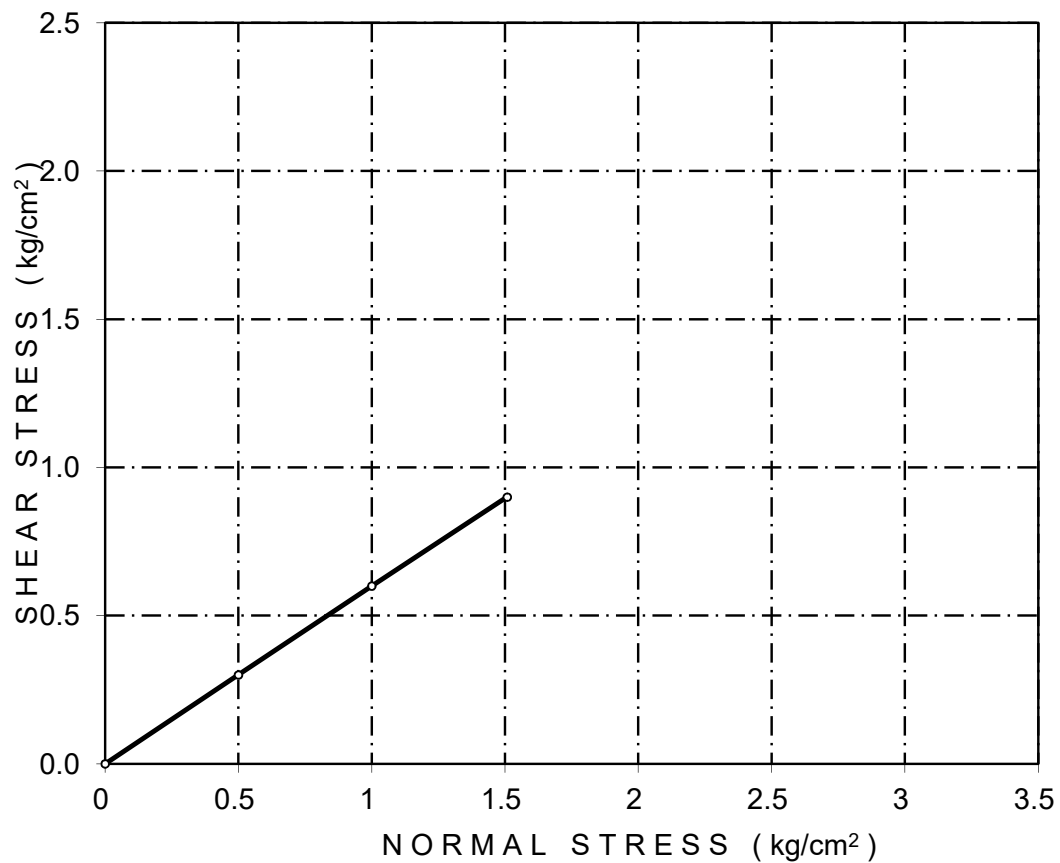




DRAINED DIRECT SHEAR TEST

Borehole No : B15-02
Depth : 5.25m
Type of Test : Drained Direct Shear
Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.56	0	31

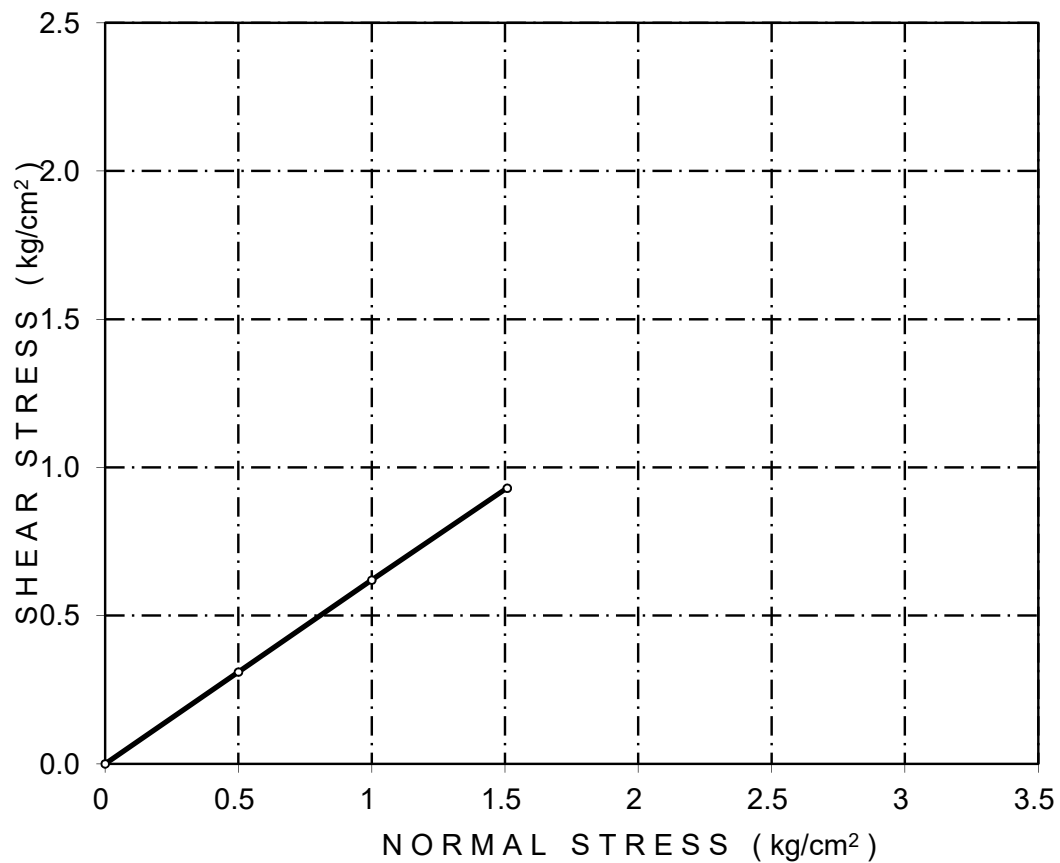




DRAINED DIRECT SHEAR TEST

Borehole No : B15-02
Depth : 8.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.60	0	32

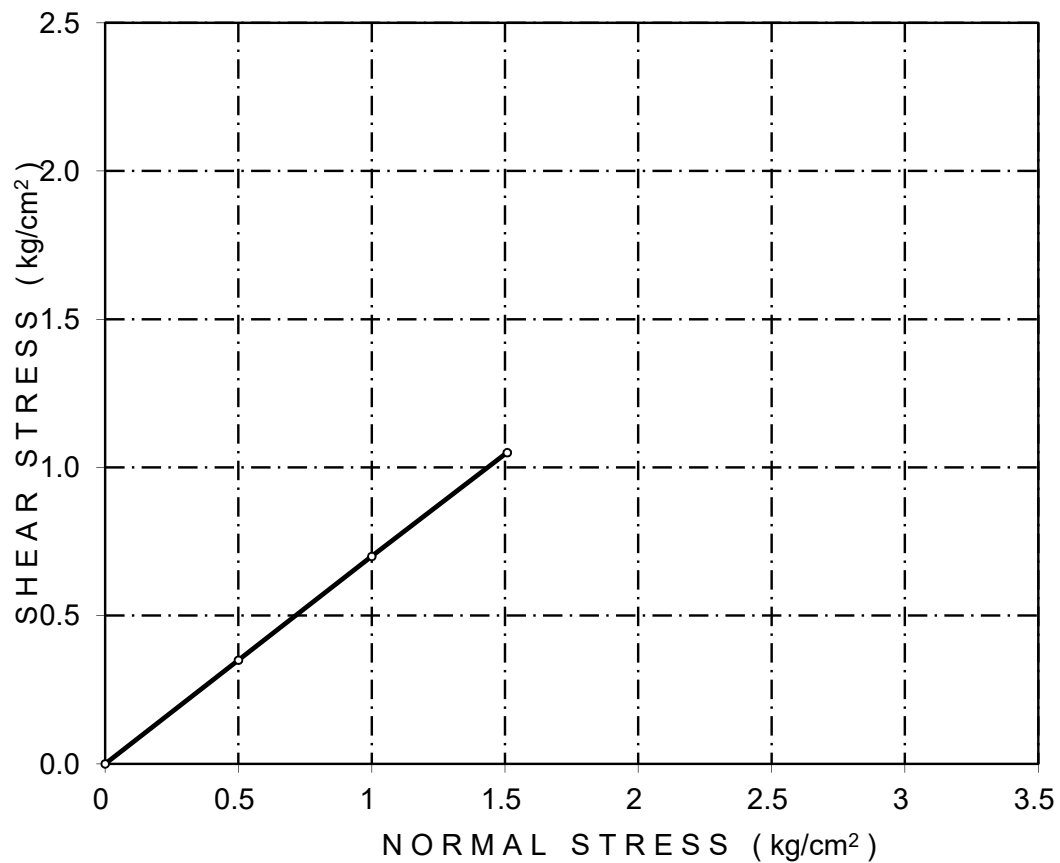




DRAINED DIRECT SHEAR TEST

Borehole No : B15-02
Depth : 14.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.67	0	35

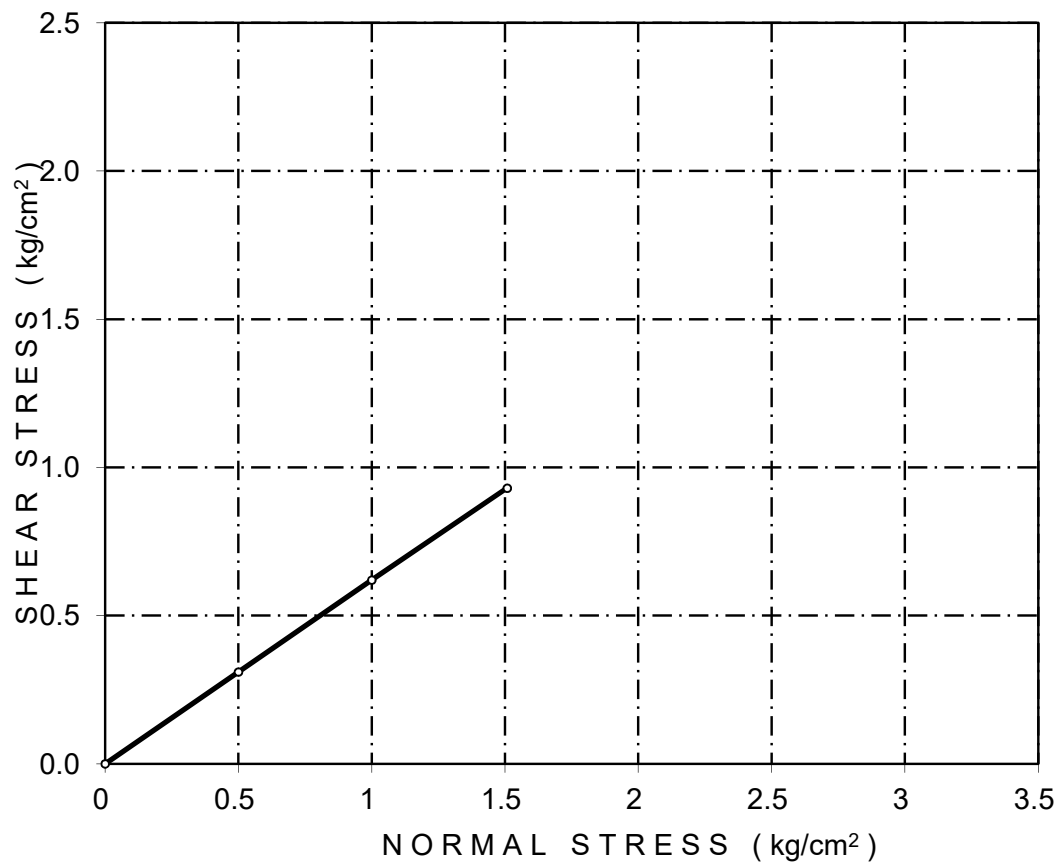




DRAINED DIRECT SHEAR TEST

Borehole No : B15-03
Depth : 5.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.55	0	32

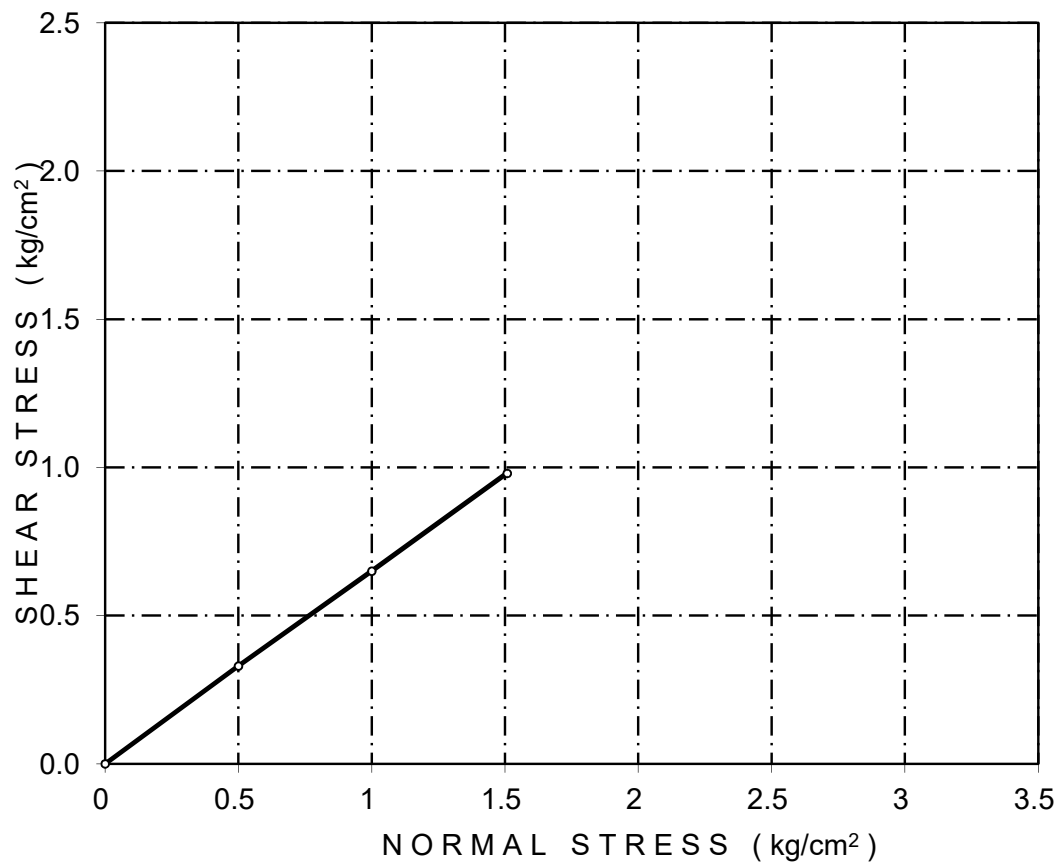




DRAINED DIRECT SHEAR TEST

Borehole No : B15-03
Depth : 8.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.61	0	33

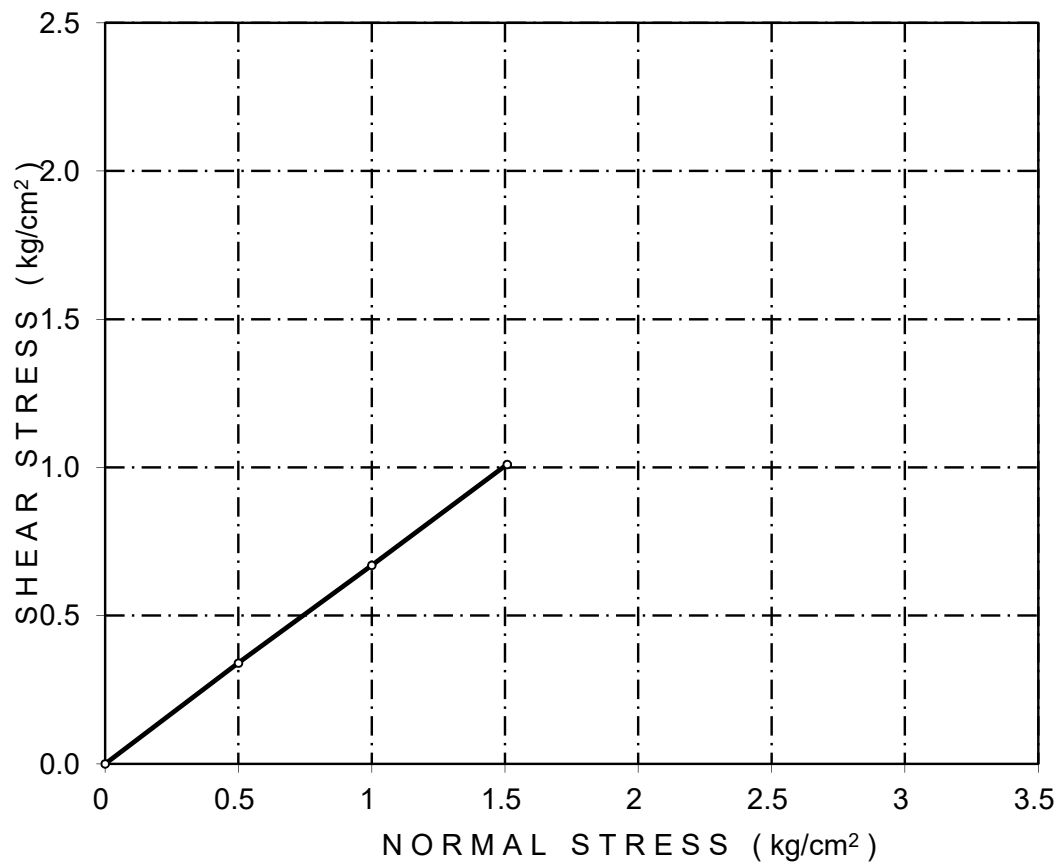




DRAINED DIRECT SHEAR TEST

Borehole No : B15-03
Depth : 11.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.64	0	34



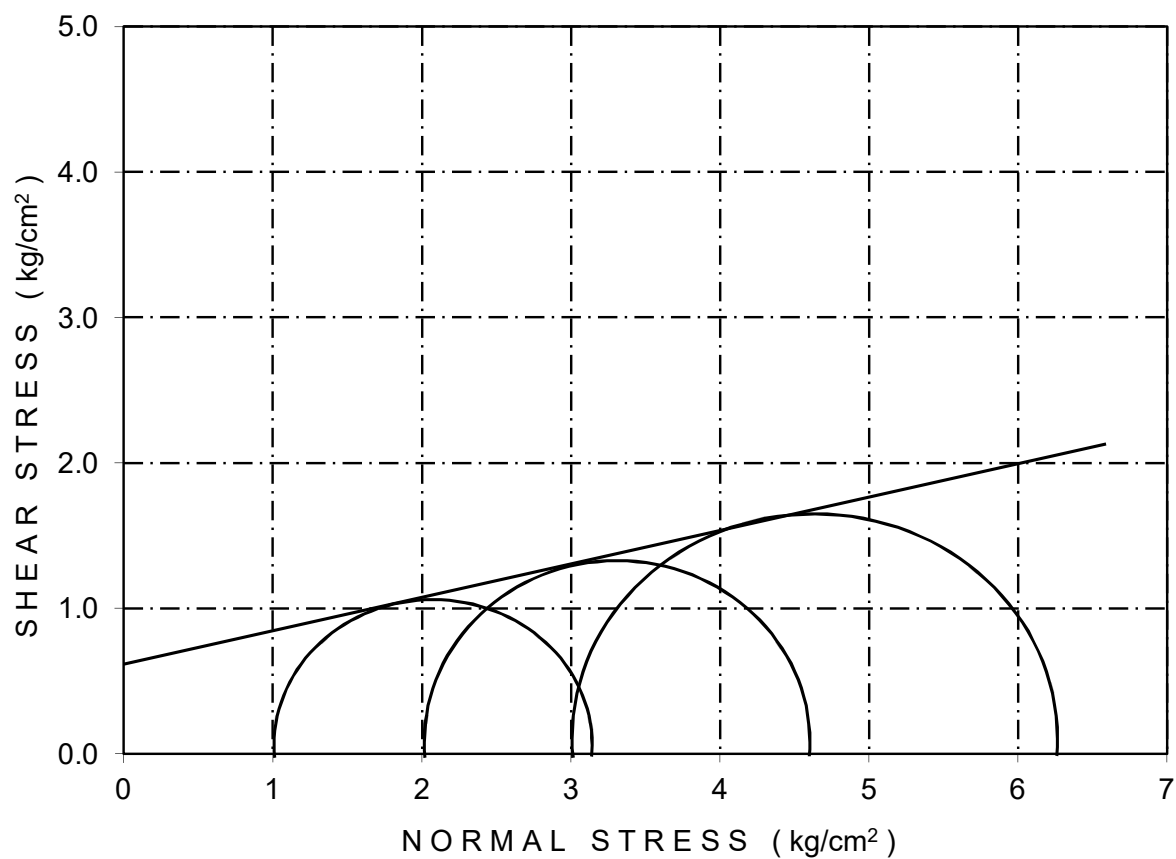


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B30-01
Depth	: 2.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.70	1.54	10.6

"c" Value kg/cm ²	"φ" Value DEGREE
0.60	10

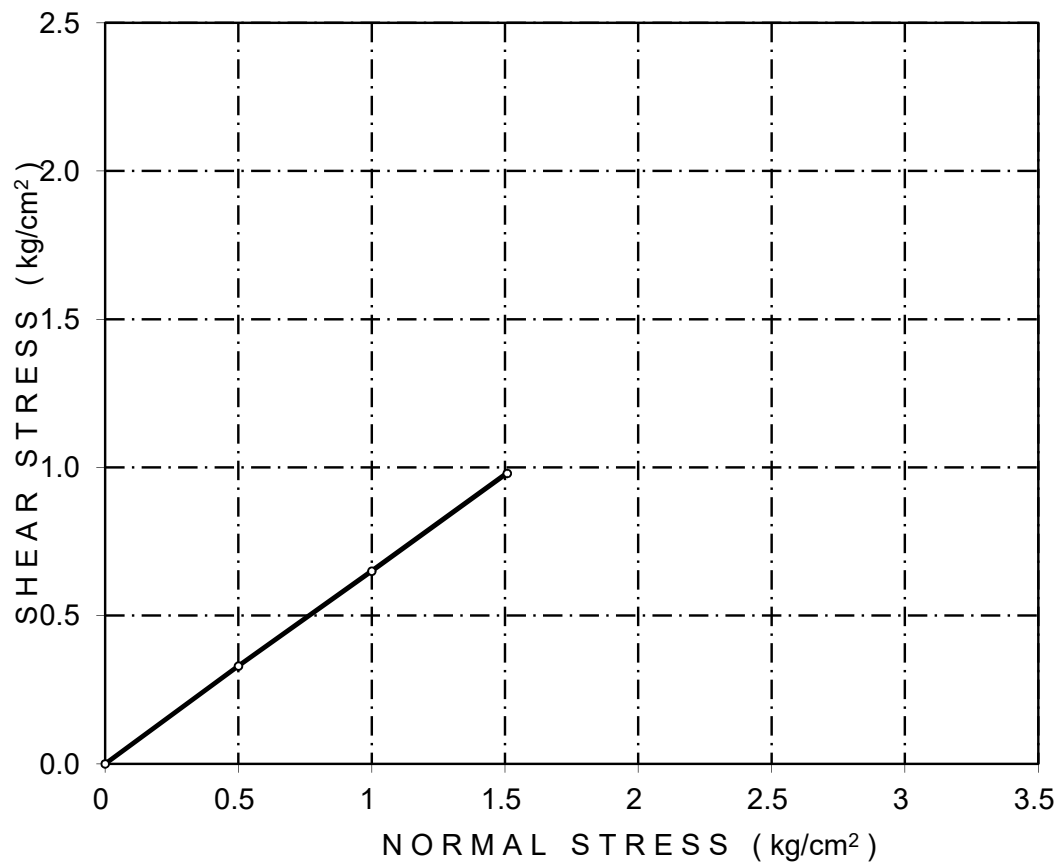




DRAINED DIRECT SHEAR TEST

Borehole No : B30-01
Depth : 8.25m
Type of Test : Drained Direct Shear Test

Dry Density gm/cc	"c" Value kg/cm ²	"φ" Value DEGREE
1.61	0	33



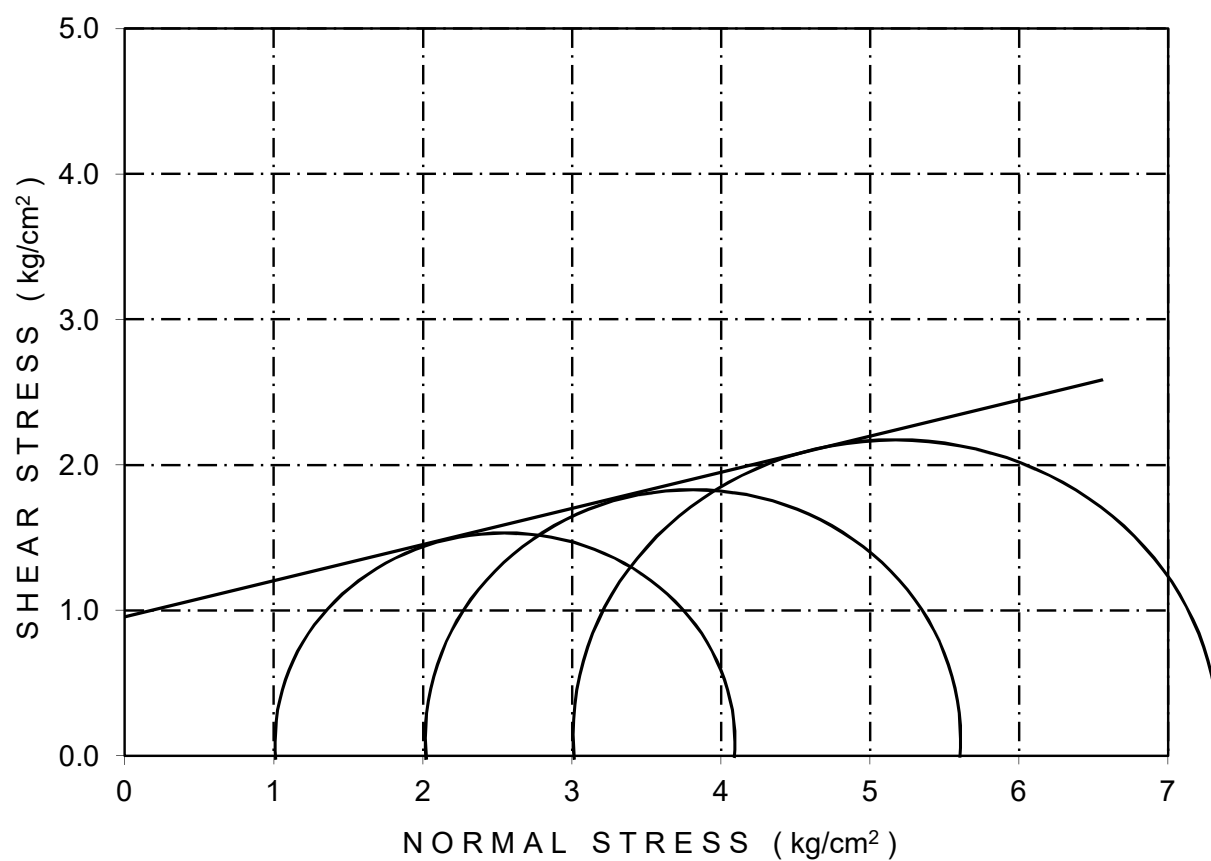


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B30-01
Depth	: 11.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.89	1.62	16.8

"c" Value kg/cm ²	"φ" Value DEGREE
0.95	11



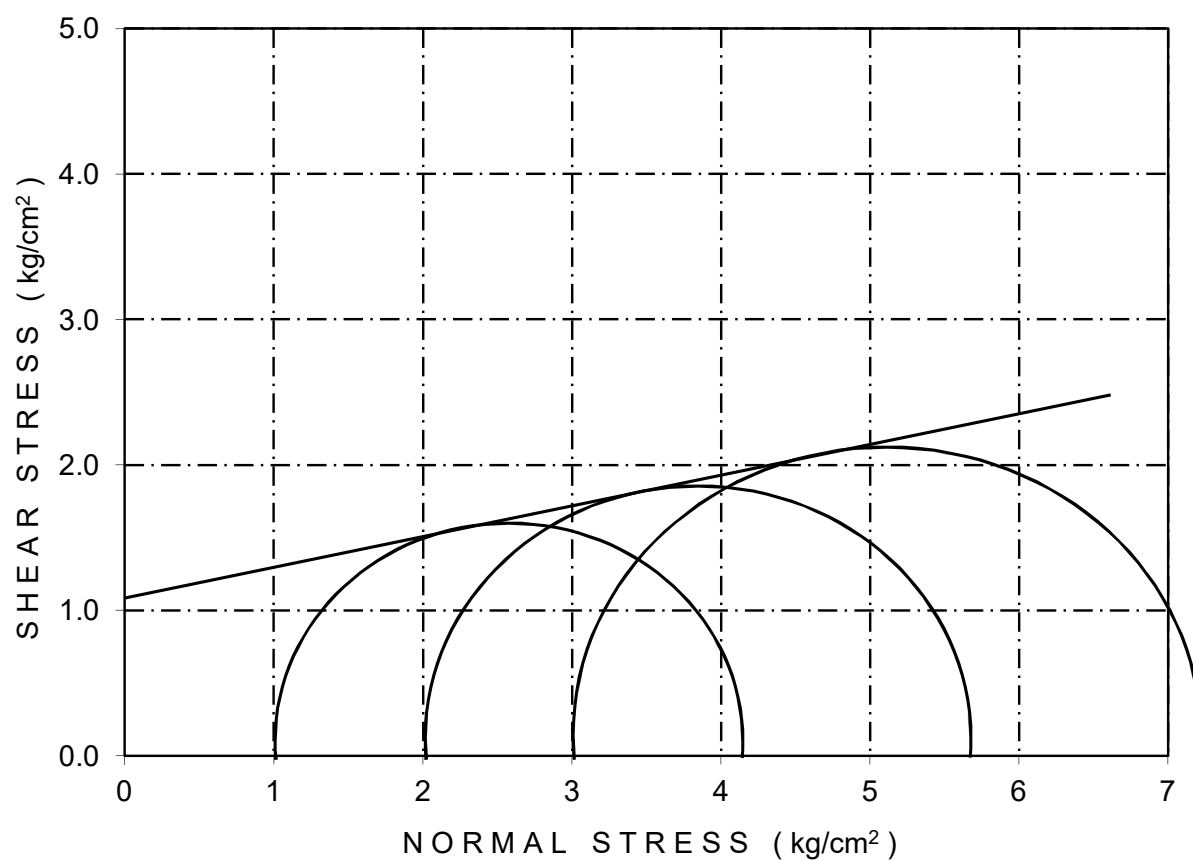


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B30-01
Depth	: 20.25m

BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
1.96	1.65	18.9

"c" Value kg/cm ²	"φ" Value DEGREE
1.10	9



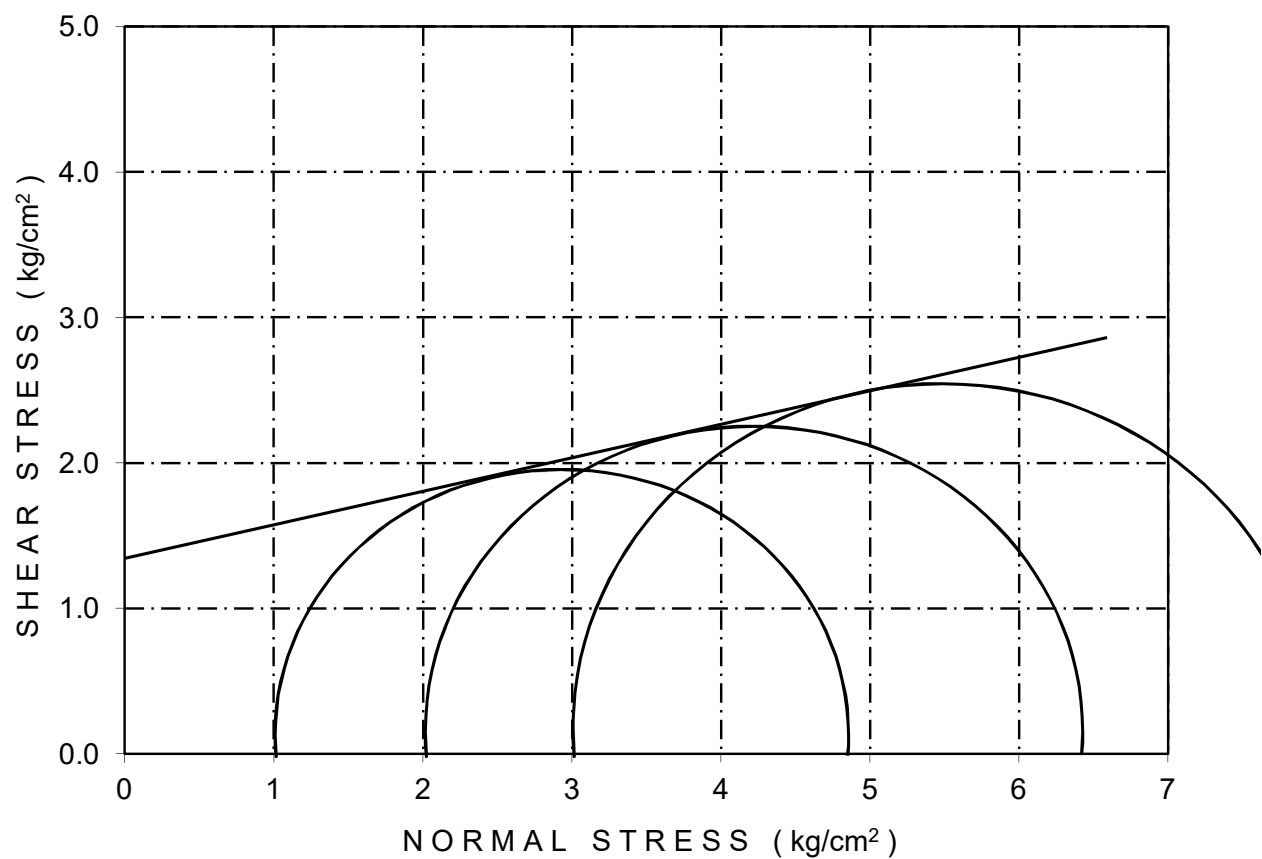


UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

Borehole No	: B30-01
Depth	: 26.25m

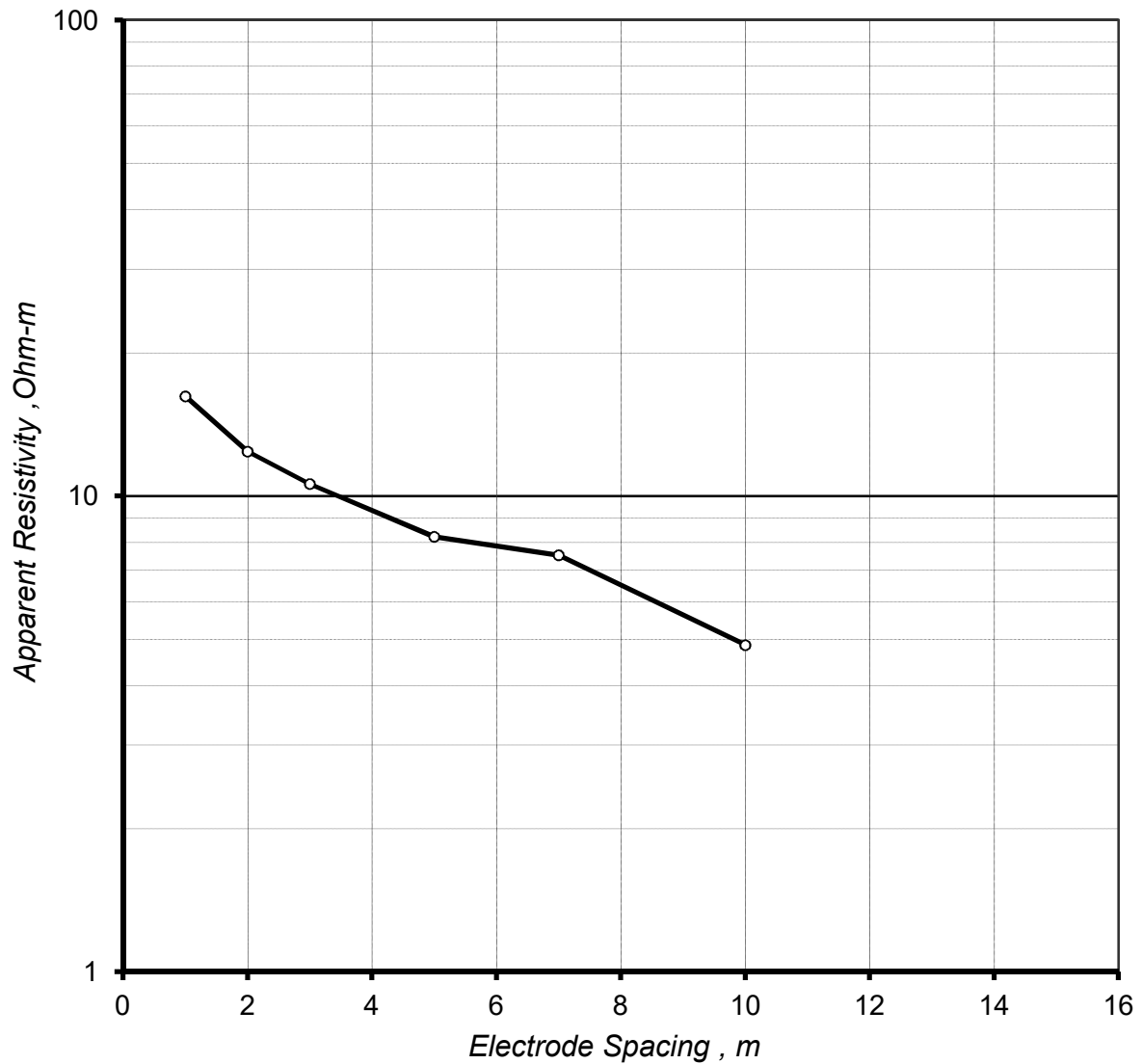
BULK DENSITY gm/cc	DRY DENSITY gm/cc	MOISTURE CONTENT %
2.02	1.68	20.4

"c" Value kg/cm ²	" ϕ " Value DEGREE
1.35	10





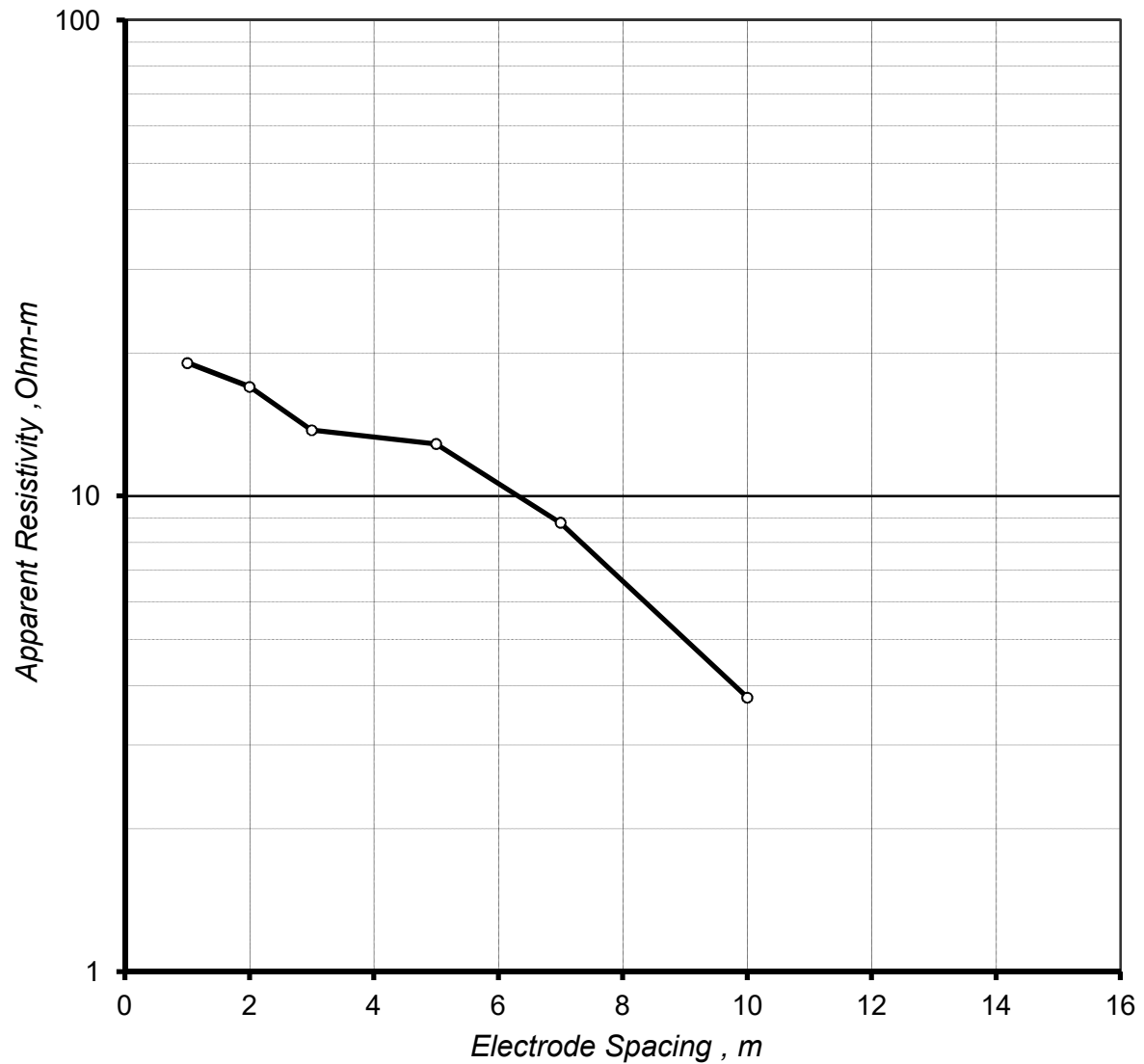
ELECTRICAL RESISTIVITY TEST NO - 1



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	16.2
2.0	12.4
3.0	10.6
5.0	8.2
7.0	7.5
10.0	4.9



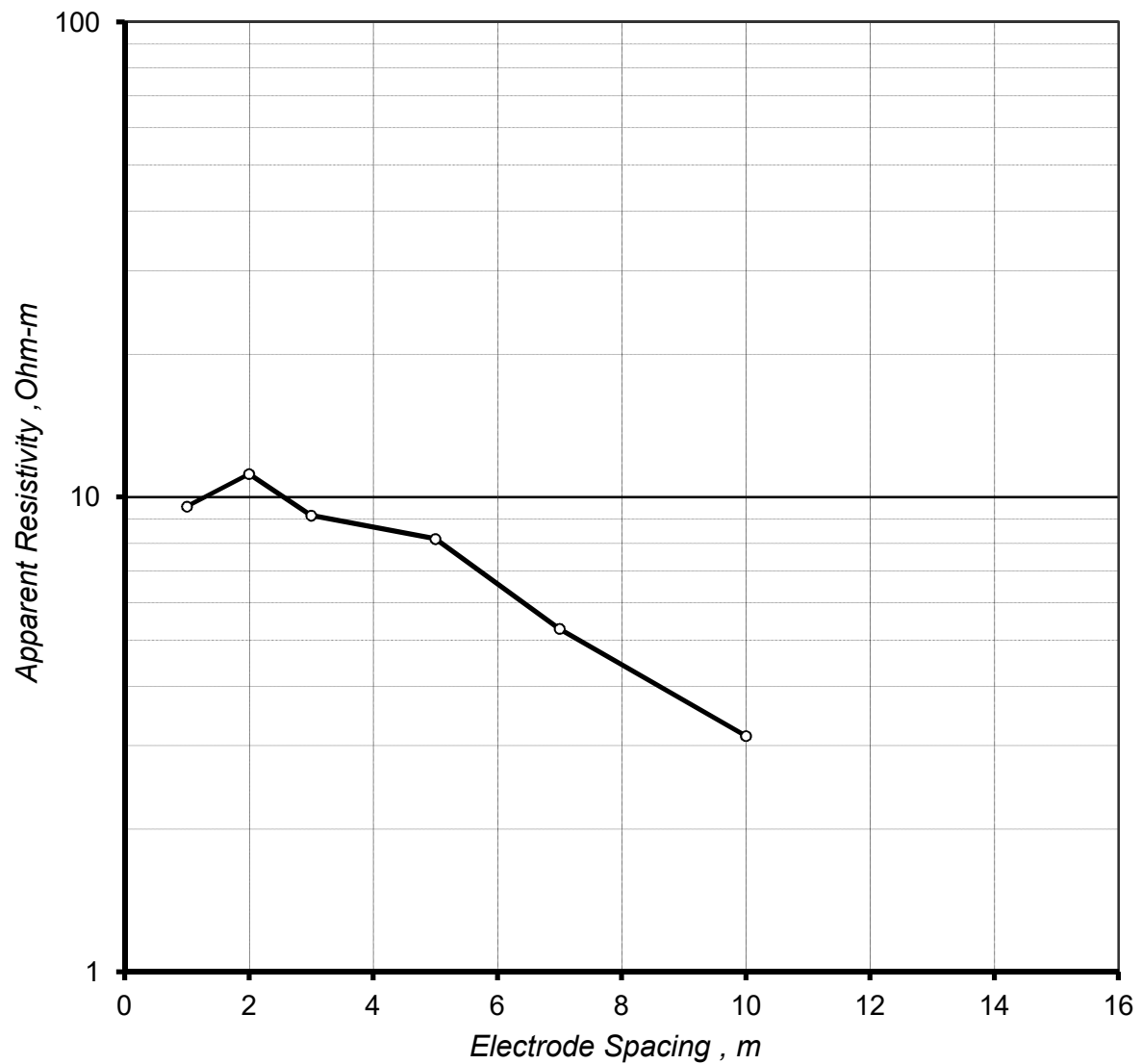
ELECTRICAL RESISTIVITY TEST NO - 2



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	19.0
2.0	17.0
3.0	13.8
5.0	12.9
7.0	8.8
10.0	3.8



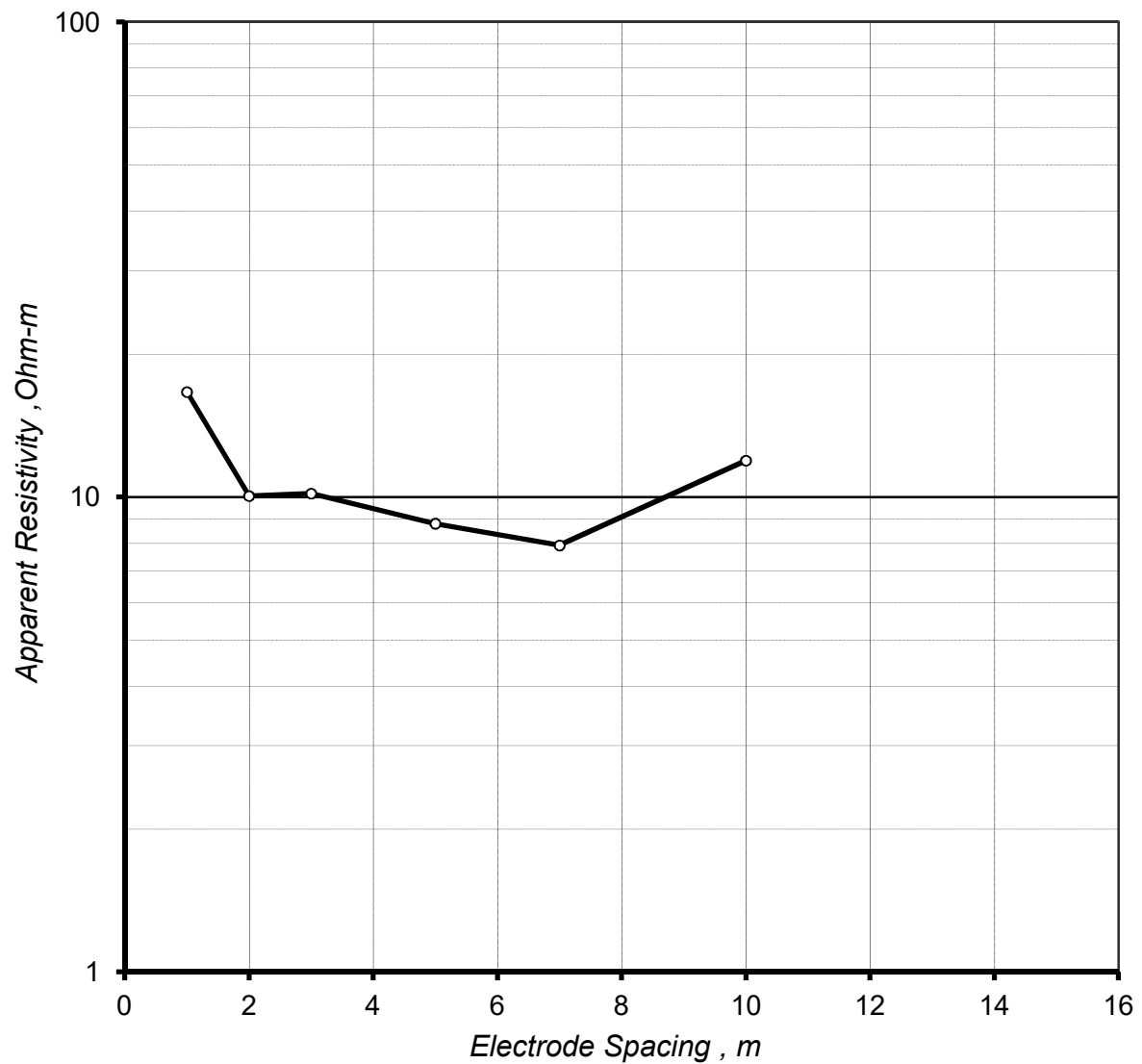
ELECTRICAL RESISTIVITY TEST NO - 3



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	9.6
2.0	11.2
3.0	9.1
5.0	8.2
7.0	5.3
10.0	3.1



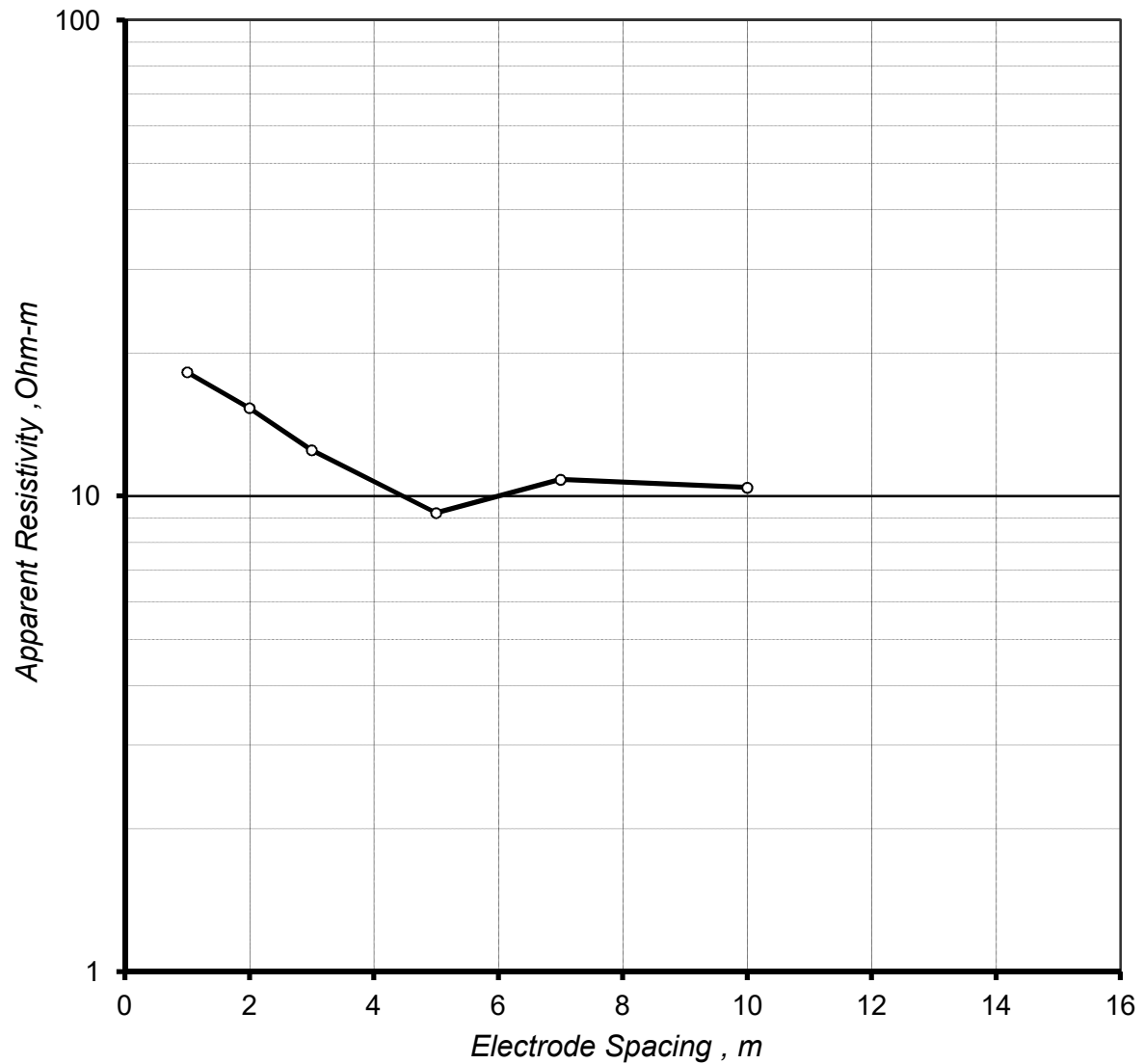
ELECTRICAL RESISTIVITY TEST NO - 4



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	16.6
2.0	10.1
3.0	10.2
5.0	8.8
7.0	7.9
10.0	11.9



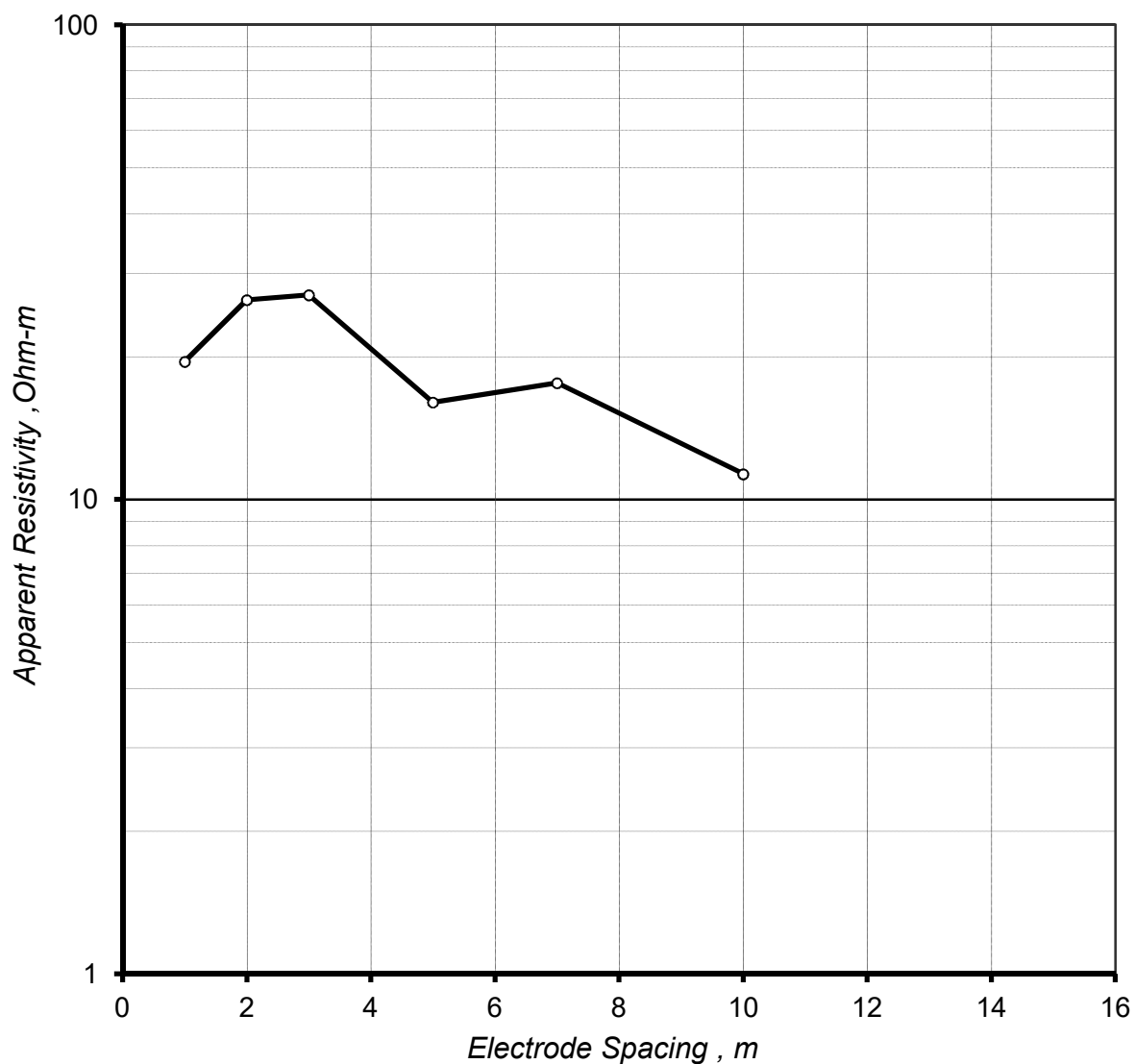
ELECTRICAL RESISTIVITY TEST NO - 5



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	18.2
2.0	15.3
3.0	12.5
5.0	9.2
7.0	10.8
10.0	10.4



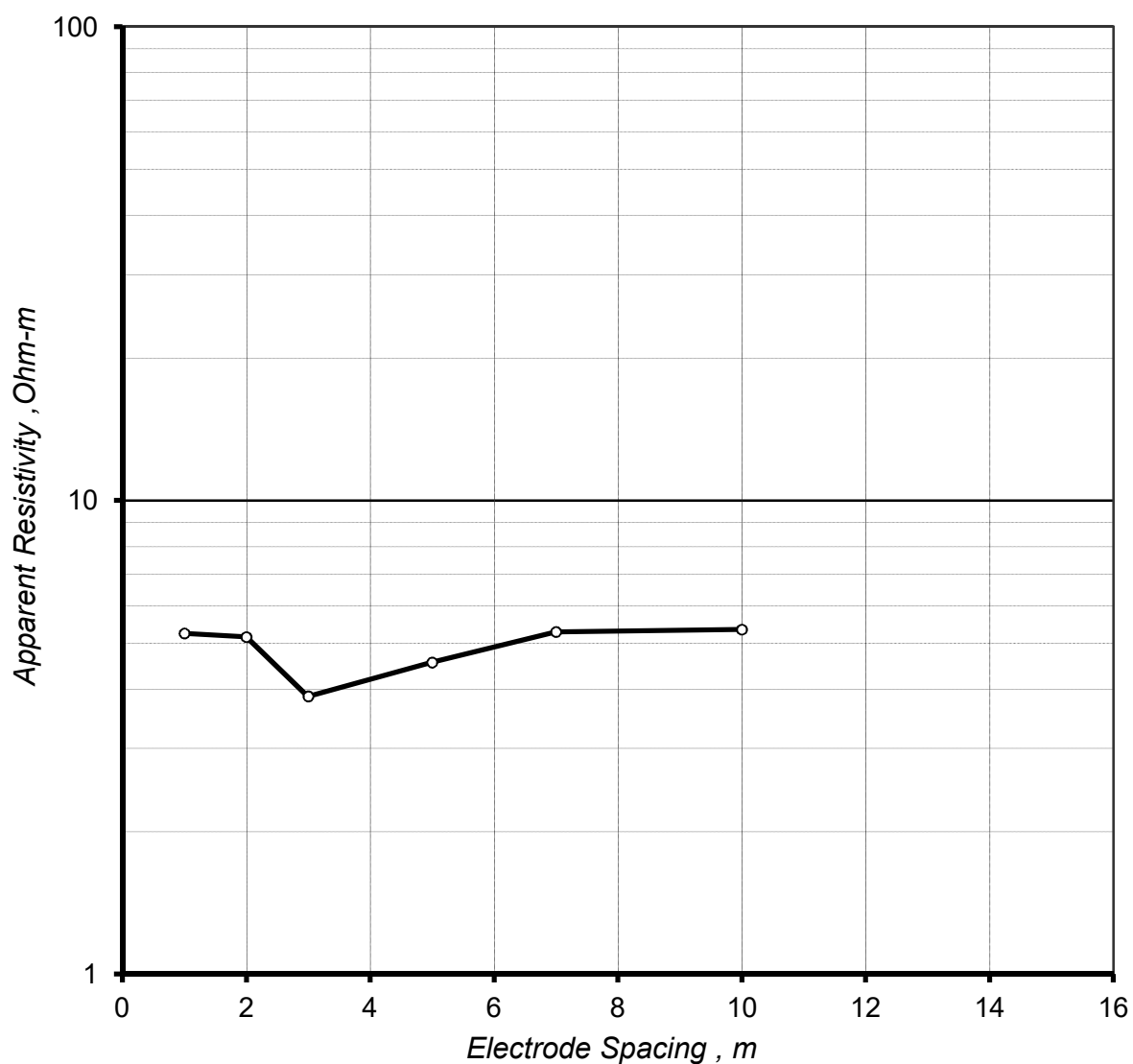
ELECTRICAL RESISTIVITY TEST NO - 6



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	19.5
2.0	26.3
3.0	26.9
5.0	16.0
7.0	17.6
10.0	11.3



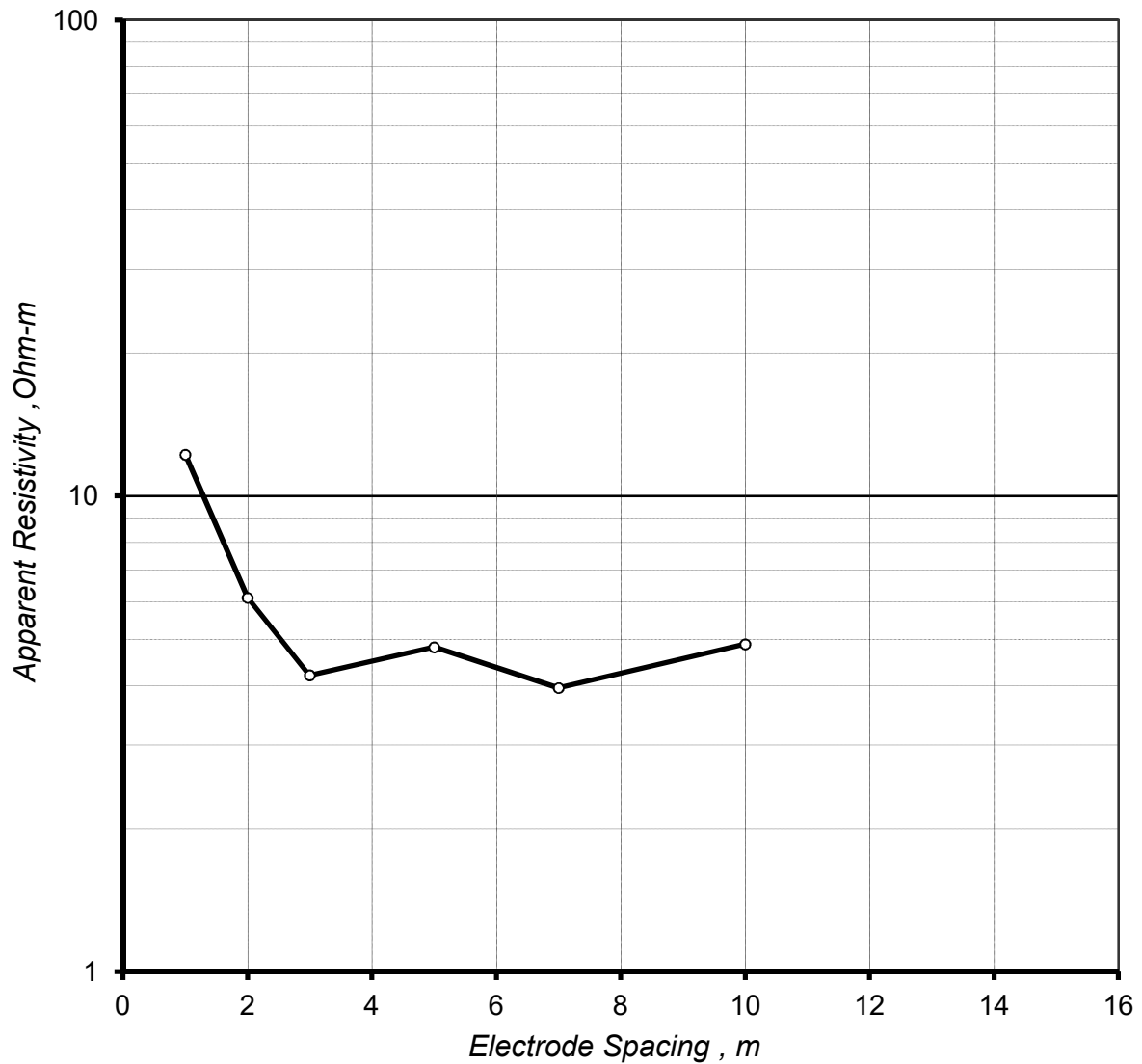
ELECTRICAL RESISTIVITY TEST NO - 7



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	5.2
2.0	5.2
3.0	3.9
5.0	4.6
7.0	5.3
10.0	5.3



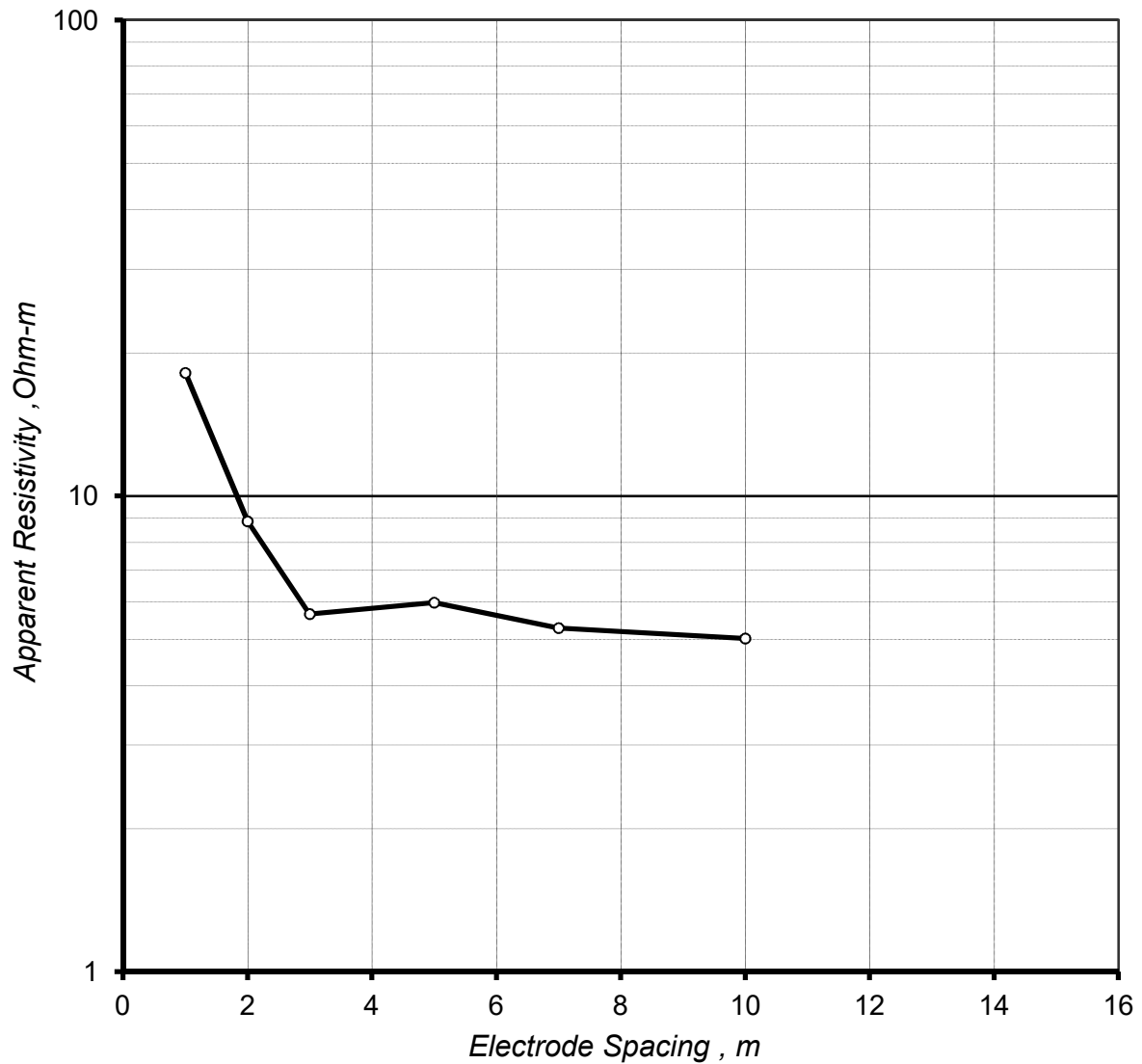
ELECTRICAL RESISTIVITY TEST NO - 8



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	12.2
2.0	6.1
3.0	4.2
5.0	4.8
7.0	4.0
10.0	4.9



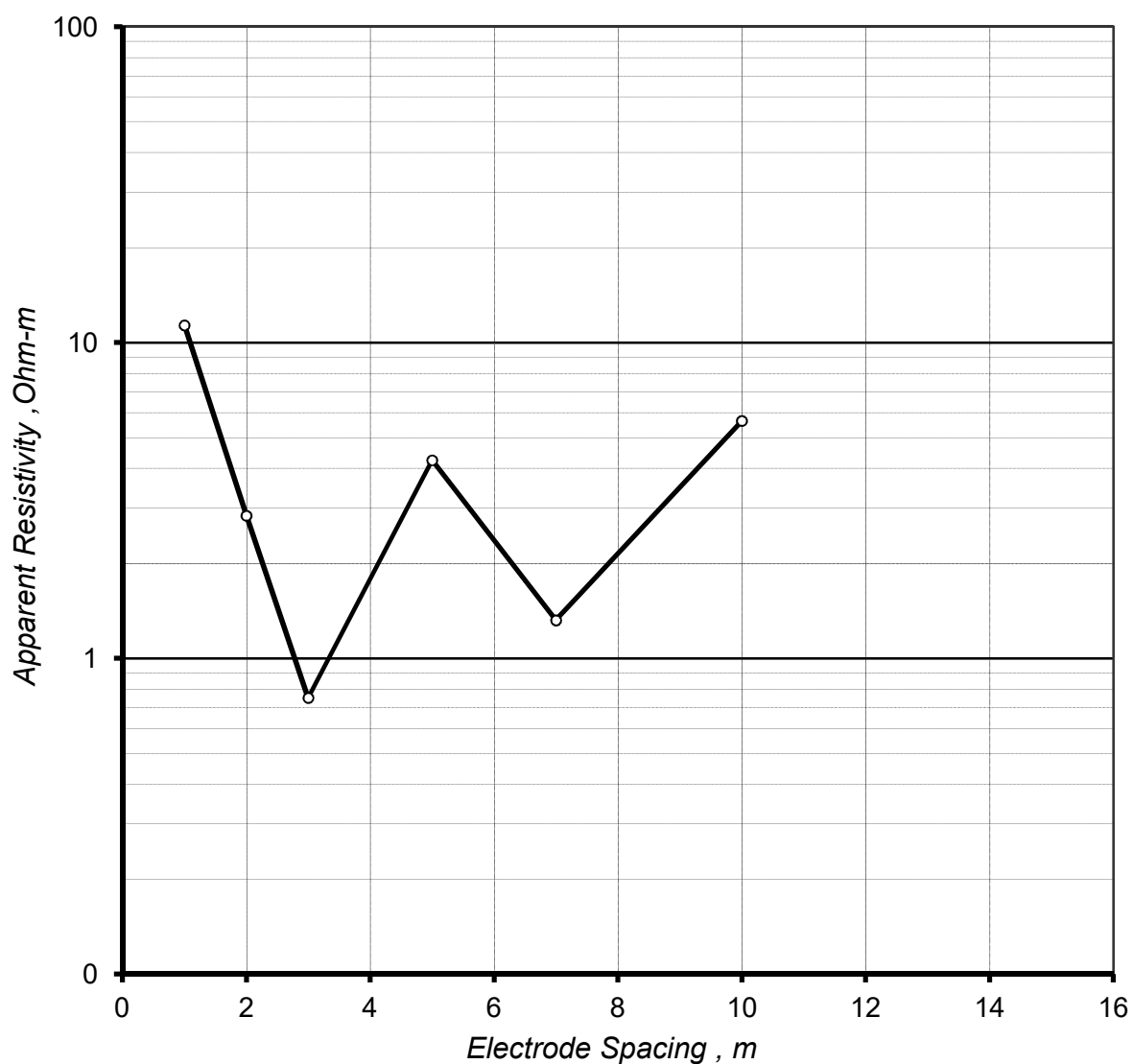
ELECTRICAL RESISTIVITY TEST NO - 9



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	18.2
2.0	8.9
3.0	5.7
5.0	6.0
7.0	5.3
10.0	5.0



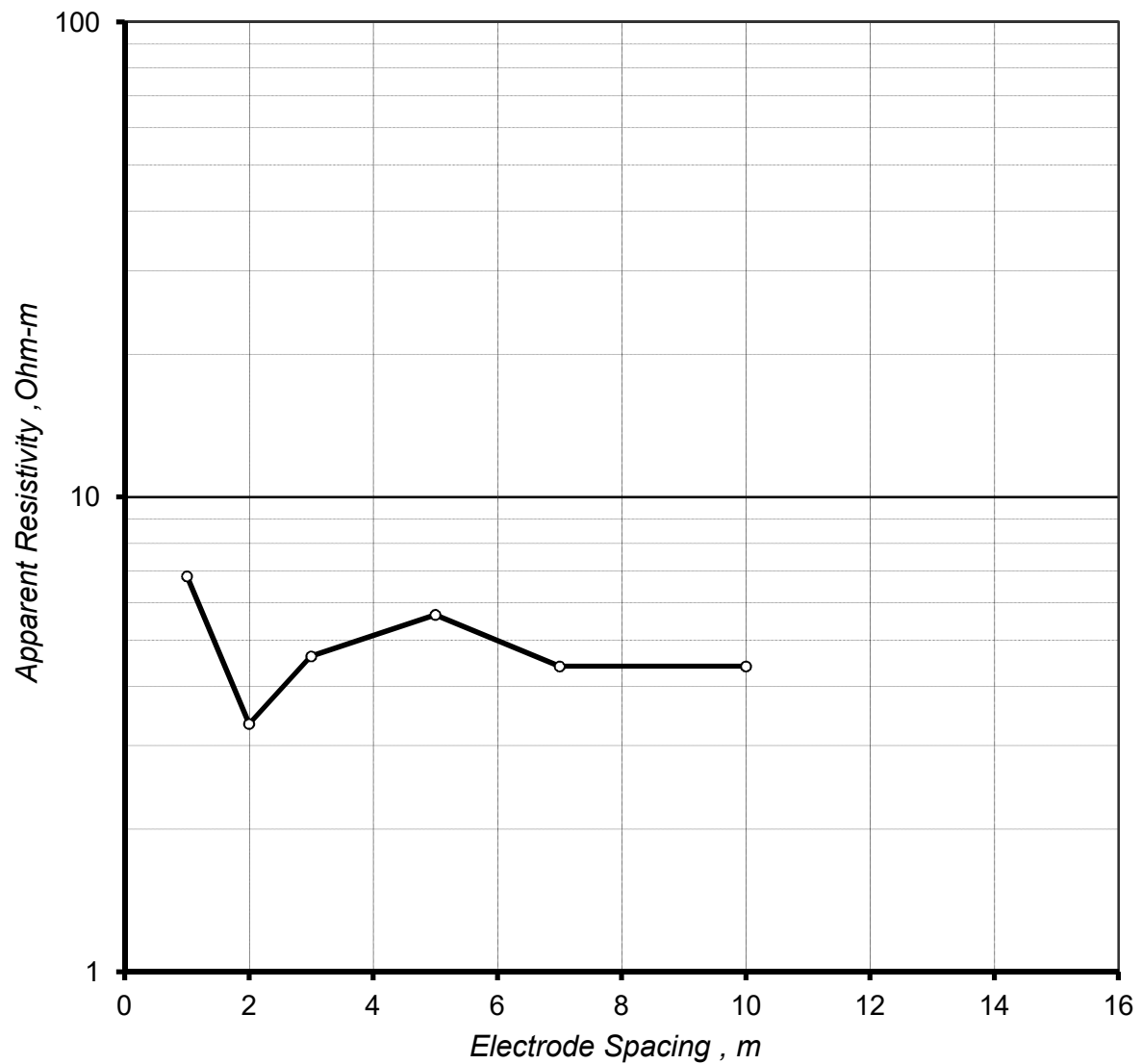
ELECTRICAL RESISTIVITY TEST NO - 10



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	11.3
2.0	2.8
3.0	0.8
5.0	4.2
7.0	1.3
10.0	5.7



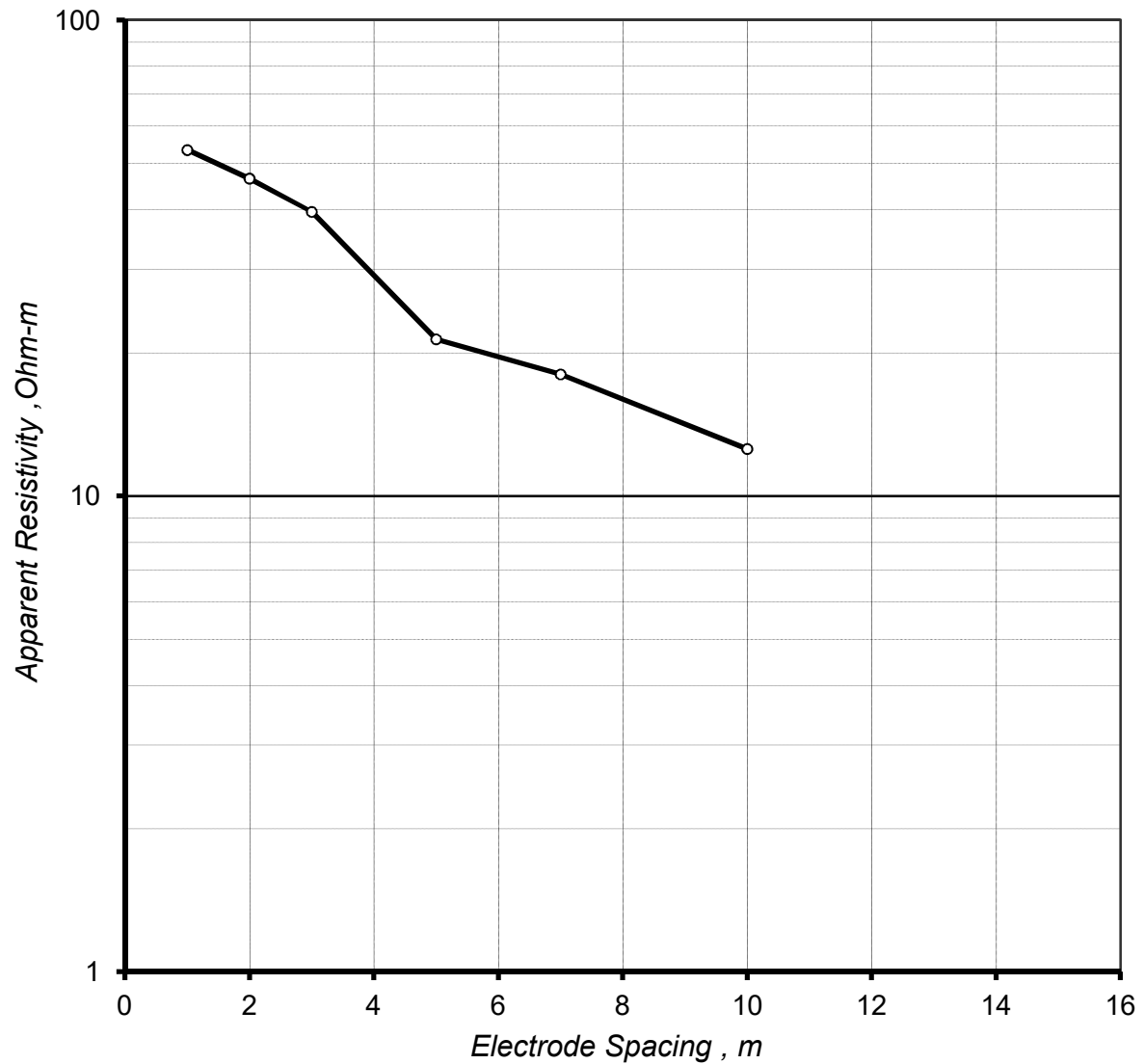
ELECTRICAL RESISTIVITY TEST NO - 11



Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	6.8
2.0	3.3
3.0	4.6
5.0	5.7
7.0	4.4
10.0	4.4



ELECTRICAL RESISTIVITY TEST NO - 12




Electode Spacing,m	Apparent Resistivity, Ohm-m
1.0	53.4
2.0	46.5
3.0	39.6
5.0	21.4
7.0	18.0
10.0	12.6

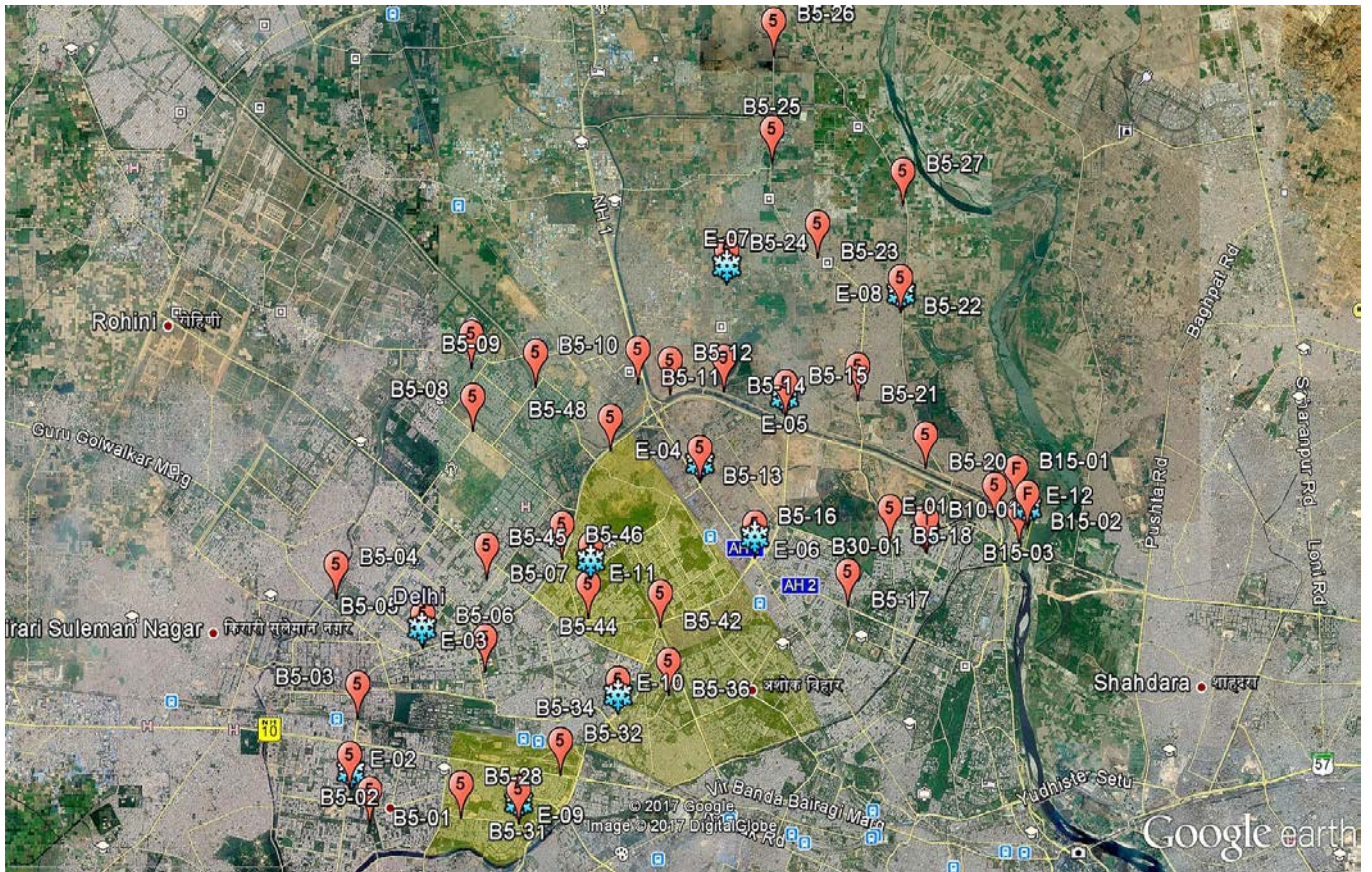
**CHEMICAL TEST RESULTS****SOIL**

Borehole No.	Depth, (m)	Sulphate Content ,% (SO ₃)	Chloride Content ,%	pH Value
B5-4	2.25	0.13	0.04	8.0
B5-12	3.00	0.11	0.02	8.2
B5-18	4.50	0.13	0.03	8.1
B5-24	1.50	0.14	0.04	8.0
B5-36	2.25	0.13	0.02	8.2
B15-02	5.25	0.14	0.04	8.2

WATER

Borehole No.	Sulphate Content mg/l (SO ₃)	Chloride Content, mg/l	pH Value
B5-07	335	260	7.8
B5-12	290	240	7.7
B5-14	320	320	7.9
B15-01	348	305	8.0

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DETAILS OF LONGITUDE, LATITUDE. & LOCATIONS OF THE BOREHOLES & ERTs

BH. No./ERT No.	Location	Longitude	Latitude
B5-01	Inside of Park near Reserve Bank Enclave	77.0977	28.6659
B5-02	Jwala Hari Mod at Outer Ring Road	77.0936	28.6718
B5-03	Mongolpuri Indust. Area Near Railway Track	77.0953	28.6836
B5-04	Avankita Near DJB Office	77.0909	28.7037
B5-05	Outer Ring Road Near Navjeeewan Hospital	77.1086	28.6954
B5-06	Saraswati Vihar Water Tank	77.1212	28.6914
B5-07	Inside of Park Rohini Sector 7C	77.1216	28.7068
B5-08	Open Ground Rohini Sector 10	77.1187	28.7319
B5-09	Inside of Park Rohini Sector 17	77.1184	28.7424
B5-10	Rohini Sector 16 Near Yamuna Canal	77.1316	28.7392
B5-11	Inside of DJB UGR at Sanjay Gandhi Transport Nagar	77.1524	28.7398
B5-12	Pushta Road Near Rajlv Nagar	77.159	28.738
B5-13	BHP petrol pump near Jhangirpuri Metro	77.1651	28.7232
B5-14	Pushta Road Near Bhalswa Lake	77.17	28.7384
B5-15	Maharana Pratap Park Mukundpur	77.1825	28.7342
B5-16	Azadpur Chowke	77.1763	28.7105
B5-17	DDA Land Near Model Town Metro Station	77.1952	28.7024
B5-18	Bhai Parmanand Marg, Near Delhi Nagar Nigam Office	77.2039	28.7131
B5-19	Along the Outer Ring Road, Wazirabad Village	77.2253	28.7169
B5-20	Jharoda Majra, Jharoda, Burari Road	77.2111	28.7255
B5-21	Shanti Swaroop Tyagi Marg, Near Police Station Burari,	77.1973	28.737
B5-22	Block A, Upakar Colony, Burari,	77.206	28.7517
B5-23	Nathupura Road, Near Shiv Mandir	77.1891	28.7608
B5-24	Burari Rd, Krishna Nagar	77.1705	28.7564
B5-25	Delhi Nursery, Nathupura Rd, Kurar Ibrahimpur Village	77.1798	28.7766
B5-26	Hiranki, Near Shiv Mandir	77.1801	28.7947
B5-27	Tehari Dawlatpur, Jeevan Jyoti Ashram	77.2065	28.7696
B5-28	Inside park at Club Road in Pocket-3 Near Gurudwara	77.1163	28.6669
B5-31	Inside of Panjabi Bagh UGR	77.1281	28.6661
B5-32	At Junction of Rohtak Road & M.G. Road Near Gurudwara	77.1366	28.6742
B5-34	Mahatma Gandhi Road Near Birtina Factory	77.1484	28.6844
B5-36	Lawrence Road UGR, Keshavpuram	77.1587	28.6875
B5-42	Mahatma Gandhi Road Near NDPL power substation	77.157	28.6989
B5-44	Inside Park Opp. To MD- Block Pitampura	77.1423	28.7004
B5-45	Inside Park Opp. To MU- Block Pitampura	77.1428	28.7069
B5-46	Along the Outer Ring Road Near RU-Block Pitampura	77.1369	28.7104
B5-48	Outer Ring Road Near Badli Metro Station	77.1468	28.7284
B10-01	Inside of Mukherjee Nagar UGR	77.2111	28.7116
B15-01	Inside of Wazirabad WTP	77.2296	28.7197
B15-02	Inside of Wazirabad WTP	77.2319	28.7155
B15-03	Inside of Wazirabad WTP	77.2302	28.7127
B30-01	Inside of Mukherjee Nagar UGR	77.2113	28.7114
E-01	Inside of Mukherjee Nagar UGR	77.2111	28.7113
E-02	Jwala Hari Mod at Outer Ring Road	77.094	28.6714
E-03	Outer Ring Road Near Navjeeewan Hospital	77.1084	28.6954
E-04	BHP petrol pump near Jhangirpuri Metro	77.1651	28.723



BH. No./ERT No.	Location	Longitude	Latitude
E-05	Maharana Pratap Park Mukundpur	77.1824	28.7343
E-06	Azadpur Chowke	77.1763	28.7107
E-07	Burari Rd, Krishna Nagar	77.1706	28.7562
E-08	Block A, Upakar Colony, Burari,	77.2062	28.7515
E-09	Inside of Panjabi Bagh UGR	77.1282	28.6662
E-10	Mahatma Gandhi Road Near Birtina Factory	77.1484	28.6842
E-11	Inside Park Opp. To MU- Block Pitampura	77.1428	28.7067
E-12	Inside of Wazirabad WTP	77.232	28.7155

Annex E: Involuntary Resettlement Due Diligence Report



Involuntary Resettlement Due Diligence Report

Project Number: 47176

June 2019

Project Loan

India: Delhi Water Supply Improvement Investment Program

Subproject: Improvement of Transmission System to Various UGRs and construction of UGRs & Clear Water Pumping stations within Wazirabad Water Treatment Plant and providing SCADA and Instrumentation system including Operation and Maintenance for 10 years (DWSIIP/04)



NJS Consultants Co., Ltd. Japan
In Joint Venture with



ICRA Management Consulting Services Ltd.
Tata Consulting Engineers Ltd.
NJS Engineers India Pvt. Ltd



Prepared by the Delhi Jal Board for the Asian Development Bank

This is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature

ABBREVIATIONS

ADB	–	Asian Development Bank
BPL	–	Below Poverty Line
CBO	–	Community Based Organization
CMRC	–	Community Mobilization and Resettlement Consultant
CE	–	Chief Engineer
CWPS	–	Clear Water Pumping Station
DH	–	Displaced Households
DJB	–	Delhi Jal Board
DP	–	Displaced Person
DWSIIP	–	Delhi Water Supply Improvement Investment Program
EA	–	Executing Agency
GNCTD	–	Government of the National Capital Territory of Delhi
GRM	–	Grievance Redress Mechanism
LARRA	–	Land Acquisition Rehabilitation and Resettlement Authority
MFF	–	Multitranchise Financing Facility
NCTD	–	National Capital Territory of Delhi
NGO	–	Non-Governmental Organization
PIU	–	Program Implementation Unit
PMC	–	Project Management Consultancy
PMU	–	Program Management Unit
PSC	-	Program Steering Committee
R&R	–	Resettlement and Rehabilitation
RF	–	Resettlement Framework
RFCTLARRA	–	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act
RP	–	Resettlement plan
RPIA	–	Resettlement plan implementation assistance
RWA	–	Resident Welfare Associations

SE	–	Superintending Engineer
SIA	–	Social Impact Assessment
SO	–	Safeguards Officer
SPS	–	Safeguard Policy Statement
UGR	–	Underground Service Reservoir
WTP	–	Water Treatment Plant

NOTES

- (i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March.
- (ii) In this report, "\$" refers to US dollars.

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EXECUTIVE SUMMARY

1. The Delhi Water Supply Improvement Investment Program (DWSIIP) will be implemented over a six-year period and will improve the infrastructure, management and performance of the water supply services in the proposed Wazirabad Water Treatment Plant (WTP) command area located in North Delhi. The investment program will include the rehabilitation, upgrading and/or replacement of key water supply infrastructure, improvements in the management of the infrastructure and improved customer related services within the Wazirabad WTP command area. The DWSIIP will be implemented as a multi-tranche financing facility (MFF) having two projects. The Objectives are:

- Equitable Water Supply
- Extension of Water Supply to Outer Area
- Demand Management by reduction in water loss and review of tariff to discourage wastage of water
- Energy Management by rationalization of system to reduce excessive pumping, and 24 x 7 Water Supply

2. The Scope of work under the project includes Transmission System Improvements- Providing, laying and maintaining New DI Transmission Pipelines from Wazirabad WTP to various UGRs and Providing, Installing, and Maintaining SCADA system in 11 UGR Command areas.. As per the ADB's safeguard policy statement 2009, it is mandatory to prepare a safeguard document (Due Diligence Report DDR) for the subproject of "Transmission network improvement in underground service reservoir (UGR) command areas C-01 (Sanjay Gandhi Transport Nagar), C-02(CD park Jahangirpuri),C-02 A(Fruit Mandi), C-03 (Model Town), C-03 A(Mukerjee Nagar), G-01 (Peeragarhi),G-02 (Punjabi Bagh) P-09(Buradi A),P-10(Buradi TPA), H-05 (Avantika)and H-06 (Pitampura), H-07 (Shakur Basti), H-08 (Lawrence Road) "proposed under the Tranche-1.

3. This Subproject is for Improvements to the clear water pumping stations and transmission mains and located in the northern part of the National Capital Territory of Delhi, India's national capital. The proposed transmission system will transmit treated water from the Wazirabad Water Treatment Plant (WTP) on the northeastern part of Delhi to the 11 UGRs spread in the northern part of Delhi. Each UGR has its own command area for water supply, so this transmission system will improve water supply in the entire project area comprising 11 UGR command areas. These are spread over in the districts of West Delhi, North Delhi, Northeast Delhi and Northwest Delhi. As per the census 2011, the total population of the project area is 2.2 million and the total area is 129.6 sq. km. The subproject includes the following civil works: (i) laying of transmission main of length 54.4 km (ductile iron (DI) and mild steel (MS)) pipe of diameter 700 mm to 2000 mm, and (ii) installation of 9 new pumps (including 3 standby) of 950 HP each in the existing clear water pumping stations at Wazirabad WTP Subproject will be implemented over a period of 42 months, under a single civil works contract package, followed with 10 years of operation and maintenance phase.

4. This Due Diligence Report (DDR) is prepared for Package 4, Project 1. The involuntary Due Diligence Report (DDR) has been prepared within the resettlement framework for the project. ADB requires the consideration of the Bank's operations and policy, and the requirements described in ADB's Safeguard Policy Statement (SPS), 2009. Then potential negative impacts if any were identified in relation to pre-construction, construction and operation of the improved infrastructure and results of the assessment show that the subproject will not cause any adverse impacts. Refer **Annexure 1**-showing the google earth map of the path from WTP gate to the site of proposed CWR on abandoned UGR of Phase 3. Thus, this Involuntary Due Diligence Report has been prepared in accordance with ADB SPS's requirements.

5. **Program Implementation Arrangements:** The DWSIIP will be carried out under the supervision of the GNCTD. The DJB has been appointed as the executing agency (EA) and will be responsible for the management, coordination and execution of all the activities funded under the MFF. A Project Steering Committee (PSC) headed by Member (Water) will provide overall guidance and strategic directions to the program. A Program Management Unit (PMU), headed by Chief Engineer (Water Projects) will oversee program implementation and a Program Implementation Unit (PIU) under the PMU, will be the implementing agency (IA). Project Manager, an Executive Engineer rank officer and will be supported by technical, financial, safeguards and administrative staff. PIU will be assisted by PMC, which has designed the infrastructure, manage the tendering of contracts, supervise the construction process, assure the technical quality of design and construction, and provide advice/assistance on institutional capacity development. PIU will appoint contractors to build infrastructure elements. PIU will also appoint CMRC to assist in program implementation. For safeguards, a qualified Environmental/Civil Engineer of Assistant Engineer rank will be posted to the PIU and designated as the Safeguards Officer (SO). PMC will support PIU in all safeguard activities through its safeguard experts.

6. Consultations were conducted throughout the project area in the form of focus group discussions and interviews during surveys and transect walk. Focus group discussions (FGDs) were conducted in over several locations. The FGDs focused on identifying the likely impacts of the construction activities on commercial establishments along the road. Though the construction activity will not involve any land acquisition, it may lead to unavoidable disruption of access. At all locations, the people did not have any objection to construction of pipelines. The need to access clean and reliable supply of water, is what the people want. Any inconvenience caused due to construction activities was not considered as an issue as even in the worst-case scenario, there will be adequate space for pedestrian movement. Information will be disseminated to public at various stages, including the project implementation period. For the benefit of the community in general, a summary of the resettlement framework and each DDR will be made available in Hindi during consultation meetings and will be disclosed in public places prior to project appraisal. This will enable stakeholders to provide inputs on the project implementation, prior to the award of civil work contracts. Copies of the DDR in Hindi will also be made available at: (i) office of the PIU, (ii) the Deputy Commissioners Office, and (iii) local level offices. A report of disclosure, giving details of the date and location will be shared with the ADB.

7. A program-specific GRM will be established to receive, evaluate, and facilitate the resolution of affected persons' concerns, complaints, and grievances about the social and environmental performance at the level of the project. The PIU will, through the CMRC conduct awareness campaigns to ensure that poor and vulnerable households are made aware of grievance redress procedures and entitlements. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes to be installed by DJB or by e-mail, or by registering complaints on the DJB website or by post, or by writing in a complaints register in the PIU office or at construction site offices. The PIU safeguards officer will have the overall responsibility for timely grievance redress on environmental and social safeguards issues and for registration of grievances, related disclosure and communication with the aggrieved party.

8. The investment program entitlement policy addresses the direct and indirect impacts of works construction and operation on DPs if any, households and communities. The most direct and immediate impacts are those associated with works construction for this sub project. Mitigation is provided through trenchless technology adoption at possible junctions, exploring alternative routes, traffic management plan to be displayed at important intersections during construction, adopting stretch wise work plan schedule and resorting to construction at night in busy areas wherever feasible. However, wherever impacts would be

unavoidable, compensation and assistance if any would be based on the resettlement framework by the DWSIIP and would be complied. The impacts if at all unavoidable due to this subproject during construction if any will include only temporary loss to shop owners/tenants- of access or livelihood or both as the case may be. Impacts to vulnerable households among them would be additionally compensated as per ADB and Indian Laws.

9. There is no land acquisition or relocation in this subproject. However, there is no impact perceived at this stage. However, during construction, unavoidable likely impacts may be temporary disruption to income generation activities along the transmission mains. If a livelihood/ business activity has to be completely shut down due to construction activity, the affected business will be compensated for lost income. A survey confirming the same will be conducted by the CMRC.

10. DJB has established a Project Steering Committee (PSC), which will be chaired by the member (Water Supply). A PMU headed by a program director at the rank of chief Engineer (Project Water) will be established under the PSC. A PIU has been established under the overall management of the PMU and will act as the implementing agency. The program manager will head the PIU and oversee the investment program, and the day-to-day management and implementation of the program. The PIU will be assisted by a PMC in the implementation, management and monitoring of the investment program. The PIU will appoint the CMRC to assist in program implementation. The PIU staff will include a safeguard officer, who will be an assistant engineer rank officer, and will be responsible for all environment, health and safety, social, and grievance redress tasks. Environmental and social safeguard specialists of the PMC will assist the safeguard officer.

11. The program will be implemented over 7years, from 2019 to 2023. In line with the principles laid down in this resettlement framework, the executing agency and implementing agency will ensure that program activities are synchronized between the DDR (Due Diligence Report) implementation activities and the subproject implementation. The executing agency and implementing agency will ensure that no physical or economic displacement of DPs will occur until: (i) compensation at full replacement cost has been paid to each displaced person for project components or sections that are ready to be constructed; (ii) other entitlements listed in the DDR are provided to the DPs; and (iii) a comprehensive income and livelihood rehabilitation program, supported by an adequate budget, is in place to help people improve, or at least restore, their incomes and livelihoods.

**Transmission System Improvement and Construction of Clear Water Reservoirs &
Pumping Stations for Wazirabad WTP Command Area Including SCADA &
Instrumentation**

(PACKAGE NO. DWSIIP/04)

Salient Features

S. No.	Item	Description	
1	Title of the Project	Project Management Consultancy for Delhi Water Supply Improvement Investment Program (DWSIIP) - Project 1 in Wazirabad Water Treatment Plant Command Area	
2	Package Name (DWSIIP/04)	Transmission System Improvement and Construction of Clear Water Reservoirs & Pumping Stations for Wazirabad WTP Command Area Including SCADA & Instrumentation	
3	Purpose of the Project	To supply water 24x7 with improved performance of the Pump house and transmission system	
4	Population (Based on 11 UGRs)	Year 2021: 2399412 Year 2036: 2714905 Year 2051: 3016679	
5	Demand (Based on 11 UGRs)	Year 2021: 95.68 MGD Year 2036: 108.14 MGD Year 2051: 120.05 MGD	
6	UGRs in existing Wazirabad WTP Command Area		
S. No.	UGR Code	UGR Name	WTP Phase /Transmission Main diameter
i	A-03	Subhash Park	Phase I & II /900 mm Duplicate and Triplicate Main
ii	A-04	Ramlila Ground Ph – 1	Phase II /900 mm Triplicate Main
iii	A-05	Ramlila Ground Ph – 2	Phase II /900 mm Triplicate Main
iv	B-01	Shastri Nagar	Phase II /750 mm IAR Main
v	C-02	CD Park Jahangirpuri	Phase III/ 1100 mm West Delhi Main/ 700 mm
vi	C-03	Model Town	Phase III/ 1500 mm/600 mm
vii	D-03	Bengali Market	Phase I/ NDMC area – Bulk Water Supplied to these areas – 675 mm / 900 mm Kilokri Main
viii	D-04	Tilak Marg	
ix	D-06	Jor Bagh	
x	D-07	Lodhi Road/Bharti Nagar	

xi	G-02	Punjabi Bagh	Phase III/ 1500 mm/900 mm (Alternative Line from Haiderpur also available)
xii	P-09	Burari A	Recycled Plant/ 700/600 mm
xiii	P-10	Burari TPA	Recycled Plant/ 700 mm
7	Existing Pipe Length		40.48 KM
8	Existing UGR at WTP		The structural condition assessment for existing UGR and Pumping Station using Non-Destructive Test (NDT) has been carried out by Specialized Agency appointed by PMC for WTP Phase I, II and III. As per NDT results and physical conditions of structures, the existing Pumping Station for WTP Phase I, II and III are in structurally poor condition and need to be demolished after the construction of new UGR and Pumping Station for WTP Phase I, II and III for design horizon of year 2051. Phase 4 UGR will be used under this package
9	Transmission System Deficiency		<p>The supply of water is inadequate in large parts of Delhi. As per DJB's installed capacity of 884 MGD of water available for a current estimated population of 19.0 Million.), the average per capita supply works out to 46.40 gpcd (211 lpcd). However, there are water losses in the system. It is estimated from the past report that total water losses are to the order of 40 percent, thus the consumption at consumer end works out to be 125 litre per capita per day. The present supply in Package -02 Wazirabad command area is estimated as 120 litres per capita per day.</p> <p>The limited hours of supply results in excessive requirement of reservoir storage. The frequent power failures necessitate further increase in capacities. It was seen that in spite of a planned transmission network leading to the service reservoirs, there are a large number of direct tapping's on the existing transmission mains. This is probably due to the insufficient water supply. Drawls through these tapping have invariably feed the distribution system directly as a result of which most of these areas practically have 24 hours supply. In addition, there are several unauthorized tapping's of which details are unavailable. These tapping are aggravating the problem. As a result, the tail end UGR and service areas receive lesser water.</p>
10	Existing Mechanical System		Existing pump set at Phase-1, 2 & 3 will be abandoned due to very old and duty point of existing pumps are not matching with the design duty point of proposed pumps. All pipe line & valves at pump house shall also be abandoned.
11	Existing Electrical and Instrumentation System		Existing HT system has Five Panel Board 11 kV OCB Panel with electromagnetic relays which are not functioning, 3.3 kV Medium Voltage 9 Panel Board OCB panel, Liquid Rotor Starters for Slip ring Induction Motors.

12	Proposed UGRs (91 MGD scenario without Phase 1 and 131 MGD with Phase 1)					
Phase-1	Pipe Line-4	Rohini Sector 19, Rohini Sector 15,16, 17, Rohini Sector 11, Rohini Sector 7, Avantika, Shakur Basti				
Phase-2	Pipe Line-3	Model Town, Pitampura, Lawrence Road, Punjabi Bagh, Peeragarhi				
Phase-3	Pipe Line-2	Mukherjee Nagar, Fruit Market, CD Park Jahangirpuri, SGT Nagar				
Recycle	Pipe Line-1	BurariTPA, Burari A, Siraspur, Holambi Kalan B and Burari B				
13 Proposed UGRs at WTP						
UGR Description		Water depth considered (m)	Proposed Plan Size (m x m) - Inner Size			
Single UGR / CWR		5.5	125 x 80			
14	Proposed Transmission Pipelines	<p>Newly Proposed: 37.278 Km (Inclusive of trenchless 1.602 Km proposed)</p> <ul style="list-style-type: none">- Burari Line (Diameters 1400mm,1200mm, 800mm) - 8.88 km (Remarks: Cost for Siraspur pipeline and Burari B UGRs is not included in this Package of length 9.45 KM)- SGT Nagar Line (900mm, 800mm, 700mm, 500mm, 400mm) - 6.11 Km.- Peeragarhi Line (1500mm, 1400mm, 900mm, 800mm, 700mm, 600mm) – 22.28 Km <p>Additional Under 131MGD scenario (Transmission main cost not included in Package 04 cost estimate) Rohini Line – (Diameters 1500m,1200mm, 1000mm, 900mm, 800mm, 700mm, 600mm, 500mm, 400mm) – 26.59 Km Existing to be retained: 10.98 km BurariLine : no existing pipe is retained SGT Nagar (1100mm dia) – 8.85Km. Peeragarhi (1500mm dia, 1100mm dia) – 2.13 Km</p>				
15 Summary Table of Proposed Pipelines						
Summary of Proposed Transmission Network						
Pipe Material	Diameter in mm (NB/OD)	Length			Existing DI/CI/MS Distribution Pipe Retained	
		Proposed DI Pipe (in m)	Proposed MS Pipe (in m)	Trenchless Proposed MS Pipe (in m)	Existing DI/CI pipe (in m)	Existing MS pipe (in m)
	400	468		0		
	500	411		71		
	600	721		70		
	700	4588		180		
	800	3996		333		

		900	10900		553		
		1100			0		9122
		1200		2090	0		
		1400		5781	291		
		1500		6721	104		1860
	Total:		21084	14592	1602		1098
16	Major Nala Crossings	5 numbers (1. Sanjay Gandhi Transport Nagar near Mukarba Chowk, 2. Near Sayad Baba Ki Mazar, 3. Near Burari TPA, 4. Near Prem Bari Bridge, 5. Near Dheerpur Wetland)					
17	Surge Related requirement	4 numbers of vessels oriented in horizontal position, with 3 numbers of compressor houses at WTP compound near proposed pump house					
18	Proposed Mechanical system	New installation of HSC pump set 3 x 6 nos = 18 nos (total for 3 nos pump house) for phase-1, 2 & 3 clear water pumping station with isolation valve at suction & delivery line & rising main and NRV at delivery line & rising main, dismantling joint, all pipe line including fittings for complete installation of pump set.					
19	Proposed Electrical system	HT system has Five Panel Board 11 KV VCB Panel with metering and protection system with numerical relays, LV Switch gear panel, Aluminium conductor Bus Duct in between Transformer and PMCC Panel, LT Soft Starters, APFC Panels with capacitor banks to improve the power factor up to 0.98 Transformer for Phase-I 1600 kVA, for Phase-II, 2000kVA and for Phase-III 2500 kVA					
20	SCADA & Instrumentation System	Field instruments- Ultrasonic type level transmitter in each compartment of each UGR, Pressure Transmitter at each pump delivery and main delivery header line, Chlorine analyzer for quality of water monitoring and an appropriate size of Electromagnetic flowmeter at delivery header line have been considered. PLC/SCADA system at each pump house for monitoring of flow, water quality, level and pressure have been considered. Provision for interfacing these data via Fire optics cable to centralized control room at WTP-PLC from each pump house has also been considered					
21	Project Implementation Schedule	42 months from date of award					

A. Overview of the Investment Program

1. The Delhi Water Supply Improvement Investment Program (DWSIIP) will be implemented over a six-year period and will improve the infrastructure, management and performance of the water supply services in the proposed Wazirabad Water Treatment Plant (WTP) command area located in North Delhi and having a 2051 design population of 2.90 million (approximately 10 percent of Delhi's projected population by that time). The DWSIIP will help achieve the National Capital Territory of Delhi Water Supply Master Plan¹ objectives of reduced non-revenue water and equitable access to water supply services. The investment program will include the rehabilitation, upgrading and/or replacement of key water supply infrastructure, improvements in the management of the infrastructure and improved customer related services within the Wazirabad WTP command area. The DWSIIP will be implemented as a multi-tranche financing facility (MFF) having two tranches and with each tranche constituting a project loan. The Wazirabad WTP command area location is presented in **Figure 1**.

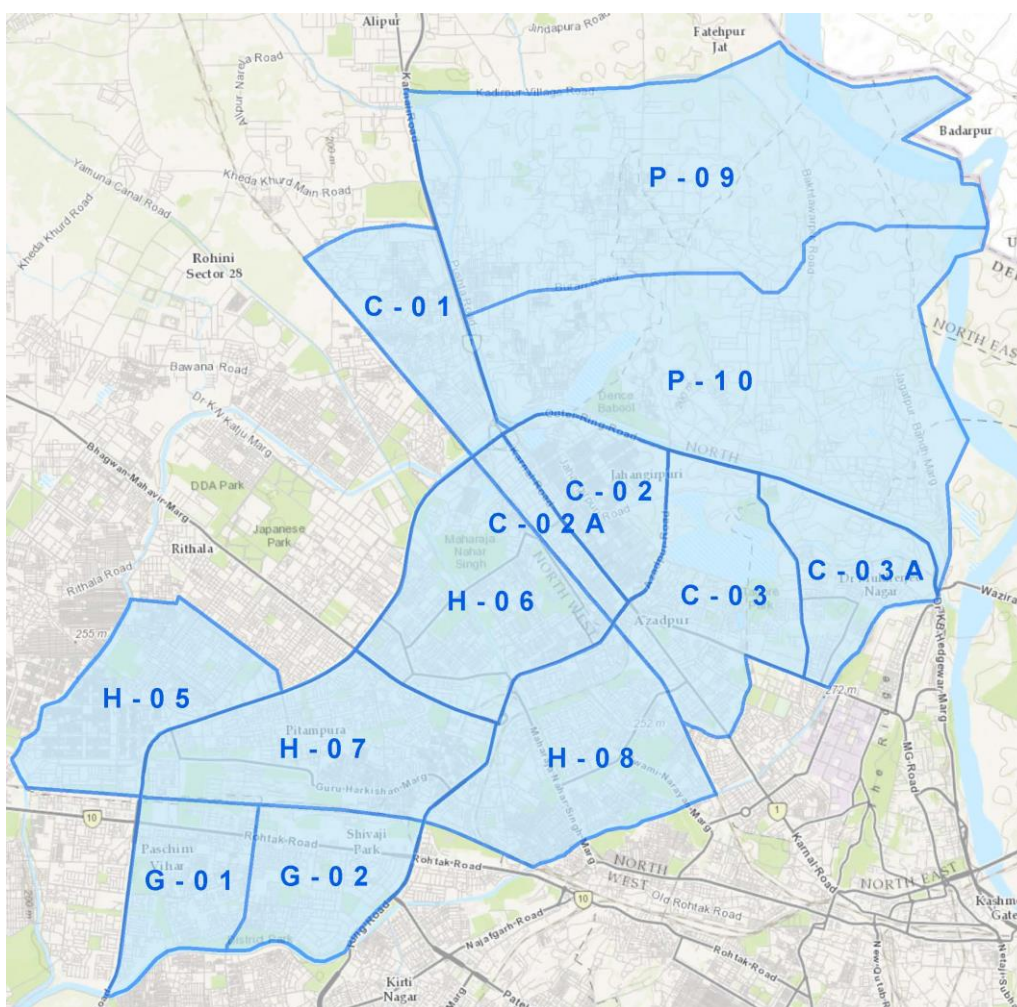


Figure 1: Location Map of the Wazirabad WTP Command Area

¹ Study on Improvement of Water Supply System in Delhi in the Republic of India; Japan International Cooperation Agency September 2011

UGRs	Area	UGRs	Area
Package No. DWSIIP/01		Package No. DWSIIP/02	
C-02	CD Park, Jahangirpuri	G-02	Punjabi Bagh
C-02 A	Fruit Mandi	H-06	Pitampura
C-03	Model Town	H-08	Lawrence Road
C-03 A	Mukherjee Nagar		
Package No. DWSIIP/05		Package No. DWSIIP/06	
G-01	Peeragarhi	C-01	Sanjay Gandhi Transport Nagar
H-05	Avantika	P-09	Burari -A
H-07	Shakur Basti	P-10	Burari -TPA

2. Tranche 1 will include: (i) an international project management consultancy (PMC);and (ii) two distribution system improvement works packages covering underground service reservoir (UGR) command areas C-02 (CD Park Jahangirpuri), C-03 (Model Town), G-02 (Punjabi Bagh), H-06 (Pitampura), and H-08 (Lawrence Road)(iii) improvements to the clear water pumping stations (CWPSs) and transmission mains; The PMC will be responsible for the technical and financial management and coordination of the DWSIIP including the undertaking of a public outreach program and ensuring safeguard compliance in line with Asian Development Bank (ADB) requirements. The Delhi Jal Board (DJB) will also recruit a DDR implementation assistance non-governmental organization (NGO) to assist in the implementation of any land acquisition and resettlement issues arising, including temporary impacts.
3. 1.Tranche 2 of the MFF will include: (i) improvements/ replacement/ rehabilitation of the 120 million gallons per day Wazirabad WTP; and (ii) two further distribution system improvement works packages covering UGR command areas G-01 (Piragarhi), H-05 (Avantika), H-07 (Shakur Basti) C-01 (SGT Nagar), P-09 (Burari A) and P-10 (Burari TPA).

Table 1:Summary of Works Packages

Package No.	Tranche	Details of Package/ General Description
DWSIIP/01	1	Distribution Network Improvement in UGR Command Areas C-02 and C-03Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.
DWSIIP/02	1	Distribution Network Improvement in UGR Command Areas G-02, H-06 and H-08 Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.
DWSIIP/04	1	Improvement of Transmission System and Construction of Clear Water Reservoirs & Pumping Stations for Wazirabad WTP

		Command Area Including SCADA & Instrumentation
DWSIIP/03	2	Design, Construction, Installation, Testing and Commissioning of 120 MGD (545 MLD) Water Treatment Plant including Raw water intake and pump house with complete Automation at Wazirabad along with 15 years Operation and Maintenance of constructed facility.
DWSIIP/05	2	Distribution Network Improvement in UGR Command Areas G-01, H-05 and H-07 Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.
DWSIIP/06	2	Distribution Network Improvement in UGR Command Areas C-01, P-09 and P-10 Targeting Continuous Pressurized Water Supply and DMA based NRW Reduction and Providing House Service Connections.

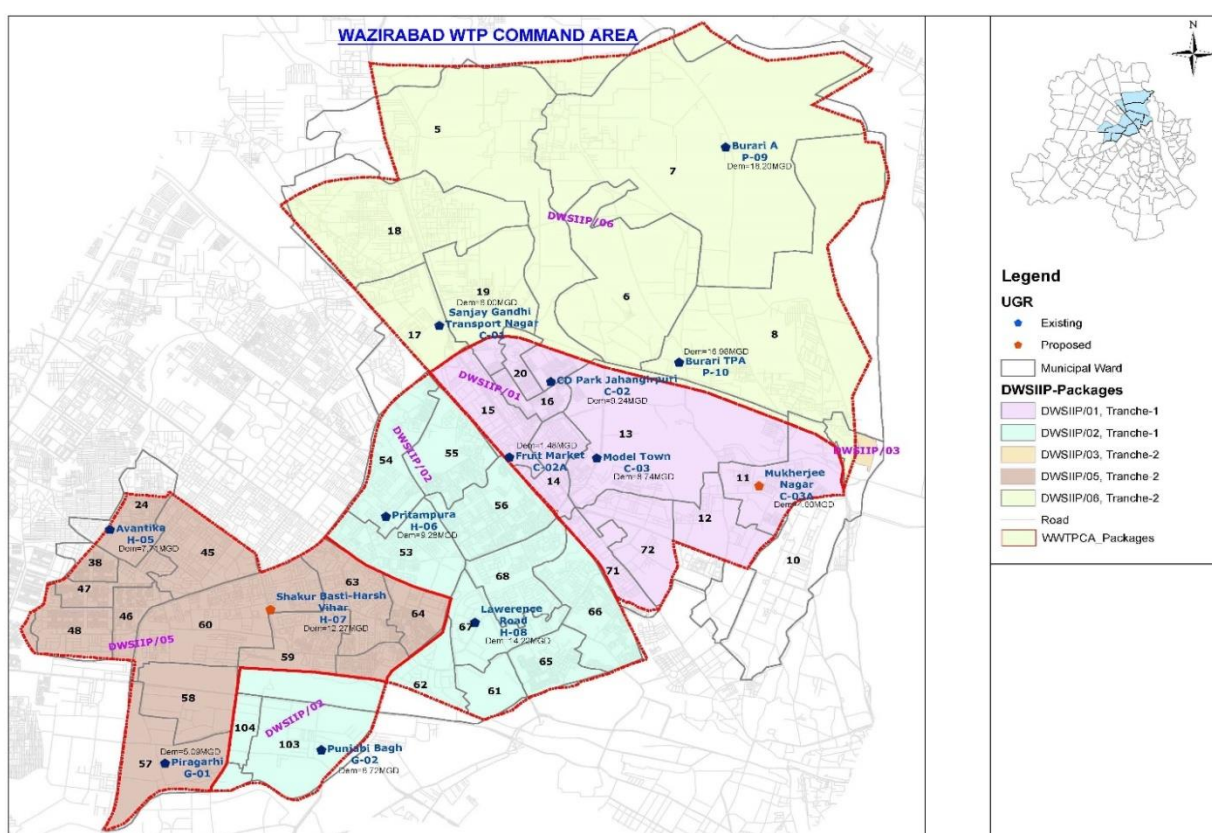


Figure 2: Wazirabad Command Area

4. The 11 UGR command areas included under the DWSIIP are summarized in Table 2 and 3, together with population projections and the number of district metering areas (DMAs).

Table 2: UGRs Proposed Under the DWSIIP

Works Package	UGR Ref.	UGR Name	Area (Ha)	Maximum Population (million)	Population (million)		DMAs (No.)
					2011	2051	
P1	C-02, C-02A	CD Park Jahangirpuri, Fruit Mandi	622.51	0.156	0.211	0.250	31
P1	C-03, C-03A	Model Town & Azadpur Mukharjee Nagar	1324.34	0.331	0.192	0.336	36
Sub Total			1946.85	0.487	0.403	0.586	67
P2	G-02	Punjabi Bagh	379.42	0.095	0.128	0.169	9
P2	H-06	Pitampura	925.83	0.231	0.214	0.234	17
P2	H-08	Lawrence Road	972.45	0.243	0.285	0.300	24
Sub Total			2277.7	0.569	0.627	0.703	50
P3	G-01	Peeragarhi	483.79	0.121	0.098	0.128	14
P3	H-05	Avantika	706.37	0.177	0.321	0.321	25
P3	H-07	Shakur Basti	1099.45	0.275	0.189	0.262	24
Sub Total			2289.61	0.572	0.608	0.711	63
P4	C-01	SGT Nagar	536.53	0.134	0.075	0.129	12
P4	P-09	Burari A	2434.18	0.609	0.126	0.449	27
P4	P-10	Burari TPA	2567.99	0.642	0.322	0.417	37
Sub Total			5538.7	1.385	0.523	0.995	76
Total			12052.9	3.013	2.161	2.995	256

Note: Maximum population based on 250 persons/Ha

Table 3: UGR wise Population Projection and Water Demand
Scenario 925 MGD - 11 UGR command area

Summary of Population Projection and Water Demand - Scenario 925 - 11 UGR												
UGR Details				2021			2036			2051		
S. No.	UGR No.	UGR Name	Command Area in Hectare	Population	Density of Population per Hectare	Water Demand in MGD@172lpcd	Population	Density of Population per Hectare	Water Demand in MGD@172lpcd	Population	Density of Population per Hectare	Water Demand in MGD@172lpcd
1	C-02	CD Park	643.00	203953	317.19	6.90	218942	340.50	7.47	233304	362.84	8.02
	C-02 A	Fruit Market	64.66	17657	273.07	1.48	17657	273.07	1.48	17657	273.07	1.48
2	C-03	Model Town	819.00	142296	173.74	5.38	190858	233.04	7.22	240484	293.63	8.23
	C-03A	Mukherjee Nagar	475.15	88433	186.12	3.35	93907	197.64	3.55	96059	202.16563	4.50
3	H-08	Lawrence Road	964.98	289171	299.66	10.94	294714	305.41	11.15	300025	310.91	11.35
4	G-02	Punjabi Bagh	541.73	139155	256.87	5.26	154739	285.64	5.85	169672	313.21	6.42
5	H-07	Shakur Basti	953.78	208988	219.12	7.91	236087	247.53	8.93	262053	274.75	9.91
6	H-06	Pitampura	923.49	219689	237.89	8.31	227274	246.10	8.60	234543	253.98	8.87
7	H-05	Avantika	707.44	321080	453.86	12.15	321080	453.86	12.15	321080	453.86	12.15
		40% From Haiderpur				-4.86			-4.86			-4.86

8	G-01	Piragarhi	515.05	106365	206.51	4.02	117803	228.72	4.46	128764	250.00	4.87
9	C-01	Sanjay Gandhi Transport Nagar	518.08	89767	173.27	3.40	110068	212.45	4.16	129520	250.00	4.90
10	P-09	BurariA	2555.18	212968	83.35	8.06	333540	130.53	12.62	449078	175.75	16.99
11	P-10	Burari TPA	1739.21	347364	199.72	13.14	383172	220.31	14.50	417487	240.04	15.80
		Sub Total	11420.76	2386886		85.45	2699841		97.29	2999724		108.64
B	Village Population - 3 villages coming under the Wazirabad Command Area Northwest, North and West Districts as per Census Data		3783.3	12527		0.47	15064		0.570	16855		0.64
C	NDMC Water Demand		As per JICA master Plan water to NDMC area is to be supplied by Chandrawal and Sonia Vihar WTP									
D	Commercial and Institutional Demand @ 7.5 LPCD has been considered as considered in World Bank report for the year 2005.					3.94			4.454			4.95
E	Industrial Demand @ 45000 l/hectare/day Area - 588 hectare		588.0			5.82			5.821			5.82
F	Total		15792.1	2399413		95.68	2714905		108.13	3016579		120.05

Project Area:

Project Area is defined as the population served by the 18 UGR of the Wazirabad Water Treatment Plant command area. Hence, project area for 131 MGD supply is considered as **22212.08** hectares and for 91 MGD supply area will be **15792.10** hectares.

Also note:

- Wazirabad Command Area falls under 3 districts - Northwest, North and West. Based on Delhi's Population - Population of 3 districts is for the year 2011 is calculated as 7,087,760.
- The base population of 2011 for the above mentioned three districts is referred from Census of India 2011 and the population is projected at the same growth rate as considered for Delhi.
- The district population is used to project the ward population. Ward density is capped at 250 pph as per DDA 2021 Master Plan.
- Some Villages also fall under the Wazirabad Command Area and the population for these Villages is considered as per Census 2011. The population for the Villages for the year 2051 has been considered to increase at same rate as considered for Delhi.
- Approximately 650-hectare Industrial Area comes under Wazirabad Command Area so, water demand at the rate 45000 l/hectare/day (DSIDC norm) has been considered

5. This Involuntary Resettlement Due Diligence Report covers Package 4, under Tranche 2 -Improvements to the CWPSs (located at the WTP) and transmission mains.

B. Project Components

6. Key Components of the Subproject

Improved water supply infrastructure in the Wazirabad WTP command area:

- Rehabilitation of the existing 120 MGD WTP at Wazirabad and its clear water pumping stations.
- Rehabilitating/ Laying transmission mains
- Enhancing underground service reservoirs (UGRs) & booster stations,
- Creating 156 DMAs
- Laying district metering area (DMA) feeder mains and distribution pipes,
- Rehabilitating and providing new customer connections and customer meters.

C. Details of Proposed Works

7. New CWR/UGR and single PS for WTP (within Wazirabad WTP boundary; land owned by DJB). **Annexure 1** shows the location of the proposed facility (CWR) within WTP premises under package 4. The site of the old abandoned UGR of phase 3 would be used for the proposed CWR site. Refer **Annexure 3** for self certification of ownership of DJB of Wazirabad WTP campus within which the CWR is proposed.
8. The following are the salient features of proposed works under this package:
 - A single CWR /UGR and single Pumping station are proposed as replacement of existing UGR's and existing Pumping stations. New UGR and new pump house will be independent of existing phase 1, phase 2 and phase 3 UGR's and corresponding pump stations. **Refer Annexure 2** for detailed layout plan of CWR.
 - For commissioning of new UGR, existing filter houses water channel of existing WTPs are to be connected to new UGRs. The new UGR is to be connected with outlet of Existing Filters considering hydraulics so that clear water from Filter can flow by gravity to new UGR.
 - Constructions of new WTP & Filters are envisaged under Package-DWSIIP-03 in near future. After construction of new filters, New UGR is to be connected with new filters in coordination with contractor of Package-03.
 - The levels in new UGRs are to be worked out considering levels of filtered water channel so that water can flow by gravity.
 - For commissioning of new PS, the new pumping main from new pump house will be connected to existing pumping main of respective PS, in line with proposed transmission system.
 - The operation of existing CWR's (UGR's) and PS's of WTP Phase I, II and III would be continued till new UGR and PS for WTP is constructed.
9. Presently existing Under Ground Reservoirs (UGR's) and Pumping stations for WTP Phase I and II are in operation. The pump house for WTP Phase III is also in operation. As the new WTP of 120 MGD is proposed, Single UGR with single pump house is proposed.
10. The location of proposed single UGR & Single Pumping Station in Wazirabad WTP Complex is shown in the fig 3 below:

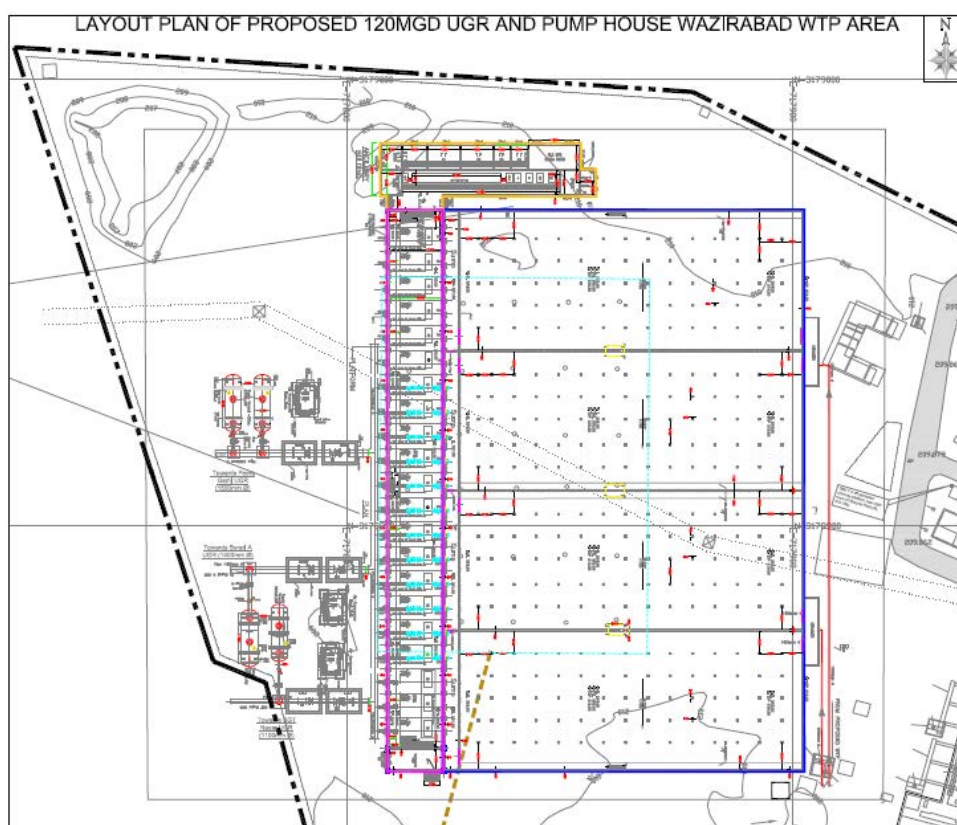


Figure 3 : Location of new single UGR and single Pumping Station in Wazirabad WTP Complex

11. New UGR/CWR along with new pump house and ancillary structures like Battery room, Transformer room, HTP, PLC/SCADA and Office will be provided nearby proposed pump house. **Refer Annexure 2** for detailed layout. The utility building like store room, Workshop etc. has been suitably provided under package 03, based on finalized WTP layout. Recycle (Phase 04) pump houses will be retained as it. However, interconnection from existing Line 04 UGR will be done to proposed Line-3 rising main.

Table 4: Proposed Size of UGR/CWR at WTP

CWR Description	Proposed Land Require (m x m)	Land Ownership
Single UGR/CWR	126X97.08	DJB
Proposed Ancillary Building	48.35 X 11.85	DJB

D. Project Benefits and Impacts

12. The impact of the proposed investment program will be improved coverage, quality and continuity of urban water supply services in alignment with the ADB's Country Partnership Strategy India 2013-2017. The outcome will be improved access to sustainable and reliable water services in the Wazirabad WTP command area. The DWSIIP will have three outputs: (i) improved water supply infrastructure in the

Wazirabad WTP command area; (ii) improved water supply infrastructure management; and (iii) improved customer related services within the Wazirabad WTP command area.

E. Objective and Methodology

13. The objective this due diligence report is to document and report that there are no involuntary resettlement impacts or land acquisition required under this subproject.
14. The methodology adopted included field visits and the verification of land information. Field visits have been made to routes of the proposed transmission mains, all of which follow existing roads or right of ways, and are free of encumbrances. The CWPSs are located within the Wazirabad WTP site which belongs to the DJB.

F. Sub Project Description

15. Water will be pumped from the Wazirabad WTP to the 11 UGRs via 4 transmission main systems. Pipe Line1, 2 and 3 will supply water of 91 MGD. Line-4 will supply water to Rohini area on availability of 131 MGD water to project area of Wazirabad Command area.

16. Area wise and line wise distribution of water is shown below:

Rohini UGR Main	Pipe Line-4	Rohini Sector 19, Rohini Sector 15,16, 17 , Rohini Sector 11, Rohini Sector 7, Avantika, Shakur Basti
Peeragarhi UGR Main	Pipe Line-3	Model Town, Pitampura, Lawrence Road, Punjabi Bagh Peeragarhi
SGT Nagar UGR Main	Pipe Line-2	CD Park, Fruit Market, Mukherjee Nagar, SGT Nagar
Burari Main	Pipe Line-1	Burari A, Burari TPA

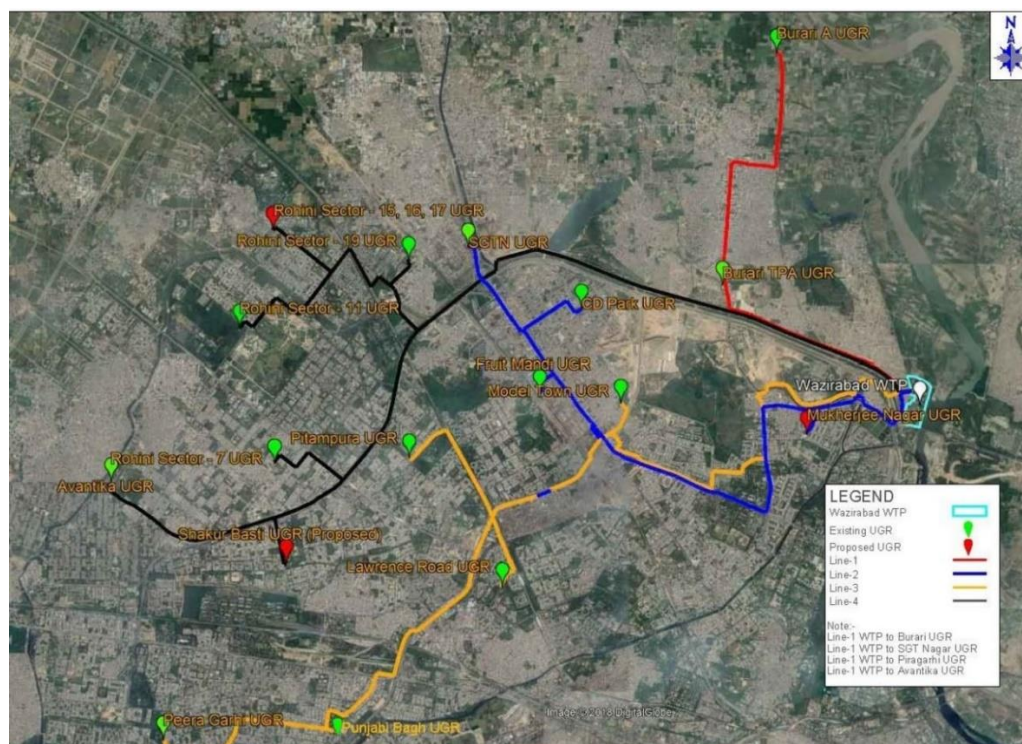


Figure 4: MAP SHOWING LINES 1, 2, 3 AND 4 in WAZIRABAD COMMAND AREA

G. Transmission System details

17. Pipe Line 1, 2 and 3 will supply water of 91 MLD Line-4 will supply water to Rohini area on availability of 131 MGD water in future and not covered under scope of this package.

Table 5: Area wise and line wise distribution of water

Rohini UGR Main	Pipe Line-4 (Future)	Rohini Sector 19, Rohini Sector 15,16, 17, Rohini Sector 11, Rohini Sector 7, Avantika, Shakur Basti
Peeragarhi UGR main	Pipe Line-3	Model Town, Pitampura, Lawrence Road, Punjabi Bagh Peeragarhi
SGT nagar Main	Pipe Line-2	CD Park, Fruit Market, Mukherjee Nagar, SGT Nagar
Burari Main	Pipe Line-1	Burari A, Burari TPA, Siraspur, Holambi Kalan B and Burari B

Technical information and details to be considered under scope of work of this package are given in Table below.

Table 6: Technical information and details

	Line 1	Line 2	Line 3	Line 4 (Future)
From	New UGR at WTP***			
To	Burari A, Burari TPA, Siraspur, Holambi Kalan B and Burari B	CD Park, Fruit Market, Mukherjee Nagar, SGT Nagar	Model Town, Pitampura, Lawrence Road, Punjabi Bagh, Peeragarhi	Rohini Sector 19, Rohini Sector 15,16, 17, Rohini Sector 11, Rohini Sector 7, Avantika, Shakur Basti
Starting Dia (mm)	1400	1100	1500	1500
Pipe Summary				
Diameter (mm)	Length (m)			
250	5289*	0	0	0
300	0	0	0	0
400	0	468	0	593
450	0	0	0	0
500	0	482	0	1264
600	0	0	791	1730
700	0	1340	3428	3383
800	4157*	1816	2513	4089
900	2854	2004	6595	1840
1000	0	0	0	1391
1100	0	8850 (Existing)	272 (Existing)	0
1200	2090	0	0	2882
1400	3940	0	2132	0
1500	0	0	8110 (New), 1860 (existing)	9429
Maximum Length to Tail end	18.33 km	14.96 km	24.42 Km	26.59 Km
New proposed- 37.278 Km , Existing retained- 10.98 Km , Total Network- 48.26 km				
Pump (2051)**	50.46 MGD @ 32.00 M	23.27 MGD @ 27 M	48.04 MGD @ 34 M	42.87 MGD @ 32 M
Pump (2036)**	41.10 MGD @ 24 M	21.02 MGD @ 24 M	44.88 MGD @ 32.5 M	40.64 MGD @ 30 M

Notes:

*Lengths of i) Pipe line tapping to Burari B UGR of 250mm diameter (5289m), ii) Pipe line tapping to Sisaspur UGR of diameter 800mm (3317m), iii) Pipe line tapping to Shalimar palace and iv) Pipe line tapping to Siraspur of 800mm diameter (840m) are not covered under scope of this package but need to be considered in Hydraulic design.

Table 7: Summary of Proposed Transmission Network with Trenchless sections

Pipe Material	Diameter in mm (NB/OD)	Length			Existing DI/CI/MS Distribution Pipe Retained	
		Proposed DI Pipe (in m)	Proposed MS Pipe (in m)	Trenchless Proposed MS Pipe (in m)	Existing DI/CI pipe (in m)	Existing MS pipe (in m)
	400	468		0		
	500	411		71		
	600	721		70		
	700	4588		180		
	800	3996		333		
	900	10900		553		
	1100			0		9122
	1200		2090	0		
	1400		5781	291		
	1500		6721	104		1860
Total:		21084	14592	1602		10982

Note: i) Taping to Siraspur UGR of length 3317m is not included in above table.

ii) Taping to Burari B UGR of length 5289 m is not included in above table.

iii) Taping point Siraspur near Shalimar Place of length 840 m is not included in above table.

H. Land Acquisition and Sub Project Impacts

18. The CWPSs are located within the property of the DJB at the Wazirabad WTP. Refer **Annexure 3** for DJB's self certification of land ownership of the facility. Any expansion work can be accommodated within the existing facilities and no land acquisition will be required.
19. The transmission mains all follow the internal roads of the Wazirabad WTP command area, or existing right of ways, leading to the UGRs. These will not require any land to be acquired or existing structures to be demolished. There is however presence of numerous mobile vendors (fruit, vegetable sellers etc. using trollies) which tend to operate at key junctions or alongside the major roads. It will be necessary for them to operate at different locations during the course of construction for a generally short period of time.
20. Trenchless technology is proposed for laying pipelines wherever feasible to avoid / minimize impacts like traffic disruptions and other public inconveniences due to construction activities, Refer **Table 7** for summary of proposed transmission network. However, this technology may not be suitable for all locations wherein open cut method may be required to certain extent. Appropriate measures are suggested as per design to minimize the construction impacts wherever unavoidable. Besides, trenchless method will have minimal impacts, and all standard construction practices and safety precautions will be undertaken to further reduce the impacts if any.

21. IA would ensure proper advance information to all concerned as the case may be along the alignment, to adjust their livelihood activities as per construction schedule. In case of unavoidable temporary impact on their livelihood, all affected persons to be compensated as per entitlement matrix and the resettlement document - DDR would be revised and updated accordingly.
22. If any impacts are identified after the mobilization of contractor (being a DBO contract) or during construction, the affected persons will be compensated or assisted in accordance with the DWSIIP Resettlement Framework. The Entitlement Matrix as given in the Resettlement Framework is presented in **Table 8**.

Table 8: Entitlement Matrix

J	Unanticipated Impacts	
J.2.Any unanticipated impacts due to project intervention		1. Any unanticipated impacts of the project will be documented and mitigated based on the spirit of the principles agreed upon in this RF and the RFCTLARRA 2013.

I. Consultation and Participation

23. The active participation and involvement of stakeholders including local community, NGOs/CBOs in all stages of project preparation and implementation is essential for successful implementation of the project. It will ensure that the subprojects are designed, constructed, and operated with minimal disturbance to local communities with regard to place of residence and livelihood, overall community acceptance and ensure maximum benefit to the community at large. To fulfill the above aim, Public consultation and information disclosure is a must as per the ADB policy.
24. Public consultation and participation for the DWSIIP has been carried out in limited way. Formal public consultation and participation for the DWSIIP has not yet been carried out at this stage. Only Focus Group Discussions as part of consumer response survey were conducted at certain sites to obtain an overview of the entire project influence area. This section will therefore be updated at the appropriate time. **Annexure 4** has consultation sheets, while **Annexure 5** has Site visit photographs. A summary of consultation is presented below:

Table 9: Summary of Consultation

Sl. no	Date	Venue	No. Of participants	Issues Discussed
1	1.2.2018	Sheesh Mahal, Shalimar Bagh	4	<ul style="list-style-type: none"> • Sheesh Mahal is an ASI protected monument • Adjoining is district park maintained by MCD. • Very few visitors. • Restricted ROW on way to the monument.
2	26.2.2018	Sewa Basti, Near Dada	13	<ul style="list-style-type: none"> • Community residing over last 3 decades

		Devta Shiv Mandir, Lawrence Road		<ul style="list-style-type: none"> Residents complained of water crisis during summer peak season 2 hand pumps are available as alternative source to tanker water supply Encroachment over the pipeline and no open space area available During consultation, proposed works were discussed with the community who assured of all cooperation during implementation.
3	2.3.2018	Central Market Punjabi Bagh	7	<ul style="list-style-type: none"> Mitigation of inconvenience is possible in the market area through proper planning and information dissemination among shopkeepers and visitors alike. Need to get permission from Traffic Controller of Traffic Police prior to construction Generally a Traffic Management Plan is submitted for approval which takes about 2 weeks to complete the formalities. Another major stakeholder is RWA who should be consulted well in advance for cooperation and smooth implementation
4	6.4.2018	WTP campus Wazirabad (Site of proposed CWR)- FGD with women only	13	<ul style="list-style-type: none"> There are 10 number of women workers within WTP who are permanent All sweepers (Women), working hours being 8 am to 4:30 pm. On holidays, no alternate cleaning arrangement

				<ul style="list-style-type: none"> • They have no access to safety gadgets • No separate washroom for ladies • No canteen facility available within the premises • There is no PSP for drinking water within the premises • WTP premises are adequately fenced and there is no issue of safety
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25. The critical areas have been identified during transect walk with design team where impacts may occur during construction where unavoidable. The residents, shopkeepers and mobile vendors who live and work alongside the roads through which transmission mains have been aligned were consulted informally. Secondary stake holder: DJB, NGOs and CBOs working in the area, community representatives, RWAs, government agencies, and the ADB), they were consulted in Focus Group Discussions (FGDs) during preparation of this Due Diligence Report (DDR). Further, any other stakeholder that would be identified during project implementation will be consulted in the future as consultation and participation is an ongoing process. Following ADBs SPS 2009 requirements this Involuntary Resettlement Due Diligence Report will be posted on the official website of the DJB and the website of the ADB after approval and endorsement of the report by the DJB and the ADB.

J. Information Disclosure

26. Prior to initiation of civil works, DJB / PIU with the assistance of PMC will conduct information dissemination sessions at various places and solicit the help of the local community, leaders for the smooth implementation of project work. At each ward/neighborhood level, focus group meetings will be conducted to share construction schedule with local communities so as to reduce negative impacts of the project to the minimum.

27. Executive summary of the DDR will be translated in Hindi and made available at the offices of DJB local office in the subproject area, PIU, DJB head office, etc., and also displayed on their notice boards. Electronic version of the DDR in English and Executive Summary in Hindi will be placed in the official website of the DJB after approval of the DDR by ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

28. Public information campaigns to explain the project details to a wider population will be conducted by PMU/PIU/PMC. Public disclosure meetings will be conducted at key project stages to inform the community of progress and future plans. Prior to starting of construction, the PIU will issue Notification on the initial date of implementation in local newspapers. A board showing the details of the project will be displayed at the construction site for the information of general public.

29. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. Mitigation measures like traffic management plan would be prepared to ease likely congestion and would be shared on display boards at major intersections. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.
30. A constant communication will be established with the affected communities to redress the social / resettlement issues that are likely to emerge during construction phases and also regarding the grievance redress mechanism. PMU/ PIU and PMC will organize public meetings and will appraise the communities in general about the progress on the implementation of the project.

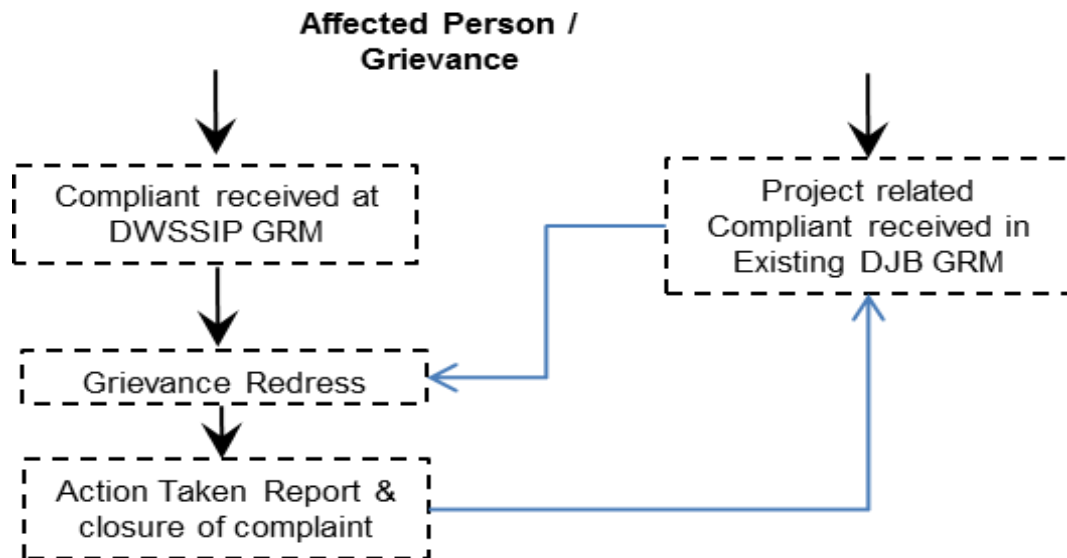
K. Grievance Redress Mechanism

31. A project-specific GRM will be established to receive, evaluate, and facilitate the resolution of DP's concerns, complaints, and grievances about the performance of the project on social and environmental parameters. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social & environmental concerns linked to the project.
32. A common GRM will be in place for social, environmental, or any other grievances related to the investment program. The DDRs/RPs and IEE will follow the GRM described below. The GRM will provide an accessible and trusted platform for receiving and facilitating the resolution of DPs' grievances related to the investment program. The multi-tier GRM for the investment program is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required.
33. Investment program area-wide public awareness campaigns will ensure that knowledge of the grievance redress procedures is generated. The PIU will, through the PMC and the Community Mobilization and Resettlement Consultant (CMRC) will conduct awareness campaigns to ensure that poor and vulnerable households are made aware of the grievance redress procedures and their entitlements.
34. DPs will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes to be installed by DJB or by e-mail, or by on the DJB website or by post, or by writing in a complaints register in the PIU office or at construction site offices. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. The PIU will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party.
35. Existing Grievance Redress Mechanism. DJB currently has an established Public GRM and has established 28 complaint receiving cells called Water Emergencies. There is also a central control room for coordination. The concerned DJB engineers/officials contact details are publicized and made available to the public to register complaints. Alternatively, the public can 'call', 'send a message', 'register' a complaint through the DJB website or through GNCTD grievances websites. Complaints are forwarded to concerned engineers (UGR wise) for their action. After taking feedback from concerned engineers on redress, an Action Taken Report are posted on the website. If no action is taken in 21 days (3 weeks), then the complaint is taken suo moto by the Public Grievance Commission for hearing. Also, the facebook page of DJB, Short Message

Service to either the water emergencies or any of the concerned officers are the other available modes of grievance registering by the people of the project command area.

36. **Proposed DWSIIP Grievance Redress Process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel from the PIU and the PMC on-site supervision staff will provide the most easily accessible or first level of contact for the quick and immediate resolution of grievances. Contact phone numbers and names of the concerned staff and contractors, will be posted at all construction sites in visible locations.
- (i) **1st level of grievance:** The CMRC or on-site Junior Engineer of the PIU will receive and record the complaint at the site. Alternatively, the complaint can be registered by phone call, message, email, or on website. The complaint will be reviewed and, if necessary, forwarded to the contractor and PMC supervision staff for immediate resolution of the issue on-site in consultation with the CMRC. The complaint will be required to be addressed within 7 days of receipt of a complaint/grievance.
 - (ii) **2nd level of grievance:** All grievances that cannot be redressed within 7 days at the field/ward level will be brought to the notice of the SO of the PIU, and the PMC Safeguard Specialist. The PIU SO will resolve the grievance within 14 days of receipt of a complaint/grievance in discussion with the CMRC and under the direction of the PIU Program Manager. If the grievance is not resolved at Program Manager level, the grievance will be referred internally to the Superintending Engineer, and the Chief Engineer in the projects division of DJB. Notwithstanding the referral to Superintending Engineer/Chief Engineer, the grievance at this 2nd level should be resolved in 14 days of its receipt.
37. The program GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage. This can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM. Alternatively, if the grievance is related to land acquisition or resettlement and rehabilitation², the DPs can approach the Land Acquisition, Rehabilitation and Resettlement Authority (LARRA). As per the recent "Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, 2013", the GNCTD will establish the LARRA to address land related grievances during implementation.
38. **Integration of the DWSIIP GRM with the Existing DJB GRM.** To facilitate quick and easy redress of grievances, both GRMs will be linked so that the affected persons have the flexibility to approach either of the channels to redress their grievances. Any complaints/ grievances regarding the project activities received at the general DJB GRM will be referred internally to DWSIIP GRM for redressal. After redressal, the Action Taken Report will be uploaded in the general system as per current procedures.

² LARRA admits grievances only with reference to the land acquisition and resettlement and rehabilitation issues under the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.



39. **Record-keeping.** The PIU /contractor/PMU will keep records of grievances received, including contact details of the complainant, the date the complaint was received, the nature of the grievance, agreed corrective actions and the date these were affected and the final outcome. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PIU office, and on the DJB website, as well as reported in monitoring reports submitted to ADB on a semi-annual basis.
40. **Periodic review and documentation of lessons learned.** The PMU will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the program's ability to prevent and address grievances.
41. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the PIU.
42. The DWSIIP GRM will be investment program specific, and will ensure that the program related grievances are received, registered and addressed in a smooth, time-bound and responsive manner. The program specific grievances are expected to be mostly related to construction work, while general grievances received by DJB's GRM are of a wider variety. However, integration of both systems is a necessity. The DWSIIP specific system will be established such that the program grievances can also be registered in DJB's general GRM. However, for the redress, all DWSIIP grievances will flow through DWSIIP GRM. After redress, the Action Taken Report will be uploaded in the general system as per current procedures.
43. It is to be considered that transmission mains are bigger pipelines in terms of dia than distribution lines in general implicating that if there are impacts due to project intervention, the scale may be higher than any distribution package. Two such critical areas were identified during transect walk where site specific mitigation measures were suggested to avoid impacts all together. One critical area that was identified which might have R & R impact due to project intervention is slum area below Azadpur Flyover, where tentatively access to **slum dwellings** (pucca) were likely being impacted during construction as per initial design; (**Refer Annexure 6**) in addition **temporary shops** which are situated /perched on the pitched section itself along with common toilets complex might need special protection during civil works. The owners of such structures stay in the adjacent slums only. These shops might get disturbed temporarily (about a month to the maximum) during project implementation which will involve not only laying

of pipeline but re construction of the pitch section back to original state after NOC is obtained from concerned department. Refer **Annexure 8**. It is estimated that this entire exercise might take a month before they can resume the business activities if at all disturbed. If impacts are unavoidable, which might entail temporary disruption of livelihood, that would be compensated as per ADB policy. However, DJB has proposed alternative alignment along the pitch section of the over-bridge whereby they would not cause disturbance to anyone at all. With careful planning and citing, all impacts including temporary can be avoided if the alignment passes through the pitch section of the over bridge, not impacting the lane below. This is as per final DPR. However, requisite permission from the line agency (PWD) would be required for this which DJB would obtain before implementation. Refer **Annexure 8** for DJB's intent of obtaining NOC before construction.

44. Another area likely to be impacted is the area behind Wazirabad WTP boundary where the 1400 mm dia transmission mains is likely to come out. Though all precautions have been adopted to avoid any impact in designing stage, even then, during pipeline laying, there might be temporary unavoidable impacts (mainly of restricted access) Refer **Annexure 7**. However, here too very carefully the alignment is chosen whereby none would be disturbed and the new pipe line would be laid adjacent to existing transmission main pipeline.
45. Along the 48.26 kms of transmission mains of pipelines of different dia spread over entire Wazirabad command area, some impacts might occur that are unavoidable which would be temporary in nature. In such cases those impacts would be addressed as per ABD policy and some provisional sum in the R&R budget has been booked under contingency fund.
46. It is to be noted that resettlement budget is only indicative; all efforts would be made by IA to avoid all impacts. However, after careful estimation an amount of 2-3% of total capital cost of package 4 have been booked for any emergency/unanticipated impacts that might arise during implementation.

L. Institutional Arrangements and Responsibilities

47. The DWSIIP will be carried out under the oversight of the GNCTD. The DJB has been appointed as the EA and will be responsible for the management, coordination and execution of all the activities funded under the MFF. DJB has established a Program Steering Committee (PSC), which will be chaired by the Member (Water Supply). A PMU has been established under the PSC, headed by the project director at the rank of chief engineer (Projects Water). A PIU has been established under the overall management of the PMU and will act as the implementing agency. The program manager will head the PIU and oversee the investment program, and the day-to-day management and implementation of the program. The DWSIIP implementation arrangements are summarized in **Figure 5**.
48. The program manager will be an executive engineer (Civil) rank officer and will be supported by technical, financial, safeguards and administrative staff. The PIU staff will mostly be drawn from DJB, and if required, will also be seconded from the other government departments on deputation. The PIU will be assisted by a PMC in the implementation, management and monitoring of the investment program. The PMC will design the infrastructure, manage the tendering of contracts, supervise the construction process, assure the technical quality of design and construction, and provide advice/assistance on institutional capacity development. The PIU will appoint the contractors to build the infrastructure elements and will manage the construction and

commissioning activities. The PIU will also appoint the CMRC to assist in program implementation.

49. The commissioner and administrator for R&R will be appointed if there is resettlement involved.

50. The PIU staff will include a safeguards officer, who will be an assistant engineer rank officer, and will be responsible for all environment, health and safety, social, and grievance redress tasks. The safeguards officer will be a qualified engineer (preferably an environmental engineer). The safeguards officer can also be deputed from other government organizations. Environmental and social safeguard specialists of the PMC will assist the safeguards officer.

51. The PIU will be responsible for the following social safeguard activities:

- (i) Appointing the CMRC;
- (ii) Implementation of the RPs;
- (iii) Providing support to the office of the district commissioner for land acquisition;
- (iv) Ensuring availability of budget for R&R activities;
- (v) Ensuring timely disbursement of compensation and assistance to the DPs in close coordination with the concerned line department;
- (vi) Liaison with district administration for land acquisition and implementation of RPs,
- (vii) Addressing grievances; and
- (viii) Ensuring disclosure of resettlement framework, DDR, and monitoring documents.

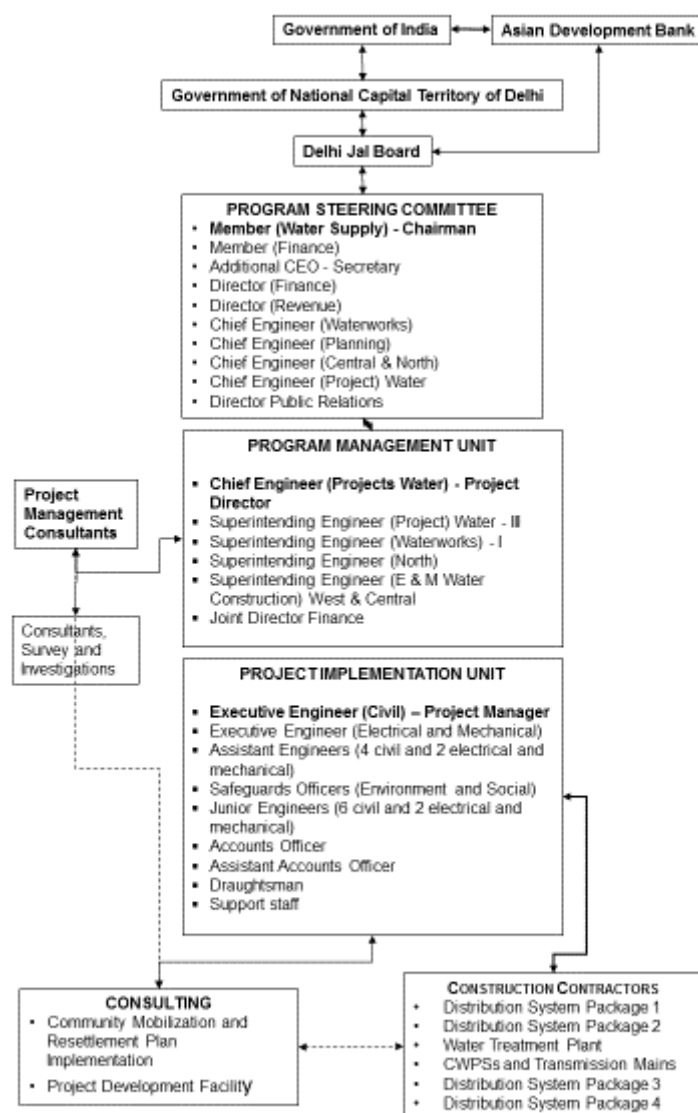


Figure 5: DWSIIP Implementation/Institutional Arrangements

52. The PIU safeguards officer will undertake internal monitoring and supervision and record observations throughout the program period to ensure that the safeguards and mitigation measures are provided as intended. He/she will have the following responsibilities: (i) addressing social safeguards issues; (ii) implementing the resettlement framework; (iii) liaising with district administration for land acquisition and resettlement plan implementation; (iv) implementing and monitoring safeguards compliance activities, public relations activities, gender mainstreaming activities; and (v) endorsing and submitting periodic monitoring reports³ received from the PMC to the PIU, who will then submit these to the ADB. If deemed necessary, based on the extent of land acquisition, the PIU will also be staffed by a land acquisition officer, who will primarily be responsible

³The semiannual monitoring report will focus on the progress of implementation of the safeguard, issues encountered and measures adopted, follow-up actions required, if any, as well as the status of compliance with subprojects election criteria and relevant loan covenants.

for the following: (i) liaising with the district administration for land acquisition; (ii) addressing any problems and/or delays in the land acquisition process; and (iii) monitoring physical and financial progress on land acquisition activities and updating the PIU.

53. The PIU will seek government clearance for submission and disclosure of the social and resettlement monitoring report to ADB. It will also coordinate with national and state agencies to resolve any interdepartmental issues arising.
54. The PIU will be supported by a PMC social safeguards specialist who will assist: (i) in the monitoring and supervision of ongoing subprojects and DDR implementation; (ii) preparing RPs for new subprojects, where required to comply with national law and/or ADB procedures; (iii) update DDRs as required and conduct surveys; (iv) ensure all subprojects meet safeguard requirements as agreed in the loan covenant and in line with this resettlement framework; (v) provide support to the PIU for consultations; and (vi) provide advice on policy changes. In addition, the PMC social safeguards Specialist will assist the PIU in all activities related to the implementation of social safeguards; play a central role in ensuring capacity building on resettlement management of the PIU, NGO, and line departments through capacity development support and training.
55. A dedicated assistant engineer in-charge of social safeguards/ resettlement officer will be required for Category A and Category B resettlement plan implementation. For Category C projects a dedicated officer is not required and can be clubbed with the environment safeguard officer.
56. **CMRC.** A CMRC will be recruited to assist the PIU in the preparation and implementation of the DDRs, if required, and the application of the MFF resettlement framework. Key tasks include the identification and survey of all affected if any and the implementation of measures to address temporary impacts resulting from program construction activities. The CMRC will be specifically assigned for community mobilization and resettlement implementation activities.
57. Key activities of the CMRC in relation to resettlement planning and implementation include: (i) conducting detailed survey of physically and economically DPs based on the detailed design, and identifying poor, female-headed, and vulnerable households affected by land acquisition and resettlement; (ii) preparing the list of the potential DPs and issuing identification cards; (iii) facilitating the process of disbursement of compensation to the DPs, coordinating with the revenue department and informing the DPs of the compensation disbursement process and timeline; (iv) assisting DPs in opening bank accounts, explaining the implications, rules, and obligations of a joint account and how he or she can access the resources he or she is entitled to; (v) assisting the executing agency in ensuring a smooth transition (during the partial or full relocation of the DPs). In close consultation with the DPs, the CMRC shall inform the PIU about the shifting dates agreed upon and the arrangements they desire with respect to their entitlements; (vi) organizing training programs for income restoration (after conducting a training needs program the CMRC will ensure training through industrial training institutes, if the displaced person so desires); (vii) conducting meaningful, ongoing consultation and ensuring disclosure of DDRs in an accessible manner to the DPs; (viii) assisting the PIU in establishing a GRM; (ix) assisting the PIU in keeping detailed records of progress and establishing monitoring and reporting systems of resettlement; (x) acting as a platform for public interface for community interaction throughout the program, and liaising between community, contractors, and program management and implementing units during the execution of the works; and (xi) providing advice and other support to the PIU as require.

58. As stated above, the safeguards officer will be drawn from DJB's engineering staff, although it should be noted that DJB staff have limited experience in dealing with social safeguard issues. It is therefore essential that the safeguard officer is provided with the necessary training to deal with environmental and social safeguard tasks following ADB SPS 2009. The safeguards officer will be trained through a series of programs periodically conducted by ADB for executing agencies and implementing agencies on safeguards.
59. The PMC resettlement specialist will conduct a training and capacity building program on resettlement management for the PIU staff on issues concerning: (i) principles and procedures of land acquisition; (ii) public consultation and participation; (iii) entitlements and compensation disbursement mechanisms; (iv) grievance redress; (v) monitoring of resettlement operation; and (vi) disclosure methods. Specific modules customized for the available skill set shall be devised after assessing the capabilities of the target participants and the requirements of the investment program. Institutional capacity building programs will involve training on environmental and social safeguards for the PIU staff and the contractors' employees.

M. Suggested Implementation Schedule

60. Project comprises of construction of transmission pipe lines, new Clear Water Reservoir (CWR) and Clear Water Pumping Stations (CWPS) including PLC and integrated SCADA.
61. Burari TPA, Burari A, Burari B, Siraspur (demand inclusive of Holambikalan) designated as Line-1 will be supplied through 1400mm dia transmission line; Mukherhee Nagar, Fruit Mandi, CD Park, SGT Nagar represented as Line-2 will be supplied water through 1100mm dia transmission line. Line 1-Burari and Line-2 -SGT Nagar both lines will take water from new UGR. Pitampura, Model Town, Lawrance Road, Peeragari, Punjabi Bagh UGR designated as Line 3 will be supplied water from new UGR at WTP through 1500mm dia transmission line from Wazirabad WTP.
62. About 10.98 Km length has been retained out of 34.60 Km existing length of above three lines (Line-1: 2.95 Km; Line-2: 13.56 Km; Line-3: 18.09 Km) The length of newly proposed transmission line is approximately 37.28 Km (Line-1: 8.88 Km of 1400/1200/900 dia.: Line-2: 6.11Km of 500/400/700/900/800 mm dia.); Line-3: 22.28 Km of 1500/1400/900/800/700/600) including trenchless of 1.6 Km and tentatively 10.98 km existing line (Line-2: 8.85 Km of 1100 mm dia. & Line-3: 2.13 Km of 1500mm dia.) has been proposed to be retained Therefore, overall length of transmission system becomes 48.26 Km for 91 MGD transmission system. .
63. Three new UGR/CWR along with single Pump house and ancillary buildings are proposed under this package. Phase 4 UGR and Pump house of 11 MGD Recycle Plant will be integrated with the proposed scheme and will be suitably connected to proposed transmission main system.
64. It is proposed that new clear water pump house will be constructed, therefore, all E&M equipment's has been considered are new. All existing E&M equipment at Phase -1, 2, 3 plant is proposed to be abandoned as required once new pump house is constructed & commissioned. As per the requirement abandoned Phase 3 UGR will be demolished and in place of that proposed single CWR/UGR along with Pump House will be constructed in that place for proposed 120MGD WTP.
65. The proposed water Transmission System targets to meet water demand up to year 2051, whereas the Electro-Mechanical components are designed to meet the demand up

to the intermediate year 2036. Instrumentation system for monitoring of flow, water quality, level and pressure of water supply has been proposed with integrated PLC/SCADA system at each CWR/CWPS.

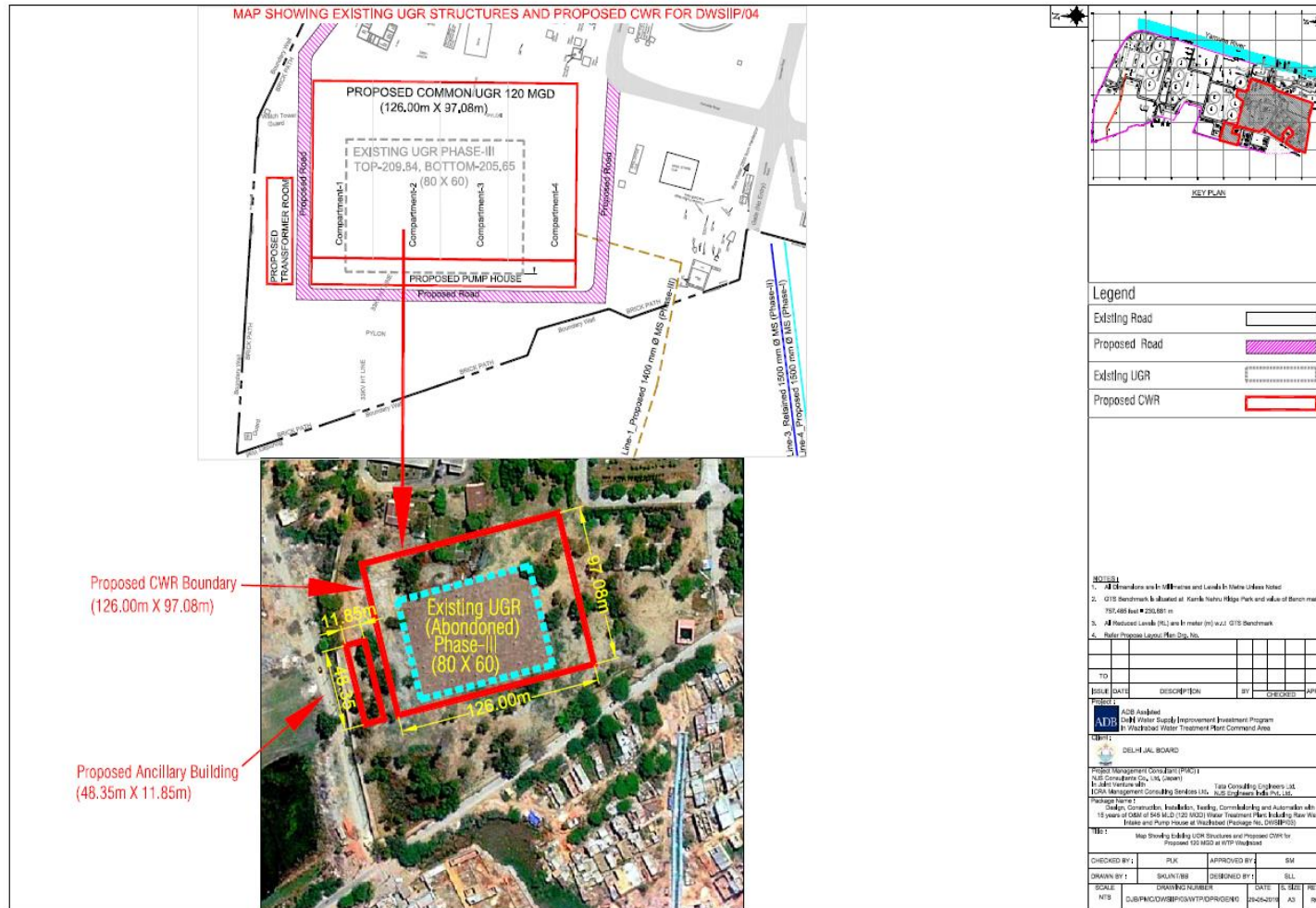
N. Monitoring and Reporting

66. **Internal Monitoring:** Internal monitoring will be undertaken by the PIU with assistance from the PMC. Internal monitoring will ensure implementation of the project as per the approved DPR and DDR and in accordance with this resettlement framework. The PIU safeguards officer will prepare quarterly progress reports and submit to the program director. The PIU will prepare semi-annual monitoring reports and submit to the ADB. The PMC/RPIA NGO will submit quarterly progress reports to PIU to inform them of DDR implementation activities. These reports will describe the progress of the implementation of resettlement activities and any compliance issues and corrective actions. These reports will closely follow the involuntary resettlement monitoring indicators agreed at the time of RP/DDR approval.
67. **External Monitoring:** External monitoring is only needed for Category A projects and as per current expectations, is not required under the DWSIIP.

Annexure 1: Google Earth Map showing Path from WTP Gate to Proposed CWR



Annexure 2: Detailed layout of proposed CWR



Annexure 3: DJB's self-certification of land ownership

Annexure 4: Consultation Sheets

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

Date: 1.2.18

Venue: Sheesh Mahal, Shalimar Bagh

S.No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
	District Pante D Block Shalimar Bagh	Saini Sahib	
	S.C Khandani	Man Singh	EL
	Env Specialist PMC-PWSII	Ram Bahadur	
		Sheesh Mahal is a	
		ASI protected monument	
		in about 0.3 hectare land	
		properly fenced by wall	
		with steel fencing.	
		and outer area is	
		wall fenced and is	
		a MC & maintained	
		park in about 20	
		hectare land area.	
		The park is named	
		as District Pante	
		D Block Shalimar Bagh	

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

ate: 26.2.18 Venue: Sewa Basti, Subhash Chandra Laxmanee

No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
1	Shibu Thakur		Shibu Thakur
2	Raghvender		Raghvender
3	Anura Devi		(Signature)
4	Chandana wati		(Signature)
	Anurag		Anurag
	Apt Kumar		Apt Kumar
	Aakhs		Aakhs
	Arun		Arun
	Harsh		Harsh
	Nitesh		Nitesh
	Subhash		Subhash
	Raj Ram		Raj Ram

S. C. Khanduor
Env. Specialist

(Signature)

Road
near
Dada
Datta
Shir
Mandir

Room Officer

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

Date: 26.2.18 Venue: Sewa Basti, Subhash Chandra Laxmanee

S.No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
1	Shibu Thakur	① There is water crisis in the area as piped water supply ^{get} interrupted since last two months.	<i>Shibu Thakur</i>
2	Raghvender	② Colony have 03 India Mark-2 hand pumps as alternative to WSS.	<i>Raghvender</i>
3	Anura Devi	③ Proposed WSS ^{attract from this area} seems unfeasible as there are habitation above the pipe line and no open space available in the area.	<i>Anura Devi</i>
4	Chandawath	④ Informal community about proposed and possible in convenience.	<i>Chandawath</i>
5	Anurag	⑤ WSS from the water supply authority as per the users interaction during public consultation.	<i>Anurag</i>
6	Ajit Kumar	⑥ Community resides in the area for last 03 decades.	<i>Ajit Kumar</i>
7	Aaksh	⑦ Having ^{type} old pucca and semi pucca with G.I.	<i>Aaksh</i>
8	Arun	⑧ For an improved water supply community assured to provide all possible support for construction work.	<i>Arun</i>
9	Harsh		<i>harsh</i>
10	Nitesh		<i>Nitesh</i>
11	Subhash		<i>Subhash</i>
12	Raj Ram		

⑬ S.C. Khanduoi
Env. Specialist P.M.C.

⑭ Dr. K. Singh
Social Safeguard

⑮ Niboshi

SL

Wing

Wing

Read
near
Dada
Dera
Shir
Mandir

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

Date: 2.3.18

Venue: Central Market Purgabi Bagh

S.No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
1.	Bablu Yadav Parking Attendant 9990202752	① Discussed possible in convenience in the construction phase	Bablu
2.	Naseem Kuma Head Constable Police	② Can be mitigated through prior information	Naseem 9266669052
3.	Rajiv Chadda 9899872776	③ Need to get permission from TC of Traffic Police	Rajiv Chadda
4.	Harpal 9350453312	④ TC - Purgabi Bagh in incharge of this area	Harpal
5.	Sunny 9911850450	⑤ TC - Purgabi Bagh 8750871464	Sunny
6.	Dr K. Singh	⑥ Traffic police have Northern, Central-West and	Dr K. Singh
7.	S.C. Khadwal	Outer zone in Delhi. Project area is mainly in West zone Traffic Police	S.C. Khadwal
		⑦ DCP-Traffic office in in Todapur Near Pusha.	
		⑧ For administrative purpose Sna Purgabi Bagh can be contacted ie Rajiv Bhardwaj 8750871124	
		⑨ Generally if map plan and project docs are submitted it take 2 weeks in getting traffic division permission	
		⑩ RWA also should be consulted well in advance Office of Cooperation i.e. in West purgabi bagh can be instrumental	

Delhi Jal Board: Government of Delhi
Delhi Water Supply Improvement Investment Program
Public Consultation participation Note Sheet

Date: 6.4.2014

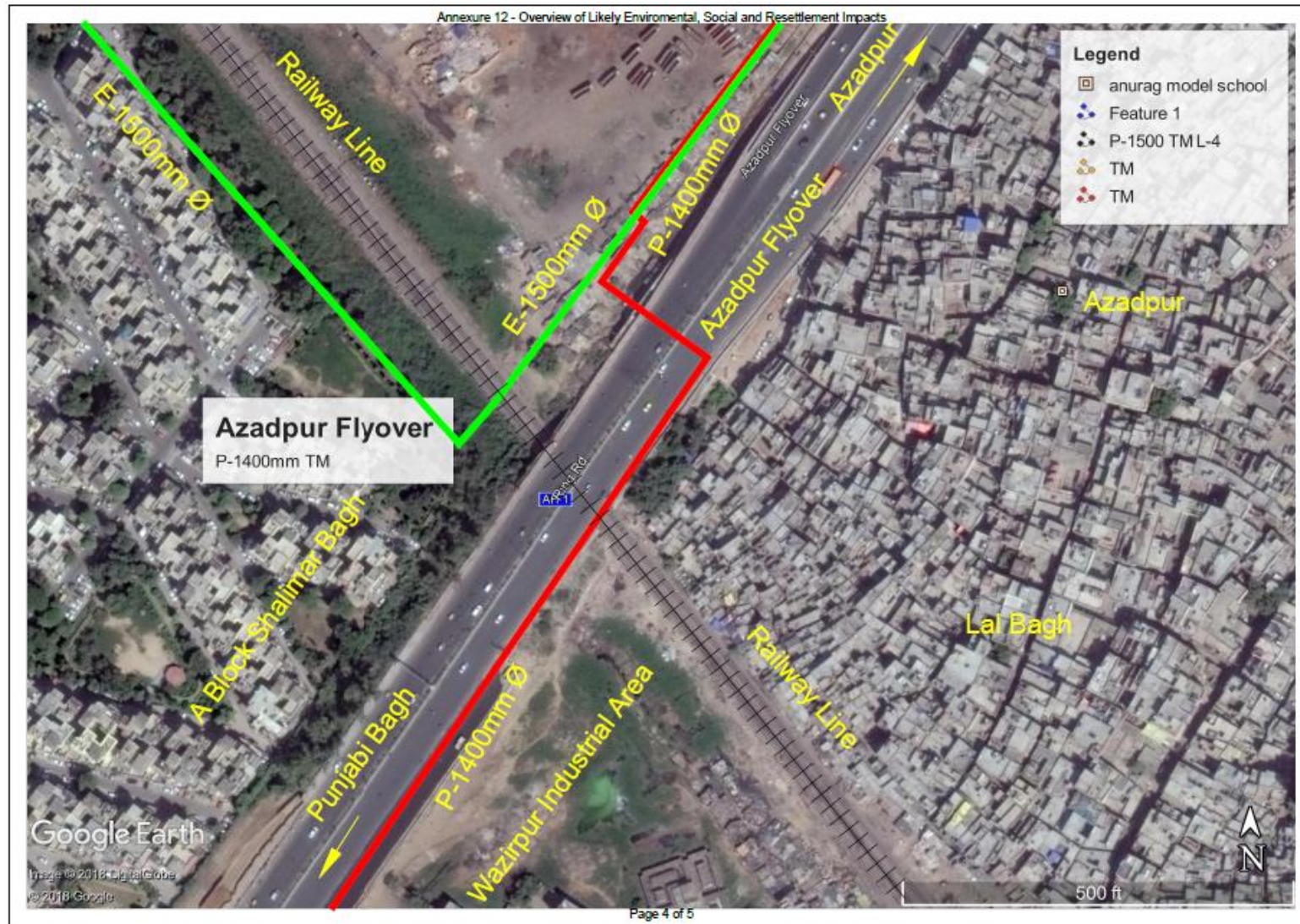
Venue: W.T.P. Wazirabad

S.No	Name of the Person, designation and Phone number	Remarks (if any)	Signature
1	Praveen Chandra Site Engineer / Surveyor	⊗ These are 10 numbers of Female sweepers working in WTP. Wazirabad.	<i>[Signature]</i>
2	Alok Sharma Construction Engineer	⊗ Working hours are 8am to 4:30 pm.	<i>[Signature]</i>
3	Nibarti Dey Senior Surveyor	⊗ All female sweepers are working as permanent	<i>[Signature]</i>
4	Diksha Design Engineer	⊗ There is no arrangement for cleaning during holidays	<i>[Signature]</i>
5	Amrita Hydraulic Engineer	⊗ No safety gadgets uniform and OHS training	<i>[Signature]</i>
6	P.L. Kshirsagar Civil Engineer	⊗ There is no canteen facility available in WTP premises.	<i>[Signature]</i>
7	Yatin Doshi GIS Analyst	⊗ Almost all tools are properly labelled with a number printed on it.	<i>[Signature]</i>
8	Anil Kumar Design Engineer	⊗ There is no water stand post in the premises.	<i>[Signature]</i>
9	Suresh C. Khanduri Environmental Specialist		<i>[Signature]</i>
10	Dr. Rakhi Singh Resettlement Specialist		<i>[Signature]</i>
11	Shawli Sweepers, DJB-WTP		
12	Sudha Sweepers, WTP Wazirabad		
12	Shakuntala Sweepers, WTP Wazirabad	⊗ WTP premises are adequately fenced for safety.	

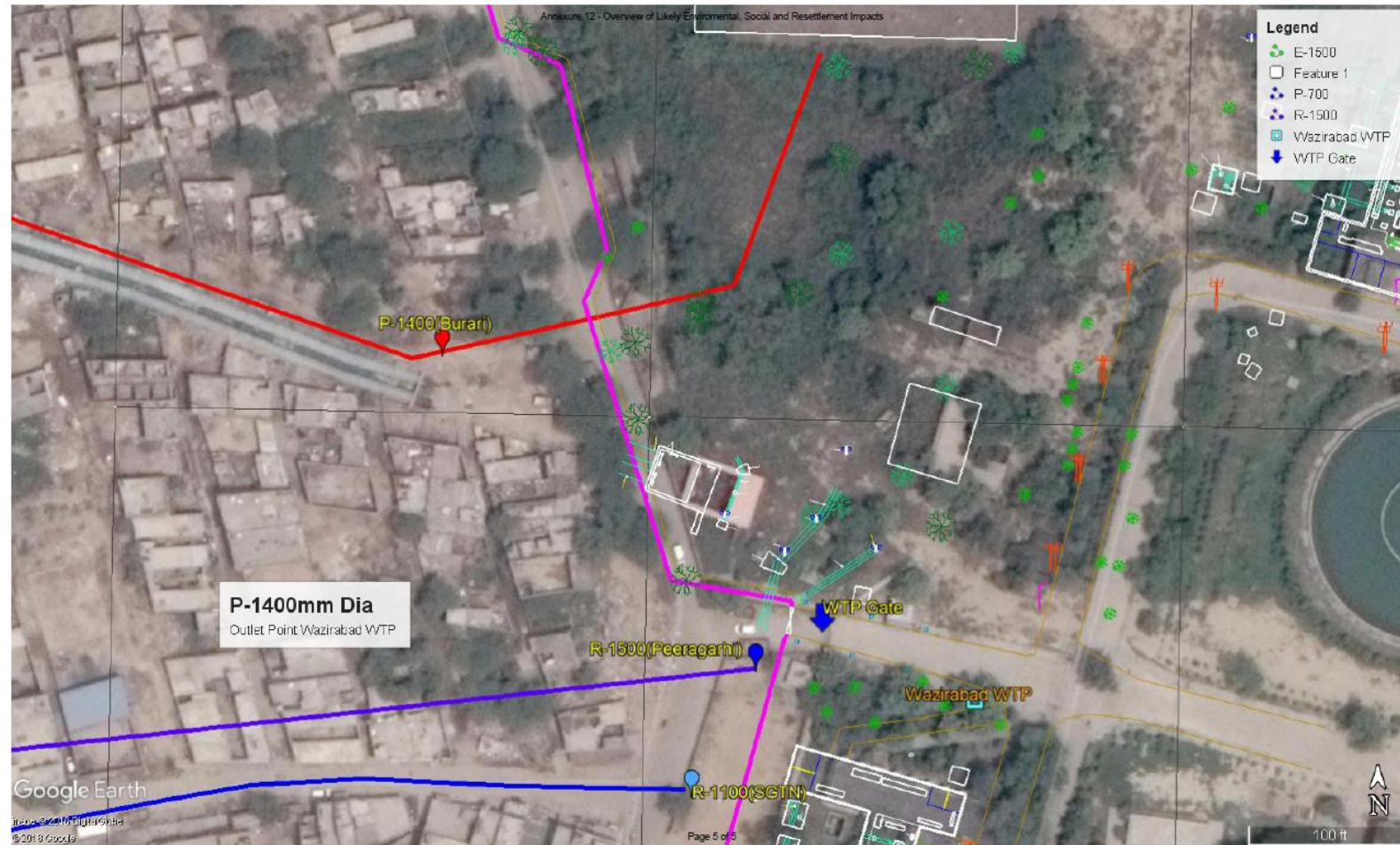
Annexure 5: Site visits

	
<p>Checking Alignment with environment expert</p>	<p>PMC team for package 4 discussing with client</p>
	
<p>Understanding metering, new connections at DJB office at SGT Nagar</p>	<p>PMC team investigating Wazirabad WTP site</p>
	
<p>Checking road width for pipeline laying</p>	<p>Checking alignment at bridge location</p>

Annexure 6: Critical Areas-Azadpur Flyover



Annexure 7: Critical Location – Behind Wazirabad WTP



Annexure 8: NOC of Road ownership from PWD/MCD



DELHI JAL BOARD:GOVT OF NCT OF DELHI
OFFICE OF THE EXECUTIVE ENGINEER(E&M)II
WAZIRABAD WATER WORKS,TIMARPUR, DELHI-110054



No:87/-DJB/EE(E&M)-II/WZD/2019/ 2044

Dated: 12.09.2019

TO WHOM IT MAY CONCERN

This is to certify that all new facilities (Clear Water Reservoir-CWR) and rehabilitation of existing facilities to be undertaken within the premises of Wazirabad WTP under ADB Assisted Delhi Water Supply Improvement Investment Program (DWSIIP) – Package DWSIIP/04 are within Delhi Jal Board land ownership.

Executive Engineer (E&M)-II

Section 7 - General Conditions of Contract

The Conditions of Contract comprise two parts, these Section 7-General Conditions of Contract (GCC) and the following Section 8-Particular Conditions of Contract (PCC).

The General Conditions shall be the Conditions of Contract for Design, Build, and Operate Projects, also known as "the Gold Book", 2008 edition, prepared by the Federation Internationale des Ingenieurs-Conseil/ (FIDIC). They are not reproduced here, and Bidders who do not have a set of the Gold Book can purchase it at the FIDIC Bookshop: www.fidic.org.

Any amendments and additions to the GCC, specific to the contract in hand, are introduced in Section 8 (Particular Conditions of Contract), Part A (Contract Data) and Part B (Specific Provisions). Clause numbers in the PCC correspond to those in the GCC.

Part A (Contract Data) of the PCC includes data to complement the GCC in a manner similar to the way in which the Bid Data Sheet (BDS) complements the Instructions to Bidders (ITB). Part B (Specific Provisions), includes the amendments and additions to the GCC.

APPENDIX

General Conditions of Dispute Board Agreement

1. Definitions

Each "Dispute Board Agreement" is a tripartite agreement by and between:

- (a) the "Employer";
- (b) the "Contractor"; and
- (c) the "Member" who is defined in the Dispute Board Agreement as being:
 - (i) the sole member of the "DB" and, where this is the case, all references to the "Other Members" do not apply, or
 - (ii) one of the three persons who are jointly called the "DB" (or "dispute board") and, where this is the case, the other two persons are called the "Other Members."

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Board Agreement, which incorporates this Appendix. In the Dispute Board Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2. General Provisions

Unless otherwise stated in the Dispute Board Agreement, it shall take effect on the latest of the following dates:

- (a) the Commencement Date defined in the Contract,
- (b) when the Employer, the Contractor, and the Member have each signed the Dispute Board Agreement, or
- (c) when the Employer, the Contractor and each of the Other Members (if any) have respectively each signed a dispute board agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 days' notice of resignation to the Employer and to the Contractor, and the Dispute Agreement shall terminate upon the expiry of this period.

3. Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor, and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members (if any), any fact or circumstance, which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

When appointing the Member, the Employer and the Contractor relied upon the Member's representations that he/she is

- (a) experienced in the work, which the Contractor is to carry out under the Contract;

- (b) experienced in the interpretation of contract documentation; and
- (c) Fluent in the language for communications defined in the Contract.

**4. General
Obligations of
the Member**

The Member shall

- (a) have no interest, financial or otherwise, in the Employer, the Contractor or Engineer, nor any financial interest in the Contract except for payment under the Dispute Board Agreement;
- (b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor, or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Board Agreement;
- (c) have disclosed in writing to the Employer, the Contractor, and the Other Members (if any), before entering into the Dispute Board Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer, or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;
- (d) not, for the duration of the Dispute Board Agreement, be employed as a consultant or otherwise by the Employer, the Contractor, or the Engineer, except as may be agreed in writing by the Employer, the Contractor, and the Other Members (if any);
- (e) comply with the annexed procedural rules and with Subclause 20.4 of the Conditions of Contract;
- (f) not give advice to the Employer, the Contractor, the Employer's Personnel or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;
- (g) not, while a Member, enter into discussions or make any agreement with the Employer, the Contractor, or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Board Agreement;
- (h) ensure his/her availability for all site visits and hearings as are necessary;
- (i) become conversant with the Contract and with the progress of the Works (and of any other parts of the project of which the Contract forms part) by studying all documents received, which shall be maintained in a current working file;
- (j) treat the details of the Contract and all the Dispute Board's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor, and the Other Members (if any); and
- (k) be available to give advice and opinions, on any matter relevant to the Contract when requested by both the Employer and the

Contractor, subject to the agreement of the Other Members (if any).

**5. General
Obligations of
the Employer
and the
Contractor**

The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the Dispute Board's activities under the Contract and the Dispute Board Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member, and the Other Members (if any),

- (a) be appointed as an arbitrator in any arbitration under the Contract;
- (b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or
- (c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the Dispute Board under Subclause 20.4 of the Conditions of Contract, which will require the Member to make a site visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

6. Payment

The Member shall be paid as follows, in the currency named in the Dispute Board Agreement:

- (a) a retainer fee per calendar month, which shall be considered as payment in full for
 - (i) being available on 28 days' notice for all site visits and hearings;
 - (ii) becoming and remaining conversant with all project developments and maintaining relevant files;
 - (iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and
 - (iv) all services performed hereunder except those referred to in sub-paragraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Board Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which the Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by one third. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Board Agreement is otherwise terminated.

- (b) a daily fee, which shall be considered as payment in full, for
 - (i) each day or part of a day up to a maximum of 2 days' travel time in each direction for the journey between the Member's home and the site, or another location of a meeting with the Other Members (if any);
 - (ii) each working day on Site visits, hearings, or preparing decisions; and
 - (iii) each day spent reading submissions in preparation for a hearing.
- (c) all reasonable expenses, including necessary travel expenses (air fare in less than first class, hotel and subsistence, and other direct travel expenses) incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, faxes and telexes: a receipt shall be required for each item in excess of five percent (5%) of the daily fee referred to in subparagraph (b) of this Clause;
- (d) any taxes properly levied in the Country on payments made to the Member (unless a national or permanent resident of the Country) under this Clause 6.

The retainer and daily fees shall be as specified in the Dispute Board Agreement. Unless it specifies otherwise, these fees shall remain fixed for the first 24 calendar months, and shall thereafter be adjusted by agreement between the Employer, the Contractor, and the Member, at each anniversary of the date on which the Dispute Board Agreement became effective.

If the parties fail to agree on the retainer fee or the daily fee, the appointing entity or official named in the Contract Data shall determine the amount of the fees to be used.

The Member shall submit invoices for payment of the monthly retainer and air fares quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement

of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Board Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the Dispute Board; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in Subclause 14.8 of the Conditions of Contract.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until the payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

7. Termination

At any time, (i) the Employer and the Contractor may jointly terminate the Dispute Board Agreement by giving 42 days' notice to the Member; or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Board Agreement, the Employer and the Contractor may, without prejudice to their other rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Board Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor, and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

8. Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 (a)-(d) above, he shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members (if any), for proceedings or decisions (if any) of the Dispute Board which are rendered void or ineffective by the said failure to comply.

If the Member fails to comply with any of his obligations under Clause 4 (e) - (k) above, he shall not be entitled to any fees or expenses hereunder from the date and to the extent of the noncompliance and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses already received by the Member, for proceedings or decisions (if any) of the Dispute Board, which are rendered void or ineffective by the said failure to comply.

9. Disputes

Any dispute or claim arising out of or in connection with this Dispute Board Agreement, or the breach, termination, or invalidity thereof, shall be finally settled by institutional arbitration. If no other arbitration institute is agreed, the arbitration shall be conducted under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with these Rules of Arbitration.

Procedural Rules

Unless otherwise agreed by the Employer and the Contractor, the Dispute Board shall visit the site at intervals of not more than 140 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor, and the Dispute Board, the period between consecutive visits shall not be less than 70 days, except as required to convene a hearing as described below.

The timing of and agenda for each site visit shall be as agreed jointly by the Dispute Board, the Employer, and the Contractor, or in the absence of agreement, shall be decided by the Dispute Board. The purpose of site visits is to enable the Dispute Board to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to endeavor to prevent potential problems or claims from becoming disputes.

Site visits shall be attended by the Employer, the Contractor, and the Engineer and shall be coordinated by the Employer in cooperation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each site visit and before leaving the site, the Dispute Board shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.

The Employer and the Contractor shall furnish to the Dispute Board one copy of all documents which the Dispute Board may request, including Contract documents, progress reports, variation instructions, certificates, and other documents pertinent to the performance of the Contract. All communications between the DB and the Employer or the Contractor shall be copied to the other Party. If the Dispute Board comprises three persons, the Employer and the Contractor shall send copies of these requested documents and these communications to each of these persons.

If any dispute is referred to the Dispute Board in accordance with Subclause 20.4 of the Conditions of Contract, the Dispute Board shall proceed in accordance with Subclause 20.4 and these Rules. Subject to the time allowed to give notice of a decision and other relevant factors, the Dispute Board shall

- a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case; and
- b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.

The Dispute Board may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.

Except as otherwise agreed in writing by the Employer and the Contractor, the Dispute Board shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor, and the Engineer, and to proceed in the absence of any party who the Dispute Board is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.

The Employer and the Contractor empower the Dispute Board, among other things, to

- a) establish the procedure to be applied in deciding a dispute;
- b) decide upon the Dispute Board's own jurisdiction, and as to the scope of any dispute referred to it;
- c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Guidelines;
- d) take the initiative in ascertaining the facts and matters required for a decision;
- e) make use of its own specialist knowledge, if any;
- f) decide upon the payment of financing charges in accordance with the Contract;
- g) (decide upon any provisional relief such as interim or conservatory measures; and
- h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute.

The Dispute Board shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the Dispute Board shall make and give its decision in accordance with Sub clause 20.4, or as otherwise agreed by the Employer and the Contractor in writing. If the Dispute Board comprises three persons:

- a) it shall convene in private after a hearing, in order to have discussions and prepare its decision;
- b) it shall endeavour to reach a unanimous decision: if this proves impossible, the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and
- c) if a Member fails to attend a meeting or hearing, or to fulfil any required function, the other two Members may nevertheless proceed to make a decision, unless
- d) either the Employer or the Contractor does not agree that they do so, or
- e) the absent Member is the chairman and he/she instructs the other Members to not make a decision.

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

Sub-Clause	Data to be given	Data
1.1.24	Where the Contract allows for Cost Plus Profit, percentage Profit to be added to the Cost	15%
1.1.26	Cut off Date (number of days after the Time for Completion of Design-Build)	30 days
1.1.32	Employer's Name and Address	Delhi Jal Board, represented by Project Manager, DWSIIP Executive Engineer (EAP) -III, Delhi Jal Board, Over Head Tank, Ashok Vihar, Delhi-110052, India Executive Engineer (E&M) WC-I 12/4 Varun Niketan , Pitampura Delhi-110085, India
1.1.35	Employer's Representative's name and address	Project Management Consultant (PMC) – DWSIIP Represented by : Team Leader -NJS Consultants Co., Ltd (Lead Partner) in Joint Venture with ICRA Management Consulting Services Limited, TATA Consulting Engineers Ltd. & NJS Engineers India Pvt. Ltd.
1.1.70	Parts of the Works that shall be designated a Section for the purposes of the Contract	Section means the part of Works scheduled to be completed provided at Section 6 – Employer's Requirements. Section-1: Line – 1 i.e. Proposed 1400, 1200, 900, 800, 700 and 250 mm Dia Transmission Pipe from Wazirabad WTP to Burari TPA, Burari A, Burari B & Siraspur UGR along with associated Pumping station Section-2 Line – 2 i.e. Proposed 450, 500,600 and 700 mm Dia Transmission Pipe from Retained 1100, 900 and 700 mm Dia to MN, MT, CD Park & SGT N UGR along with associated Pumping station Section-3 Line – 3 i.e. Proposed 1400, 1200, 900, 800, 700 and 250 mm Dia Transmission Pipe from Wazirabad WTP to Burari TPA, Burari A, Burari B & Siraspur UGR along with associated Pumping station
1.1.78	Time for Completion of Design-Build one of Section on top priority; to be identified later during preparation and approval of SIP	1260 days from Commencement Date 900 days from Commencement Date
1.3 (c)	Agreed methods of electronic transmission	By electronic mail to official Email ID only

Sub-Clause	Data to be given	Data
1.3 (d)	Address of Employer for communications	Delhi Jal Board, represented by Project Manager, DWSIIP Executive Engineer (EAP) -III, Delhi Jal Board, Over Head Tank, Ashok Vihar, Delhi-110 052, India
1.3 (d)	Address of Employer's Representative for communications	Team Leader, Project Management Consultants - DWSIIP Gyan Avenue, 12 Pragati Market Ashok Vihar II, New Delhi-110052
1.3 (d)	Address of Contractor for communications	Contractor to provide prior to signing of Contract Agreement
1.4	Contract shall be governed by the law of	India
1.4	Ruling Language	English
1.4	Language for Communication	English
2.1	After Commencement Date, the Contractor shall be given right of access to all or part of the Site within:	Right of access <ul style="list-style-type: none"> • For priority Transmission line: 7 days after commencement Date • For other stretch of Transmission line: as per the completion schedule • For CWT and pumping stations: 7 days after commencement Date
4.2	Performance Security (as percentages of the Accepted Contract Amount in Currencies)	<p>The Performance Security shall be in the form of an unconditional bank guarantee equivalent to the amount indicated below, issued by a reputable bank, which includes scheduled banks or nationalized banks of the Employer's country</p> <p>The Performance Security shall be denominated in currency/ies stated in the bid of the successful bidder.</p> <p>Amount of Performance Security Two Separate Performance Securities to be furnished by the Contractor as indicated below:</p> <ul style="list-style-type: none"> • <i>Design – Build Performance Security</i> – 10 % of the Design-Build Contract Price • <i>Operations Services Performance Security</i> – 10% of the Operation Services Contract Price <p>Time of Submission <i>Design - Build Performance Security</i> - Within 28 days after issue of Letter of Acceptance <i>Operations Services Performance Security</i>: Within 28 days before start of Operations Period.</p> <p>The Employers name and address in the Performance Security for the Design Build and Operations Services will be as per Contract Data Clause 1.1.32.</p>

Sub-Clause	Data to be given	Data
		<p>Return of Performance Security <i>Design-Build Performance Security:</i> 75% to be released at the end of the Retention Period (365 days after issuance of the Commissioning Certificate)</p> <p>25% to be released after issue of Contract Completion Certificate</p> <p><i>Operations Services Performance Security:</i> The Performance Security to be reduced annually after adjusting the cost of accepted O&M Contract Price for previous year.</p>
4.2	Reduction in Performance Security at the end of the Retention Period	As Defined above
5.1	Period for notification of errors, faults and other defects is	90 days from the Commencement Date
5.2	Contractor's Documents requiring approval	The Service Improvement Plan (SIP) which includes all documents as detailed in Section 6.1, Scope of Services
6.5	Normal working hours on the Site	<p>Normal hours during which work will be permitted to be carried out at the Site shall be between 09:00 hrs to 18:00 hrs, Monday to Saturday, excluding gazetted and national holidays.</p> <p>The Contractor shall be responsible to obtain the written consent of the Employer's Representative and concerned authorities if he desires to work outside these times.</p> <p>The Operations Services shall be carried out 24 hours a day, 7 days a week for all days of the year including national holidays.</p>
8.2	Period of the Operation Service	Start Date: 1260 days from commencement date End Date: 4910 days from Commencement Date
9.2	Time for Completion of Design-Build	1260 days from commencement date. one of Section on top priority; to be identified later during preparation and approval of SIP to be completed within 900 days from Commencement Date
9.6	Delay damages (percent of final Contract Price per day of delay)	<ul style="list-style-type: none"> • Applicable on delays in sectional completion and/or delay in complete Design Build works • 0.02 % of the Accepted Contract Amount of Design Build works of sections or full Design Build work (excluding Operation services) on per day basis pertaining to each sections or full completion of Design Build, in

Sub-Clause	Data to be given	Data
		the same currency / currencies in which the Design Build Contract price is payable.
9.6	Maximum amount of delay damages	<ul style="list-style-type: none"> Maximum amount of sectional delay damages limited to 10% of Accepted Contract Amount of the section Maximum amount of delay damages equal to 10% of Accepted Contract Amount for the Design Build.
10.6 (a)	Maximum compensation payable by the Contractor	10% of the Accepted Contract Amount for Operation Services
10.6 (b)	Maximum compensation payable by the Employer	10% of the Accepted Contract Amount for Operation Services
10.7	Performance damages	Shall be in accordance with Clause 3.2 of Schedule 3 to Section 8: Particular Conditions of Contract - Contractor Payment
10.7	Rights of Employer if failure continues for more than 84 days	As per Clause 10.7 (b) Conditions of the Contract
10.7	Minimum production output required	Shall be in accordance with subsection B- Performance Targets of Schedule 5 to Section 8: Particular Conditions of Contract– Performance Targets and Measurement
13.5	Percentage rate to be applied to Provisional Sums	15% which includes statutory deductions on contractor payment
13.8	Adjustment for changes in costs	Adjustment for changes in costs (Price adjustment) shall be as per the provisions in Schedule 3 to Section 8: Particular Conditions of Contract – Contractor Payment
14.2	Amount of Advance Payment (percent of Accepted Contract Amount)	<ul style="list-style-type: none"> 10% of the Accepted Contract Amount of Design Build works in two installments Against a bank guarantee of equal amount issued by a reputable bank, including scheduled bank or nationalized bank of India or a foreign bank through a correspondent bank located in India to make it enforceable First installment of not more than 5% of the Accepted Contract Amount immediately after signing the Contract. Second instalment of remaining amount on demand by the contractor on submission of details of use of first instalment.
14.2	Currencies of payment if different to the currencies quotes in the Contract	Not applicable.
14.3(c)	Percentage of Retention	10% of the Interim Payment Certificates
14.3(c)	Limit of Retention Money	5% of Accepted Contract Amount for the Design - Build
14.6 (b) (i)	Plant and Materials for payment when shipped	Not applicable; No payment against shipping will be made to the Contractor.

Sub-Clause	Data to be given	Data
14.6(c) (i)	Plant and Materials for payment when delivered to the Site	Payment for Plant and Materials when delivered to the Site shall be as stated in Schedule 3 to Section 8: Particular Conditions of Contract - Contractor Payment
14.7(b)	Minimum Amount of Interim Payment Certificate	<ul style="list-style-type: none"> 1% of the Accepted Contract Price for Design-Build portion payment on monthly basis for Operational Services
14.9	Financing charges for delayed payment:	If payment of any sum payable is delayed, the Contractor shall be entitled to receive interest on the unpaid amount during the period of delay. Interest will be calculated from the date by which the payment shall have been made at the simple interest rate of 4 % (four percent) per annum.
14.10	Payment of Retention Money	50% of Retention Money applicable to Completion of works can be released against Bank Guarantee after accumulation of limit of Retention Money. Balance 50% retention money can be released against Bank Guarantee within 30 days of successful commissioning of the works. The validity of these Bank Guarantees will be 6 month beyond commissioning of the works and the same will be released accordingly”
14.17	Currencies for payment of Contract Price	The currencies of payment shall be the currency or currencies as specified for the Accepted Contract Amount in the Letter of Acceptance.
14.17	Proportion of Local and Foreign Currencies are	In the proportions of currencies of Contract as quoted by the Bidder
14.17	Rate of Exchange	As per GC Clause No 14.17 (e)
14.17	Currencies for Payment of Damages	Local and Foreign Currency in the proportions of contract.
14.19	Amount of Maintenance Retention Fund	5% of the Accepted Contract Amount for Operation Service
17.1	Operation of forces of nature allocated to the Contractor	None
17.8	Total liability of the Contractor shall not exceed	100% of that portion of the Accepted Contract Amount attributable to the Design-Build of the Works for the period extending until 5 years after the date of issue of the Commissioning Certificate, at which point the Total Liability of the Contractor shall reduce to 50% of the Accepted Contract Amount attributable to the Design-Build of the Works until Contract Completion.
19.2 (a) (i)	Permitted Deductible Limits	NIL
19.2 (c)	Insurance of Contractor's Equipment (amount required)	Minimum of INR 200 Million for the total project duration
19.2 (c)	Amount of professional liability insurance	100% of the Design-Build Contract Price (For Design-Build Contract Period),

Sub-Clause	Data to be given	Data
		100% of the Operations Services Contract Price (for the Operations Services Period)
19.2 (c)	Period for which professional liability insurance required	Until issue of final payment certificate for Design-Build. For the entire period of Operations Services.
19.2 (d)	Amount of insurance required for injury to persons and damage to property	Shall be to a minimum of INR 5 (five) million for each occurrence with unlimited occurrences up to the Contract Completion Date
19.2 (f)	Other insurances required by law and local practice	As per GOI Regulations in India and specific in NCR region.
19.3 (a)	Amount of fire extended cover insurance required	INR 100 million
19.3 (d)	Other insurances required by law from the Contractor	As per GOI Regulations in India and specific in NCR region.
19.3 (e)	Other Optional Operational Insurances	None
20.3	Date for appointment of DAB	28 days from the Commencement Date
20.4	The DAB shall comprise	3 (Three) members
20.4	Appointing entity (official) for DAB members, if not agreed, shall be:	The President of FIDIC or a person appointed by him/her.
20.8	Place of Arbitration	For National (Indian) Contractor: at Delhi For Foreign Contractor: at Singapore
20.8	Language to be used for arbitration proceedings	English
20.8(a)	Arbitration to be administered by:	For National (Indian) Contractor: As per Rules of Arbitration of the Indian Arbitration Act For Foreign Contractor: As per Rules of Arbitration of Singapore International Arbitration Centre (SIAC) Administering Institution: SIAC

Part B –Special Provisions

The Particular Conditions of Contract (PCC) Part B – Special Provisions, is to amend or for additions to the General Conditions of Contract (GCC - Section 7). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Sub-Clause	Section	Special Provision
1.1	Definitions	Unless otherwise specifically stated, or unless the context requires otherwise, capitalized terms in this Part B and in the Schedules to the Section 8: Particular Conditions of Contract are as defined under Sub-Clause 1.1 of the General Conditions of Contract and under Section 6.1 Scope of Services under Section 6 - Employer's Requirements. 'Bid' and 'Tender' will have the same meaning, as defined in Section 1- Instructions to Bidder.

Sub-Clause	Section	Special Provision
		Performance Standards are the minimum standard to measure quality, efficiency and performance of service delivery parameters set under clause D of Schedule 5 attached to Section 8: Particular Conditions of Contract
1.1.8	Commissioning Certificate	Replace the text under this sub-clause in totality with the following text: “Commissioning Certificate” means the certificate issued by the Employers Representative to the Contractor under Sub-Clause No 11.7 [Commissioning Certificate] marking the end of the Design Build Period under Sub-Clause 9.12 [Completion of Design Build] and the commencement of the Operations Service Period of the Constructed works or section as applicable.”
1.1.35	Employer’s Representative	The term “Engineer”, as used in the Contract, is synonymous to “Employer’s Representative”
1.1.58	Operation Service Period	<i>Add following:</i> The Works installed or constructed and commissioned by the Contractor (sections, or any particular area, etc) will be put to Operation Services and will be operated on section basis until Design-Build completed in accordance with Sub-Clause 9.12 [Completion of Design-Build] and the Commissioning Certificate issued under Sub-Clause 11.7 [Commissioning Certificate]. The Operation Service of entire system will be commenced only after Completion of Design-Build and the Commissioning Certificate issued. In addition to these the contractor has to operate the completed section from the date of Sectional Commissioning as the case may be. The Operations Services will commence as and when the Commissioning Certificate is issued after successful demonstration of the KPI’s. However irrespective to early completion of individual section , Operations Services shall continue up to Completion of Operation services as defined in para 10.8 of GCC.
1.1.66	Retention period	<i>Replace this sub-clause in its entirety by the following:</i> “ Retention Period ” means the period of 1 year after the date stated in the “Commissioning Certificate”
1.1.83	Year and Month	<i>Amend the Definition as:</i> “Year means three hundred and sixty five [365] days and “month” means thirty [30] days
1.1.84	ADB	<i>Add new Sub-Clause as follows:</i> “ ‘ADB’ means the Asian Development Bank, the institution financing the Contract.”
1.1.85	Price Schedules	<i>Add new Sub-Clause as follows:</i> “ ‘Price Schedules’ means those Schedules incorporated in the Contract showing the manner in which the Contract Price is broken down into Rates and Prices.”
1.1.86	Schedules of Performance Guarantees	<i>Add new Sub-Clause as follows:</i> “ ‘Schedule of Performance Guarantees’ means the Schedule incorporated in the Contract detailing the performance standards to be achieved by the Contractor under the Contract.”

Sub-Clause	Section	Special Provision
1.2	Interpretation	Add the following sub-paragraphs, after sub-paragraph (f): “(g) The word ‘tender’ or ‘tender’ is synonymous with ‘Bid’ or ‘bid’ and the words ‘Letter of Tender’ are synonymous with ‘Letter of Bid’, and ‘tender documents’ with ‘bidding documents’; and (h) The words ‘Contractor’s Proposal’ are synonymous with ‘Contractor’s Technical Proposal’.”
1.6	Contract Agreement	Revise the Last line of this sub-clause with: “The costs of stamp duties and similar charges imposed by the law shall be borne by the Contractor”
1.9	Care and Supply of Documents	Replace the entire third paragraph with the following “If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.”
1.9	Care and Supply of Documents	Add to the end of Sub-Clause 1.9 the following: “Failure to issue such Notice by the Employer or the Engineer to the Contractor in respect of any error in the Contractor’s document shall not in any manner relieve the Contractor of its obligation to ensure the correctness and accuracy of the Contractor’s documents, and their compliance with the requirements of the Contract.”
1.14	Compliance with Laws	Replace the Sub-Clause 1.14(b) with the following: “The Contractor shall, in all matters arising in the performance of the Contract, comply with, give all notices under, and pay all fees required by the provisions of any national or state statute, ordinance or other law, or any regulation of any legally constituted public authority having jurisdiction over the works. The Contractor shall obtain all permits, licenses or approvals required for any part of the Works, in reasonable time taking account of the times for delivery of the Plant and Materials and for completion of the Works. The Employer shall facilitate in getting necessary approvals, permissions by the Contractor. The Employer and the Contractor shall comply with the laws of each country where their activities in relation to the Contract are performed. However statutory charges to obtain approvals required for any parts of the works shall be initially be paid by contractor; which will be later reimbursed and to be borne by employer”
1.14	Compliance with Laws	Add sub clause (d) and (e) as follows: (d) Contractor shall Prepare application and liaison with concerned authorities so as to obtain all statutory clearances and approvals required in accordance to standard procedures from Government of NCT Delhi and/or Government of India, including all environmental clearances, permission from highway and railway authorities, inland waterway authorities, forest authorities and any other such authorities as may be required. and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so (e) DJB shall by or before the Commencement Date, grant, or arrange for the benefit of the Contractor, the rights and authority to repair or replace the facilities, to lay pipes, construct civil structures, install equipment and machinery on its behalf and to carry out necessary excavations to fulfill its obligations under this Contract.
1.16	Inspections and Audit by the	Add Sub Clause 1.16 as follows:

Sub-Clause	Section	Special Provision
	Employer / GOI / Asian Development Bank / any other authorized agency	The Contractor shall permit the ADB and/or persons appointed by the ADB to inspect the Site and/or the Contractor's accounts and records relating to the performance of the Contract and to have such accounts and records audited by auditors appointed by the ADB if required by the ADB.
2.1	Right of Access to the Site	<i>Add at the end of Sub-Clause as follows:</i> DJB shall provide to the Contractor and Contractor's Personnel, at no cost to the Contractor, free, continuous and exclusive access to, possession and right to use of, and rights over, the land, installations, and Works and Site, sufficient to enable the Contractor to carry out its obligations under this Contract from the dates as indicated in Contract Data until the Contract Completion Date. Employer will assist the Contractor to get all the utilities shifted in right of way as identified by the Contractor.
2.3	Employer's Personnel	<i>Add following sub clauses after sub clause (b):</i> (c) The day-to-day management control, work requirements, responsibilities and related terms and conditions pertaining to the Employer's Personnel deputed to the Contractor shall be in accordance to the Section – 6, Employer's Requirement DJB, its sub-contractors, employees and consultants (other than the Contractor), in exercising their rights of access to the Project Facilities within the Site, shall comply at all times with: <ul style="list-style-type: none"> • All governing Laws, relevant permits set forth in GCC Sub-Clause 1.14 and 2.2 and other permits for the services and all relevant health and safety requirements; • Instructions and directions issued by the Contractor which are necessary to ensure compliance by the Contractor with any governing Laws and any relevant health and safety requirements applicable to their respective activities in the Service Area; and • Such health and safety regulations and Site regulations as the Contractor has in effect at the facilities from time to time, such regulations having been provided to DJB.
2.5	Overall Project Management	<i>Add following sub clause 2.5:</i> Employer through its representative will be responsible for review and finalization of the Service Improvement Plan (SIP) submitted by the Contractor and supervision of agreed SIP, disbursement of the Contractor Payments, taking decision regarding completion of the works and achievement of the respective obligations by each party, approval of investments as per the agreed Service Improvement Plan, measurement and evaluation of the Performance Parameters for service delivery in water supply sector set under clause D of Schedule 5 attached to Section 8: Particular Conditions of Contract, etc.
3.1	Employer's Representative's Duties and Authority	Insert the following after the second paragraph: Employer's Representative will have no authority to approve the (i) Service Improvement Plan (ii) Time extensions (iii) Variation. Employer's representative will review above and submit recommendations to Employer for approval.
3.4	Replacement of the Employer's representative	<i>Add following at the end of clause:</i> Employer can also appoint a third party and transfer partial duties from Employer's representative.

Sub-Clause	Section	Special Provision
3.6	Management Meetings	<p><i>Insert sub-clause 3.6 after sub-clause 3.5:</i></p> <p>The Employer's Representative shall convene management meetings in accordance with the Employer's Requirements, which the Employer's Representative and the Contractor shall attend, and which the Employer may attend as the case may be. Minutes of the management meetings shall be made by the Employer's Representative and issued to the Employer and Contractor within 7 days of each meeting</p>
4.2	Performance Security	<p><i>Replace the first 3 paragraphs and the last paragraph of the Sub-Clause 4.2 with the text as provided in Part A – Contract Data</i></p> <p><i>Replace the fourth paragraph in its entirety by the following:</i></p> <p>"The Contractor shall obtain at his cost the Performance Security for proper performance of the Design-Build Period, in the amounts and currencies set out in the Contract Data.</p> <p>The Contractor shall deliver the Performance Security to the Employer within 28 days after receiving the Letter of Acceptance, and shall send a copy to the Employer's Representative. The Performance Security shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be based on the sample form included in the tender documents, or in another form approved by the Employer. The entity shall have its origin in any eligible source country listed Bin section 5 of Bid document.</p> <p>Without limitation to the provisions of the rest of this Sub-Clause, whenever any portion of the Contract Price payable in a specific currency increases by more than 25 percent, because of one increase or multiple increases as a result of Variations, the Contractor shall, at the Employer's Representative's request, promptly increase the value of the Performance Security in that currency by an equal percentage.</p> <p>The Contractor shall ensure that the Performance Security is valid and enforceable until the end of the Retention Period. If the terms of the Performance Security specify its expiry date, and the Retention Period has not come to an end by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the end of the Retention Period. Failure by the Contractor to maintain the validity of the Performance Security shall be grounds for termination in accordance with Sub-Clause 15.2 [<i>Termination for Contractor's Default</i>].</p> <p>The Employer shall not make a claim under the Performance Security except for amounts to which the Employer is entitled under the Contract in the event of:</p> <ul style="list-style-type: none"> (a) failure by the Contractor to extend the validity of the Performance Security as described in the preceding paragraph, in which event the Employer may claim the full amount of the Performance Security; (b) failure by the Contractor to pay the Employer an amount due, as either agreed by the Contractor or determined under Sub-Clause 3.5 [<i>Determinations</i>] or Clause 20 [<i>Claims, Disputes and Arbitration</i>], within 42 days after this agreement or determination;

Sub-Clause	Section	Special Provision
		<p>(c) failure by the Contractor to remedy a default within 42 days after receiving the Employer's Notice requiring the default to be remedied; or</p> <p>(d) Circumstances which entitle the Employer to terminate under Sub-Clause 15.2 [<i>Termination for Contractor's Default</i>], irrespective of whether Notice of termination has been given.</p> <p>The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security which the Employer was not entitled to make.</p> <p>The Employer shall return the Performance Security to the Contractor within 21 days after the end of the Retention Period."</p>
4.2A	Parent Company Guarantee	<p><i>Add new Sub-Clause as follows:</i></p> <p>"The Contractor shall arrange for his ultimate parent company (or any other parent company as the Employer may approve in his absolute discretion, acting reasonably) to provide to the Employer a parent company guarantee in the sample form set out in the tender documents, or in another form approved by the Employer, within 28 days after receiving the Letter of Acceptance, and shall send a copy to the Employer's Representative.</p> <p>Where the Contractor comprises a consortium of two or more entities, they shall all cause their respective ultimate parent companies (or other parent company or parent companies approved by the Employer in his absolute discretion, acting reasonably) to provide a joint and several parent company guarantee in accordance with this Sub-Clause.</p> <p>The Contractor shall, if requested by the Employer in his absolute discretion, provide to the Employer financial or other information the Employer may require to satisfy himself that the parent company is an appropriate entity with sufficient means to satisfy the parent company guarantee."</p>
4.3	Contractor's Representative	<p><i>Add the following paragraph towards the end of this Sub-Clause 4.3</i></p> <p>If the Contractor's Representative or such persons are not fluent in the said language, the Contractor shall make competent interpreters available during all working hours in a number deemed sufficient by the Employer's Representative, acting reasonably.</p>
4.4	Subcontractors	<p><i>Add the following paragraph towards the end of this Sub-Clause 4.4</i></p> <p>"The Contractor shall ensure that the requirements imposed on the Contractor by Sub-Clause 1.12 [Confidential Details] apply equally to each Subcontractor".</p> <p>Where practicable, the Contractor shall give fair and reasonable opportunity for contractors from the Country to be appointed as Subcontractors.</p> <p>The Contractor shall only employ person from any eligible source country as listed under Section 5 of Bid Document.</p> <p>The Contractor shall not employ any person which is listed either on:</p> <p>The United Nations Security Council Sanctions Lists, or</p>

Sub-Clause	Section	Special Provision
		<p>The Asian Development Bank Anticorruption Sanctions List both accessible on the related organization Internet Web sites, and as amended from time to time.</p> <p>In case of failure by the Contractor to comply with this requirement, and, for the avoidance of doubt, irrespective of whether the Employer's Representative has given prior consent under this Sub-Clause, the Contractor shall forthwith cease any business dealing with any ineligible Subcontractor and replace such Subcontractor by one having its origin in an eligible source country, all at the Contractor's risk and cost. Additionally, the Employer, at his own election, shall be entitled to terminate the Contract in accordance with Sub-Clause 15.2 [Termination by Employer]."</p>
4.8	Safety Procedures	<p><i>Replace the Sub-Clause 4.8 (a) with the text below:</i></p> <p>"The Contractor shall, comply with all applicable safety regulations during Design Build, Retention Period & Operations Services period"</p>
4.12	Unforeseeable Physical Conditions	<p><i>Add the following at end of the Sub-Clause:</i></p> <p>In addition to notice of any Unforeseeable Physical Conditions, the Contractor shall provide the Employer's Representative with a written notice of any unanticipated environmental or resettlement risks or impacts that arise during the Design Build or Operation Services Period, which were not considered in the updated and approved Initial Environmental Examination (IEE), or the Environmental Management Plan (EMP) attached in Section 6.1, Scope of Services.</p>
4.16	Transport of Goods	<p><i>Add the following at end of the Sub-Clause:</i></p> <p>The Contractor shall adequately record the condition of roads, agricultural land and other infrastructure prior to the start of transporting Materials, Goods and equipment, and construction.</p>
4.17	Contractor's Equipment	<p><i>Add before the first sentence of Sub-Clause 4.17 with the following:</i></p> <p>"Unless otherwise stated in the Employer's Requirements, the Contractor shall provide all Contractors' Equipment necessary to fully and satisfactorily complete the Scope of Works as per the Contract both during the Design Build and Operations Services Period".</p>
4.18	Protection of Environment	<p><i>Insert the following at the end of Sub-Clause:</i></p> <p>The Contractor shall comply with all applicable national, provincial and local environmental Laws and regulations. The Contractor shall:</p> <p>(a) establish all operational systems for managing environmental impacts;</p> <p>(b) carry out all of the monitoring and mitigation measures set forth in the updated and approved IEE and EMP attached in Section 6, Employer's Requirement.</p> <p>(c) allocate the budget required to ensure that such measures are carried out.</p> <p>The Contractor shall submit monthly reports on the implementation and monitoring of such measures to the Employer. More particularly, the Contractor shall comply with (i) the measures</p>

Sub- Clause	Section	Special Provision
		<p>and requirements set forth in the Initial Environmental Examination and the Environmental Management Plan attached hereto as Appendix C. (ii) any corrective or preventative actions set out in safeguards monitoring reports that the Employer will prepare from time to time to monitor implementation of the IEE and the EMP.</p> <p>The Contractor shall allocate a budget for compliance with these measures, requirements and actions.</p>
4.19	Electricity, Water and Gas	<p><i>Replace the entire Clause 4.19 with the following:</i></p> <p><u>Electricity</u></p> <p>For Construction work during Design Build Period:</p> <p>The Contractor shall arrange and provide at his own cost electric connection of suitable load from electricity Supply Agency. All electricity charges during construction period shall be borne by the Contractor. The Contractor will also keep ready Generators of adequate capacity as standby arrangement in case of electric failure during construction for running of pump sets, vibrators, mixer, needle sets and electric set and other electrically operated construction equipment etc. at his own cost. However, the Engineer will issue essentially certificate in favor of the Contractor for obtaining a temporary electric connection from Electricity Supply Agency. The cabling for electric connection shall be arranged by the Contractor himself at his own cost. The non-availability /sanction of electric connection shall be no excuse for delay in completion of work.</p> <p>During Trial Run / Commissioning and Operations Services Period</p> <p>DJB shall provide the Contractor with continuous access to electricity supply facilities. DJB shall pay to the electricity supply company directly all the charges for demand, consumption, etc., as levied other than the penalties if levied due to operating negligence of the Contractor or power factor surcharges. Such penalties will be recovered from the Contracts payments.</p> <p>The Contractor will be providing a Power Consumption Guarantee during the Operations Service Period along with his proposal. Any cost of electricity over and above the guaranteed power consumption by the Contractor will be deducted by DJB from the operations services payment due to the Contractor.</p> <p>The Contractor shall take special care that while replacing the Pump sets and other machines within the UGR and Pumping Station premises effect on supply to the consumers should be as minimum as possible.</p> <p><u>Water</u></p> <p>a) The Water required for construction purpose during the Design Build Period shall be arranged by Contractor at his cost. The Employer will not be responsible for any water supply and no time extension will be granted on account of non-availability of water. Water required for testing of pipelines and liquid retaining structures/tanks shall also be arranged by the Contractor at his cost. Wherever the Employer's water is made available to the</p>

Sub-Clause	Section	Special Provision
		<p>Contractor for construction and drinking purpose recovery for volume of water shall be made at the prevailing bulk supply/ commercial supply rates of the employer respectively. The ferrule connection with the Employer's main and the pipeline up to the site shall be provided by the contractor at his own cost.</p> <p>b) In case the contractor uses ground water for construction/drinking water its quality should be tested and confirmed based on relevant BIS requirements in employer's laboratory. The contractor should bear all related costs. The contractor should obtain permission for extraction from the concerned authority prior to extraction.</p> <p>c) During the Operation Service Period permanent water connection to operator's office and workers camp etc shall be provided by the Employer. Deposit/fees, if any, required by the Employer shall be paid by Contractor and reimbursed by the Employer. All other works/expenses etc. are in the Contractor's scope. All maintenance and running expenses shall be borne by the Contractor.</p>
4.20	Employers Equipment and Free-issue material	<p><i>Replace the Sub-Clause 4.20 with the following:</i></p> <p>"Employer does not have provision for any equipment or Free Issue material."</p>
4.21	Progress Reports	<p><i>Insert following after Sub-Clause (h):</i></p> <p>(i) Monitoring of the obligations in Sub-Clauses 4.18, 6.4, 6.7, 6.12, 6.13 and 6.24.</p>
4.24	Fossils	<p><i>Replace the first sentence of Sub-Clause 4.24 with the following:</i></p> <p>"All gold, silver, coins, oil and other minerals of any description, and all precious stones of all kinds, treasures, antiques, fossils and other similar things, which shall be found in or at site, shall be the property of the Employer, and the Contractor shall duly preserve the same to the satisfaction of the Employer, and shall from time to time deliver the same to such person or persons, as the Employer may appoint to receive the same."</p>
4.26	Contract Management	<p><i>Add sub-clause 4.26 as follows:</i></p> <p><i>Contractor will use the suitable computer operated software to manage the contract.</i></p>
4.27	On-Site Log Book	<p><i>Add new Sub-Clause as follows:</i></p> <p>"The Contractor shall maintain on Site a log book. in a form approved by the Employer's Representative and which shall integrate the fields required in the Employer's Requirements. It will be used to record the Contractor's activities on a daily basis, and any instruction from the Employer's Representative given on Site.</p> <p>The Employer's Personnel shall have the right of access to this document at all times, and one copy of each daily record shall be promptly provided by the Contractor to the Employer's Representative."</p>
5.1	General Design Obligations	<p><i>Replace the first sentence of Sub-Clause 4.24 with the following:</i></p> <p>"The Contractor shall carry out and be responsible for, the design of the Works, including any site surveys, subsoil investigations and all other things necessary for proper planning and design."</p>

Sub-Clause	Section	Special Provision
5.6	Operation and Maintenance Manuals	Insert "28 days" before the first line of Sub –Clause
6.1	Engagement of Staff and Labour	<i>Add the following at the end of this Sub-Clause:</i> "The Contractor shall, to the extent practicable and reasonable, employ staff and labour with appropriate qualifications and experience from sources within the Country."
6.2	Rates of Wages and Conditions of Employment	<i>Add the following at the end of this Sub-Clause:</i> "The Contractor shall inform the Contractor's Personnel about their liability to pay personal income taxes in the Country in respect of such of their salaries, wages, allowances and any benefits as are subject to tax under the Laws of the Country for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such Laws."
6.4	Labour Laws	<i>Insert the following at the end of the Sub-Clause:</i> The Contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The Contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. In countries where the relevant labour laws provide for non-discrimination in employment, the Contractor shall comply with such laws. When the relevant labour laws are silent on non-discrimination in employment, the Contractor shall meet this Sub-Clause's requirements. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination. The Contractor shall provide equal wage and benefits to men and women for work of equal value or type. The Contractor shall not employ forced labour, which consists of any work or services, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour, or similar labour-contracting arrangements.
6.7	Health and Safety	<i>Add to the end of first paragraph of Sub-Clause 6.7, the following:</i> "In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and/or carry out all such regulations, orders, and/or requirements as may be applicable, including those imposed by various governments and the local medical or sanitary authorities." <i>Replace the last sentence of second paragraph of Sub-Clause 6.7, with the following:</i> "Throughout the execution of the Works and the Operation and Maintenance Period, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority."

Sub-Clause	Section	Special Provision
		<p><i>Add to the end of Sub-Clause 6.7, the following:</i></p> <p>HIV-AIDS Prevention. The Contractor shall conduct an HIV-AIDS awareness programme via an approved service provider, and shall undertake such other measures as are specified in this Contract to reduce the risk of the transfer of the HIV virus between and among the Contractor's Personnel and the local community, to promote early diagnosis and to assist affected individuals.</p> <p>The Contractor shall throughout the contract (including the Retention Period / DLP): (i) conduct Information, Education and Communication (IEC) campaigns, at least every other month, addressed to all the Site staff and labour (including all the Contractor's employees, all Subcontractors and any other Contractor's or Employer's personnel, and all truck drivers and crew making deliveries to Site for construction activities) and to the immediate local communities, concerning the risks, dangers and impact, and appropriate avoidance behavior with respect to, of Sexually Transmitted Diseases (STD) - or Sexually Transmitted Infections (STI) in general and HIV/AIDS in particular; (ii) provide male or female condoms for all Site staff and labour as appropriate; and (iii) provide for STI and HIV/AIDS screening, diagnosis, counseling and referral to a dedicated national STI and HIV/AIDS programme, (unless otherwise agreed) of all Site staff and labour. The Contractor shall include in the programme to be submitted for the execution of the Works under Sub- Clause 8.3 an alleviation programme for Site staff and labour and their families in respect of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS. The STI, STD and HIV/AIDS alleviation programme shall indicate when, how and at what cost the Contractor plans to satisfy the requirements of this Sub-Clause and the related specification. For each component, the programme shall detail the resources to be provided or utilised and any related sub-contracting proposed. The programme shall also include provision of a detailed cost estimate with supporting documentation. Payment to the Contractor for preparation and implementation this programme shall not exceed the Provisional Sum dedicated for this purpose.</p> <p>"The Contractor is required to follow the Employer's Safety Code and guidelines published by National Human Rights Commission (N.H.R.C).</p>
6.8	Contractor's Superintendence	<p><i>Add to the end of Sub-Clause 6.8, the following:</i></p> <p>"The Contractor shall submit, within 14 days of signing the Contract Agreement, the proposed Deployment Program for all key personnel for superintendence of construction activities for approval by the Engineer. Such Deployment Program shall show details of qualifications and experience of key personnel which is essential for proper superintendence and systematic and professional management of all construction works. The Engineer will either approve the submittal or provide comments thereon to the Contractor within 14 days of submission by the Contractor.</p> <p>None of the Contractor's key personnel shall be withdrawn from the Works without due notice being given to the Engineer. Further, no such withdrawals shall be made if in the sole opinion of Engineer, such withdrawals will jeopardize the progress and timely, successful completion of the Works.</p>

Sub-Clause	Section	Special Provision
		<p>Contractor shall appoint a Planning Engineer at Project Site with computer having MS Project/Primevera and CAD facility. The role and purpose of the Planning Engineer shall be mainly to maintain weekly reporting to the Employer (besides Monthly Progress Reports) on an approved format of the Employer through e-mail facility kept by the Contractor at site.</p> <p>Also CAD drafting facility is required to incorporate necessary details/variation on drawings or the As-Built Drawings time-to-time during construction process and to avoid any discrepancies therein."</p>
6.10	Records of Contractor's Personnel and Equipment	<p><i>Add to the end of Sub-Clause 6.10, the following:</i></p> <p>The Contractor shall submit by the 4th and 19th of every month, to the Engineer a true statement showing in respect of the second half of the preceding month and the first half of the current month respectively:</p> <p>(i) The number of laborers employed by him on the work, (ii) Their working hours, (iii) The wages paid to them, (iv) The accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them, and (v) The number of female workers who have been allowed maternity benefit and the amount paid to them."</p>
6.11	Disorderly Conduct	<p><i>Add to the end Sub-Clause 6.11, the following:</i></p> <p>The Contractor shall at all the times during the progress of Works take all requisite precautions and use his best endeavors for preventing any riotous or unlawful behavior by or among the workers and other employees at work and shall preserve peace and protection of the inhabitants and the security of property in the neighborhood of the Works.</p>
6.12	Child Labour	<p><i>Add Sub-Clause 6.12 as follows:</i></p> <p>The Contractor shall not employ any child to perform any work, including work that is economically exploitative, or is likely to be hazardous to, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. "Child" means a child below the statutory minimum age specified under applicable national Laws. The Contractor shall follow all applicable Child Labour Laws in India.</p>
6.13	Resettlement	<p><i>Add Sub-Clause 6.13 as follows:</i></p> <p>The Contractor shall comply with (i) the measures and requirements set forth in the updated and approved 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 Resettlement Plan.</p> <p>The Contractor shall allocate a budget for compliance with these measures, requirements and actions.</p>
6.14	Foreign Personnel	<p><i>Add Sub-Clause 6.14 as follows:</i></p> <p>The Contractor may bring in to the Country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and</p>

Sub-Clause	Section	Special Provision
		<p>work permits. The Employer will, if requested by the Contractor, use his best endeavors in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.</p> <p>The Contractor shall be responsible for the return of these personnel to the place where they were recruited or to their domicile. In the event of the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.</p>
6.15	Supply of Water	<p><i>Add Sub-Clause 6.15 as follows:</i></p> <p>The Contractor shall, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Contractor's Personnel.</p>
6.16	Measures against insect and pest nuisance	<p><i>Add Sub-Clause 6.16 as follows</i></p> <p>The Contractor shall at all times take the necessary precautions to protect the Contractor's Personnel employed on the Site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall employ with all the regulations of the local health authorities, including use of appropriate insecticides.</p>
6.17	Alcoholic Liquor or Drugs	<p><i>Add Sub-Clause 6.17 as follows</i></p> <p>The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs, or permit or allow importation, sale, gift, barter or disposal thereto by Contractor's Personnel.</p>
6.18	Arms and Ammunition	<p><i>Add Sub-Clause 6.18 as follows</i></p> <p>The Contractor shall not give, barter, or otherwise dispose of, to any person, any arms, or ammunition of any kind, or allow Contractor's Personnel to do so.</p>
6.19	Festivals and Religious Customs	<p><i>Add Sub-Clause 6.19 as follows:</i></p> <p>The Contractor shall respect the Country's recognized festivals, days, of rest and religious or other customs.</p>
6.20	Funeral Arrangements	<p><i>Add Sub-Clause 6.20 as follows:</i></p> <p>The Contractor shall be responsible, to the extent required by local regulations, for making any funeral arrangements for any of his local employees who may die while engaged upon the Work.</p>
6.21	Employment Record of Workers	<p><i>Add Sub-Clause 6.21 as follows:</i></p> <p>The Contractor shall keep complete and accurate records of the employment of labour at the Site. The records shall include the names, ages, genders, hours worked and wages paid to all workers. These records shall be summarized on a monthly basis and submitted to the Engineer, and these records shall be available for inspection by Auditors during normal working hours. These records shall be included in the details to be submitted by the Contractor under Sub-Clause 6.10 [Records of Contractor's Personnel and Equipment].</p>
6.22	Workers Organizations	<p><i>Add Sub-Clause 6.22 as follows:</i></p> <p>In countries where the relevant labour laws recognize worker's rights</p>

Sub-Clause	Section	Special Provision
		to form and to join workers' organizations of their choosing without interference and to bargain collectively, the Contractor shall comply with such laws. Where the relevant labour laws substantially restrict workers' organizations, the Contractor shall enable alternative means for the Contractor's Personnel to express their grievances and protect their rights regarding working conditions and terms of employment. In either case described above, and where the relevant labour laws are silent, the Contractor shall not discourage the Contractor's Personnel from forming or joining workers' organizations of their choosing or from bargaining collectively, and shall not discriminate or retaliate against the Contractor's Personnel who participate, or seek to participate, in such organizations and bargain collectively. The Contractor shall engage with such workers' representatives. Workers' organizations are expected to fairly represent the workers in the workforce.
6.23	Supply of Foodstuffs	<i>Add Sub-Clause 6.23 as follows:</i> The Contractor shall arrange for the provision of a sufficient supply of suitable food as may be stated in the Employer's Requirements at reasonable prices for the Contractor's Personnel for the purpose of or in connection with the Contract.
6.24	Forced Labour	<i>Add Sub-Clause 6.24 as follows:</i> The Contractor shall not employ forced labour, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty, and includes any kind of involuntary or compulsory labour, such as indentured labour, bonded labour or similar labour-contracting arrangements.
6.25	Non-Discrimination and Equal Opportunity	<i>Add Sub-Clause 6.25 as follows:</i> The Contractor shall not make employment decisions on the basis of personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment relationship on the principle of equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employment or retirement, and discipline. In countries where the relevant labour laws provide for non-discrimination in employment, the Contractor shall comply with such laws. When the relevant labour laws are silent on non-discrimination in employment, the Contractor shall meet this Sub-Clause's requirements. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination.
6.26	Respectful Work Environment	<i>Add Sub-Clause 6.26 as follows:</i> The following sentence shall apply: The Contractor shall ensure that its employees and Subcontractors observe the highest ethical standards and refrain from any form of bullying, discrimination, misconduct and harassment, including sexual harassment and shall, at all times, behave in a manner that creates an environment free of unethical behavior, bullying, misconduct and harassment, including sexual harassment. The Contractor shall take appropriate action against any employees or Subcontractors, including suspension or termination of employment

Sub-Clause	Section	Special Provision																
		<p>or subcontract, if any form of unethical or inappropriate behavior is identified.</p> <p>The Contractor shall conduct training programs for its employees and Subcontractors to raise awareness on and prevent any form of bullying, discrimination, misconduct and harassment including sexual harassment, and to promote a respectful work environment.</p> <p>The Contractor shall keep an up-to-date record of its employees and Subcontractors who have attended and completed such training programs and provide such records to the Employer or the Engineer at their first written request.”</p>																
7.3	Inspections	<p><i>Add following paragraph at the end of sub clause:</i></p> <p>Employer shall be entitled to monitor on a regular basis the Contractor's performance of the services and may request any technical documents and reports necessary to do so provided that such requests would not hinder the Contractor in performing its obligations under the Contract. The Employer shall have access to the Project Facilities to inspect the facilities during business hours upon reasonable advance notice to the Contractor. Employer shall be entitled to delegate such inspection rights to a third party provided that the same conditions shall apply.</p>																
7.4	Testing	<p><i>Add the following paragraph at the end of Sub-Clause 7.4:</i></p> <p><i>“The Contractor shall, prior to commencement of Permanent Works on Site, establish his own laboratory on the Site, with prior notification to the Engineer. Calibration of the laboratory equipment and instruments shall be certified by agencies approved by the Engineer. Laboratory equipment shall be properly maintained and calibrated throughout the period of the Contract by the Contractor at his own expense. The Contractor shall give the Engineer at least 24-hours’ advance notice prior to conducting any tests on Materials and work. The Engineer shall also inspect the laboratory if deemed necessary and the Contractor shall provide adequate facilities to the Engineer for his independent verification of the accuracy and adequacy of the facilities.</i></p>																
7.8	Royalties	<p><i>Add the following sub clause:</i></p> <p>(c) Dismantled Material The Contractor shall treat all materials (including bricks, scarp, stone soling, trees, etc.) obtained during dismantling of a structure, excavation of the Site, etc. as Employer's property and such materials shall be disposed off to the best advantage of Employer according to the instructions in writing issued by the Engineer-in-Charge. However cost of dismantled Civil material will be recovered from the contractor. Further, the recovery towards dismantled civil material shall be made from Contractor, at the following specified rates</p> <table><tr><td>(i)</td><td>Bricks</td><td>:</td><td>Rs 2000/ 1000 bricks</td></tr><tr><td>(ii)</td><td>CI/ MS Scrap</td><td>:</td><td>Rs 21/ kg</td></tr><tr><td>(iii)</td><td>Stone soling</td><td>:</td><td>Rs 331/ m3</td></tr><tr><td>(iv)</td><td>Unserviceable Reinforcement</td><td>:</td><td>Rs 21 /Kg</td></tr></table> <p>Further any dismantled mechanical / electrical material shall be treated as Employer's (i.e DJB's) property. Contractor will hand over all such materials to DJB store as directed by Engineering Incharge</p>	(i)	Bricks	:	Rs 2000/ 1000 bricks	(ii)	CI/ MS Scrap	:	Rs 21/ kg	(iii)	Stone soling	:	Rs 331/ m3	(iv)	Unserviceable Reinforcement	:	Rs 21 /Kg
(i)	Bricks	:	Rs 2000/ 1000 bricks															
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(iv)	Unserviceable Reinforcement	:	Rs 21 /Kg															

Sub-Clause	Section	Special Provision
7.9	Origin of Goods	<p><i>Add the following sub clause:</i></p> <p>Goods shall have their origin in any eligible country listed in Appendix _ to these Particular Conditions Part B. In case of failure by the Contractor to comply with this requirement, he shall forthwith remove the ineligible Goods from the Site and replace those with Goods having their origin in an eligible source country, all at the contractor's risk and cost. For the avoidance of doubt, the Employer's Representative shall be entitled to withhold corresponding payment certification in accordance with Sub-Clause 14.7 [Issue Advance Payment and Interim Payment Certificates] until such time replacement Goods are provided in accordance with the Contract.</p>
8.1	Commencement of Works	<p><i>Replace the last sentence of the Sub-Clause 8.1 with the following:</i></p> <p>The Commencement Date shall be within 28 days after the Contractor receives the Letter of Acceptance.</p>
8.3	Programme	<p><i>Add following paragraph at the end of sub clause:</i></p> <p>(f) The previous Programme will be modified suitably by the Contractor based upon any changes / value engineering proposed as per the Service Improvement Plan (SIP) submitted by the Contractor. The revised programme will be reviewed and approved by Employer.</p> <p>(g) The STI, STD and HIV/AIDS alleviation programme in accordance with Sub-Clause 6.7 [Health and Safety]</p>
8.6	Contract Completion Certificate	<p><i>replace the first sentence in the second paragraph with the following::</i></p> <p>The Employer's Representative shall, subject to Sub-Clause 11.8 [Joint Inspection Prior to Contract Completion], Sub-Clause 10.8 [Completion of Operation Service], Sub-Clause 14.18 [Asset Replacement Fund] and Sub-Clause 4.23 [Contractor's Operations on Site], issue the Contract Completion Certificate to the Contractor, with a copy to the Employer, within 21 days after the last day of the Contract Period.</p>
9.1	Commencement of Design-Build	<p><i>Add the following after the last sentence of this Sub-Clause:</i></p> <p>"There shall be no work authorized to proceed on Site until such time the Contractor has effected the insurances defined under Sub-Clause 19.2 [<i>Insurances to be provided by the Contractor during the Design-Build Period</i>] in accordance with the provisions under Sub-Clause 19.1 [<i>General Requirements</i>]."</p>
9.3	Extension of Time for Completion of Design-Build	<p><i>After "exceptionally adverse climatic conditions", add the following:</i></p> <p>"as defined in the Employer's Requirements"</p>
9.3	Extension of Time for completion of design-Build	<p><i>Add following paragraph at the end of sub clause:</i></p> <p>(f) Employer shall have full authority to decide on "Extension of Time for completion of Design Build". Employer's representative will review above requirement and submit recommendations to Employer for approval.</p>
9.7	Suspension of work	<p><i>Add the following after the last sentence of this Sub-Clause:</i></p> <p>"As an example, and without limitation to other possible causes, any suspension of work caused by any failure from the Contractor to</p>

Sub-Clause	Section	Special Provision
		<p>comply with the obligations stated :</p> <ul style="list-style-type: none"> • under Sub-Clause 4.8 as to safety procedures, • under Sub-Clause 4.9 as to the quality assurance, • under Sub-Clause 4.18 as to the protection of the environment, or • under Sub-Clause 6.7 as to health and safety, shall be considered as cause of suspension which is the responsibility of the Contractor”.
9.14	Bonus for early completion of Design Build	<p><i>Add a new sub-clause 9.14 as follows:</i></p> <p>The Contractor shall be eligible for an incentive/ bonus for early completion of work for each day (less any days of which the Contractor is paid for acceleration) that the completion is earlier than the intended completion date of the contract Sectional Milestone and Key Time periods as detailed below:</p> <ul style="list-style-type: none"> • @ 0.02% (zero point zero Two percent) per day of the Accepted Contract Amount of design Build. • Maximum amount of bonus shall be limited to 5% (five percent) of the Contract Amount of design Build. • The Employer’s Representative shall certify that the respective works are complete.
10.2	Commencement of Operation Service	<p><i>Add the following after the second paragraph:</i></p> <p>“The Operation Service shall not commence until such time the Contractor has effected the insurances defined under Sub-Clause 19.3 [Insurances to be provided by the Contractor during the Operation Service Period] in accordance with the provisions under Sub-Clause 19.1 [General Requirements].”</p>
10.7	Failure to Reach Production Outputs	<p><i>Replace this Sub-Clause in its entirety by the following:</i></p> <p>“In the event that the Contractor fails to achieve any of the performance standards defined in the Schedule of Performance Guarantees, the Parties shall jointly establish the cause of such failure.</p> <p>(a) If the cause of the failure lies with the Employer or any of his servants or agents, then, after consultation with the Contractor, the Employer shall give written instruction to the Contractor of the measures which the Employer requires the Contractor to take.</p> <p>If the Contractor suffers any additional cost as a result of the failure or the measures instructed by the Employer, the Employer, subject to Sub-Clause 3.5 [<i>Determinations</i>] and Sub-Clause 20.1 [<i>Contractor’s Claims</i>], shall pay the Contractor his Cost Plus Profit.</p> <p>If the cause of the failure lies with the Contractor then, after due consultation with the Employer, the Contractor shall take all steps necessary to restore the output to the levels required under the Contract.</p> <p>The Contractor, subject to Sub-Clause 3.5 [<i>Determinations</i>], shall pay the Employer the performance damages specified in Appendix 2 to these Particular Conditions Part B for this failure.</p>

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		<p>These performance damages shall be the only damages due from the Contractor for such failure, other than in the event of termination under Clause 15 [<i>Termination by Employer</i>] and of failure to pass Tests Prior to Contract Completion under Sub-Clause 11.11 [<i>Failure to Pass Tests Prior to Contract Completion</i>].</p> <p>The payment of such performance damages shall not relieve the Contractor of any duties, obligations or responsibilities he has under the Contract, including, for the avoidance of doubt, the obligation to ensure that the Works remain in accordance with the Contract during the Operation Service Period.</p> <p>If the failure continues for a period of more than 84 days and the Contractor is unable to achieve the required production output, the Employer may either:</p> <p>(i) continue with the Operation Service at a reduced level of compensation determined in accordance with Sub-Clause 3.5 [<i>Determinations</i>], in lieu of applying the performance damages defined above; or,</p> <p>(ii) if the production outputs fail to reach the minimum values required in the Schedule of Performance Guarantees, give Notice to the Contractor not less than 56 days prior to terminating the Contract, in accordance with Sub-Clause 15.2 [<i>Termination for Contractor's Default</i>]. In such an event, the Employer shall be free to continue the Operation Service himself or by others."</p>
10.8	Completion of Operations Service	<p><i>Add to the end of the Sub-Clause 10.8 the following:</i></p> <p>All work shall be executed by the Contractor at his own cost before handing over the Works. In the event that the Contractor fails to carry out the necessary remedial works, the Engineer shall notify the Contractor, and proceed in accordance with the provisions of Sub-Clause 12.3 (a) and (b). Any costs incurred by the Employer in so doing shall be recoverable from the Contractor and will become a debt due and payable by the Contractor to the Employer and the Employer may, at his sole discretion, recover such amount by invoking the Contractor's bank guarantee provided as Performance Security.</p> <p>The Contract shall not be considered to be completed until the Contract Completion Certificate has been signed by the Engineer and delivered to the Contractor, stating the date upon which the Contractor has completed his operation and maintenance obligations to the satisfaction of the Engineer. The Contract Completion Certificate shall be given by the Engineer within 28 days after the end of the Operation and Maintenance Period, or as soon after such date as the Contractor has completed his obligations.</p> <p>Only the Contract Completion Certificate shall be deemed to constitute final certification that the Contractor has satisfactorily fulfilled all of his obligations under the Contract</p>
11.1	Testing of the Works	<i>Replace "Schedule of Guarantees" by "Schedule of Performance Guarantees".</i>
11.4	Failure to Pass Tests on Completion of	<i>Replace this Sub-Clause in its entirety by the following:</i>

Sub-Clause	Section	Special Provision
	Design-Build	<p>"If the Works, or a Section, fail to pass the Tests on Completion of Design-Build repeated under Sub-Clause 11.3 [<i>Retesting of the Works</i>] the Employer's Representative shall be entitled to:</p> <ul style="list-style-type: none"> (a) order further repetition of Tests on Completion of Design-Build under Sub-Clause 11.3 [<i>Retesting of the Works</i>]; (b) issue a Notice under Sub-Clause 15.1 [<i>Notice to Correct</i>]; or (c) issue the Commissioning Certificate to the Contractor subject to the payment of performance damages as per the provisions of Sub-Clause 10.7 [<i>Failure to Reach Production Outputs</i>], in which case the Employer shall also be entitled to forthwith apply the provisions found under Sub-Clause 10.7(b)(ii) without waiting for the prescribed period expiry."
11.11	Failure to Pass Tests Prior to Contract Completion	<p><i>Replace sub-paragraph(c) in its entirety by the following</i></p> <p>"(c) issue a Contract Completion Certificate, if the Employer so requires. The Contractor, subject to Sub-Clause 3.5 [<i>Determinations</i>] and to Contractor's adjustments or modifications as laid down below, shall pay the Employer the performance damages specified in Appendix 2 to these Particular Conditions Part B for this failure. These performance damages shall be the only damages due from the Contractor for such failure."</p>
12.1(a) iii	Completion of outstanding work and Remedying the Defects	<p><i>Add a new Sub-Clause as follows:</i></p> <p>(iii) on 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.</p>
13.1	Right to vary	<p><i>Add following paragraph at the end of sub clause:</i></p> <p>Employer shall have full authority to decide on "Right to vary". Employer's representative will review above requirement and submit recommendations to Employer for approval.</p>
13.3	Variation procedure (As per applicable price schedule)	<p><i>Add following at the end of clause:</i></p> <p>In case of Variation, except as otherwise stated in the Contract, the Employer's representative shall proceed in accordance with Sub-Clause 3.5 [<i>Determinations</i>] to agree or determine the Contract Price by evaluating each item of work, applying the measurement agreed or determined and the appropriate rate or price for the item. For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contract.</p> <p>Variation will be dealt as follows:</p> <ul style="list-style-type: none"> (i) The Engineer-in-Charge shall have power (a) to make alteration in, omissions from, additions to, or substitutions for the original specifications, drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work, and (b) to omit a part of the works in case of non-availability of a portion of the site or for any other reasons and the contractor shall be bound to carry out the works in accordance with any instructions given to him in writing signed by the Engineer-in-Charge and such alterations, omissions, additions or substitutions shall form part of the contract as if originally provided therein and any altered, additional or substituted work which the contractor may be directed to do in the manner specified above as part of the works, shall be

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		<p>carried out by the contractor on the same conditions in all respects including price on which he agreed to do the main work except as hereafter provided.</p> <p>(ii) Quantity variation (plus or minus) up to 20% of the BOQ quantity will be paid on the BOQ rates. Quantity variation will generally be limited to 20% of BOQ quantity.</p> <p>(iii) BOQ items for quantities variation more than 20% of BOQ quantity and non BOQ items, the contractor may within fifteen days of receipt of order or occurrence of the excess, claim revision of the rates, supported by proper analysis for the work in excess of the above mentioned limits, provided that if the rates so claimed are in excess of the rates specified in the schedule of quantities, the Engineer-in-Charge shall after giving consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of the market rates and the contractor shall be paid in accordance with the rates so determined.</p> <p>Until such time as an appropriate rate or price is agreed or determined, the Engineer shall determine a provisional rate or price for the purposes of Interim Payment Certificates as soon as the concerned work commences.</p>
13.3	Variation Procedure	<p><i>Replace "reasonable profit" by:</i></p> <p>"reasonable profit which shall be the percentage profit applicable to the Cost as stated in the Contract Data for Cost Plus Profit under Sub-Clause 1.1.24"</p>
13.5	Provisional Sums	<p><i>Add the following after the Sub-Clause 13.5 (b) (ii):</i></p> <p>All the items are covered in the price schedule. However, for any unforeseen items which is not covered in price schedule shall be paid as per the latest schedule of rates (SOR) or on the basis of market rate + 15% over head & profit if not covered in SOR. However, no escalation shall be paid on such items.</p> <p>As an exception to the above, the Provisional Sum for the cost of the DAB, shall be used to pay the Contractor of the Employer's one-half share of the invoices of the DAB for its fees and expenses, in accordance with Clause 20 [Claims, Disputes and Arbitration]. No prior instruction of the Employer's Representative shall be required with respect to the work of the DAB. The Contractor shall produce the DAB invoices and satisfactory evidence of having paid the entirety of such invoices as part of the substantiation of those Statements submitted under Sub-Clause 14.3 [Application for Interim Payment Certificates]. The Employer's Representative certification of such Statements shall be based upon such invoices and such evidence of their payment by the Contractor. No sum for Contractor's overhead charges and profit shall apply in addition to the DAB invoices amounts."</p>
13.8	Adjustment for changes in costs	<p><i>Replace the contents of the Sub-Clause 13.8 with the following:</i></p> <p>Adjustment for changes in costs shall be as per the provisions in Schedule 3 to Section 8: Particular Conditions of Contract - Contractor Payment.</p>
13.9	Taxes and Duties	<p><i>Add the new sub-clause as follows:</i></p> <p>The Accepted Contract Amount shall be deemed to include all taxes, duties, levies, cess and other charges imposed outside the Country</p>

Sub-Clause	Section	Special Provision
		<p>on the production, manufacture, sale and transport of the Contractor's Equipment, Plant, Materials and supplies to be used on or furnished under the Contract and on the services performed under the Contract.</p> <p>The responsibility for obtaining any exemptions from the respective department will remain with the Contractor and the Employer shall not in any way be responsible for admissibility of the claims or eligibility of the Contractor.</p> <p>Employer doesn't ensure / guarantee any tax/duty benefits (reduced tax rate/ tax waivers) under Custom Duty, GST, any Cess, etc. during the time of submission of bids. Bidders are advised to consider the actual tax rates (without considering any waiver) while estimating the Contract Price. Any benefits received during the currency of Contract or later shall be passed on to the Employer by the Contractor.</p> <ul style="list-style-type: none"> • In case there is any relaxation in GST or other taxes after quoting the rates the benefit so achieved shall be transferred to DJB. • The contractor should be registered in GST and shall submit the documentary proof • Circulars/Instructional orders /clarifications /modifications / amendments/ issued by DJB/Delhi Government /Central Government regarding taxes etc. subsequent to date of tender shall also be applicable.
14.1	Contract Price	<p><i>Add the following paragraph to the end of this Sub-Clause, as follows:</i></p> <p>Any quantities, which may be set out in a Schedule are estimated quantities and are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfillment of his obligations under the Contract</p>
14.2	Advance Payment	<p><i>Replace the entirety of this Sub-Clause by the following:</i></p> <p>The Employer shall make an interest free advance payment for the Design-Build Period. Advance payment shall be made when the Contractor submits an advance payment guarantee in accordance with this Sub-Clause. The amount of the advance payment and the applicable currencies shall be as stated in the Schedule of Payments. The advance payment is paid as one-off instalment.</p> <p>The Employer's Representative shall issue an Interim Payment Certificate for the advance payment under Sub-Clause 14.7 [<i>Issue of Advance and Interim Payment Certificates</i>] after receiving an application under Sub-Clause 14.3 [<i>Application for Advance and Interim Payment Certificates</i>] and after the Employer receives (i) the Performance Security in accordance with Sub-Clause 4.2 [<i>Performance Security</i>] and the parent company guarantee in accordance with Sub-Clause 4.2A [<i>Parent Company Guarantee</i>] and (ii) an advance payment guarantee in amounts and currencies equal to the advance payment. This guarantee shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be based on the sample form included in the tender documents or in another form approved by the Employer.</p> <p>The Contractor shall ensure that the guarantee is valid and enforceable until the issue of the Commissioning Certificate for the whole of the Works. If the terms of the guarantee specify its expiry</p>

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		<p>date, and the Contractor has not become entitled to receive the said Commissioning Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the Contractor has been entitled to receive the Commissioning Certificate. Failure by the Contractor to maintain the validity of the guarantee in accordance with this Sub-Clause shall entitle the Employer's Representative to withhold the issue of the Commissioning Certificate.</p> <p>The Employer shall not make a claim under the advance payment guarantee except for amounts to which the Employer is entitled under the Contract in the event of:</p> <ul style="list-style-type: none"> (a) failure by the Contractor to pay the Employer an amount due, as either agreed by the Contractor or determined under Sub-Clause 3.5 [<i>Determinations</i>] or Clause 20 [<i>Claims, Disputes and Arbitration</i>], within 42 days after this agreement or determination; (b) failure by the Contractor to remedy a default within 42 days after receiving the Employer's Notice requiring the default to be remedied; or (c) circumstances which entitle the Employer to terminate under Sub-Clause 15.2 [<i>Termination for Contractor's Default</i>], irrespective of whether Notice of termination has been given. <p>The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the advance payment guarantee which the Employer was not entitled to make.</p> <p>The Employer shall return the advance payment guarantee to the Contractor within 21 days from the date of issue of the Commissioning Certificate for the whole of the Works."</p>
14.3 (d)	Application for Advance and Interim Payment Certificates	<p><i>Replace the sub-paragraph (d) by the following:</i></p> <p>"(d) any amounts to be added for the advance payment in accordance with Sub-Clause 14.2 [<i>Advance Payment</i>]."</p>
14.4	Schedule of Payment	This Clause should be read in conjunction with Schedule 3: Contractor's Payments
14.10	Payment of Retention Money	<p>GC Clause to be deleted and replaced with</p> <p>"50% of Retention Money applicable to Completion of works can be released against Bank Guarantee after accumulation of limit of Retention Money. Balance 50% retention money can be released against Bank Guarantee within 30 days of successful commissioning of the works. The validity of these Bank Guarantees will be 6 month beyond commissioning of the works and the same will be released accordingly"</p>
14.18	Asset Replacement Fund	<p><i>Replace the 3rd paragraph in its entirety by the following:</i></p> <p>"As a condition precedent to the issue of the Contract Completion Certificate, the Parties shall proceed as per the provisions under Appendix 1 to these Particular Conditions Part B for assessing the final amount due to or by the Contractor under the Asset Replacement Fund. Following this assessment, the Contractor shall include such amount to be added or deducted, as the case may be, in his Final Statement Operation Service when proceeding in accordance with Sub-Clause 14.13 [<i>Application for Final Payment Certificate Operation Service</i>]."</p>

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15.2	Termination for Contractor's default	<p><i>Replace sub-paragraph (a) in its entirety by the following:</i></p> <p>"(a) fails to comply with Sub-Clause 4.2 [<i>Performance Security</i>] or with Sub-Clause 4.2A [<i>Parent Company Guarantee</i>] or with a Notice under Sub-Clause 15.1 [<i>Notice to Correct</i>],"</p> <p><i>Add the following sub-paragraph, after sub-paragraph (h):</i></p> <p>" (i) subcontracts any work to any person sanctioned by the United Nations or debarred by the ADB, in breach of Sub-Clause 4.4 [<i>Subcontractors</i>]"</p> <p><i>Replace the paragraph, after sub-paragraph (i), in its entirety with the following:</i></p> <p>"In any of these events or circumstances, the Employer may, not less than 14 days after giving Notice to the Contractor, terminate the Contract and expel the Contractor from the Site unless the Contractor cures the event or circumstance within the said 14 days. However, in the case of sub-paragraph (f) or (g) or (i), the Employer may by Notice terminate the Contract immediately."</p>
15.2	Termination for Contractor's default	<p><i>Add sub clause (j) after sub clause (i) as follows:</i></p> <p>Changes the structure of the JV during the currency of the Contract without prior written consent of DJB.</p>
15.8	Corrupt or Fraudulent Practices	<p><i>Add Sub-Clause 15.8 as provided hereunder:</i></p> <p>For the purposes of this Sub clause:</p> <p>ADB's Anticorruption Policy (1998, as amended to date) 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</p> <p>(a) defines, for the purposes of this provision, the terms set forth below as follows:</p> <ul style="list-style-type: none"> (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) "abuse" means theft, waste, or improper use of assets related to ADB-related activity, either committed intentionally or through reckless disregard; (vi) "conflict of interest" means any situation in which a party

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		<p>has interests that could improperly influence that party's performance of official duties or responsibilities, contractual obligations, or compliance with applicable laws and regulations;</p> <p>(vii) "obstructive practice" means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an ADB investigation, or deliberately making false statements to investigators, with the intent to impede an ADB investigation; (b) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to a Bank investigation or from pursuing the investigation; or (c) deliberate acts intended to impede the exercise of ADB's contractual rights of audit or inspection or access to information; and</p> <p>(viii) "integrity violation" is any act, as defined under ADB's Integrity Principles and Guidelines (2015, as amended from time to time), which violates ADB's Anticorruption Policy, including (i) to (vii) above and the following: 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.</p> <p>(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;</p> <p>(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</p> <p>(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, 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.</p> <p>All Bidders, consultants, contractors, suppliers and other third parties engaged or involved in ADB-related activities have a duty to cooperate fully in any screening or investigation when requested by ADB to do so. Such cooperation includes, but is not limited to, the following:</p> <p>(a) being available to be interviewed and replying fully and</p>

¹ Whether as a Contractor, Subcontractor, Consultant, Manufacturer or Supplier, or Service Provider; or in any other capacity (different names are used depending on the particular Bidding Document).

Sub-Clause	Section	Special Provision
		<p>truthfully to all questions asked;</p> <p>(b) providing ADB with any items requested that are within the party's control including, but not limited to, documents and other physical objects;</p> <p>(c) upon written request by ADB, authorizing other related entities to release directly to ADB such information that is specifically and materially related, directly or indirectly, to the said entities or issues which are the subject of the investigation;</p> <p>(d) cooperating with all reasonable requests to search or physically inspect their person and/or work areas, including files, electronic databases, and personal property used on ADB activities, or that utilizes ADB's Information and Communications Technology (ICT) resources or systems (including mobile phones, personal electronic devices, and electronic storage devices such as external disk drives);</p> <p>(e) cooperating in any testing requested by ADB, including but not limited to, fingerprint identification, handwriting analysis, and physical examination and analysis; and</p> <p>(f) preserving and protecting confidentiality of all information discussed with, and as required by, ADB.</p> <p>All Bidders, consultants, contractors and suppliers shall ensure that, in its contract with its sub-consultants, Subcontractors, and other third parties engaged or involved in ADB-related activities, such sub-consultants, Subcontractors, and other third parties similarly undertake the foregoing duty to cooperate fully in any screening or investigation when requested by ADB to do so.</p>
18.2	Notice of an Exceptional Event	<p><i>Replace the first sentence of this Sub-Clause by the following:</i></p> <p>"If a Party is or will be substantially prevented from performing his obligations under the Contract due to an Exceptional Event, then it shall give Notice to the other Party of such event or circumstance and shall specify the obligations, the performance of which is or will be prevented"</p>
18.4	Consequences of an Exceptional Event	<p><i>Replace first sentence</i></p> <p>"If the Contractor is prevented from performing any of his obligations under the Contract"</p> <p><i>by</i></p> <p>"If the Contractor is substantially prevented from performing his obligations under the Contract"</p>
19.1	General Requirements	<p><i>Add the following at the end of the first paragraph:</i></p> <p>"The Contractor shall take out any insurance under or in connection with the Contract with insurers from any eligible source country listed in Section 5 of Bid Document. In case of failure by the Contractor to comply with this requirement, and irrespective of any former approval from the Employer, he shall forthwith take replacement insurance(s) from insurers having their origin in an eligible source country and in terms both subject to approval by the Employer, all at the Contractor's risk and cost. For the avoidance of doubt, the Employer's Representative shall be entitled to withhold corresponding payment certification in accordance with Sub-Clause 14.7 [<i>Issue of Advance and Interim Payment Certificates</i>] until such time replacement insurance(s) are provided in accordance with the Contract."</p>

Sub-Clause	Section	Special Provision
20.3	Appointment of the Dispute Adjudication Board	<p><i>Replace the fifth paragraph in its entirety by the following:</i></p> <p>"The agreement between the Parties and either the sole member ("adjudicator") or each of the three members shall be based on the sample form included in the tender documents, and incorporate by reference the General Conditions of Dispute Adjudication Agreement in these General Conditions, with such amendments as are agreed between them."</p>
20.5	Avoidance of Disputes	<p><i>Insert the text below after the first paragraph and before the second paragraph of this Sub-Clause:</i></p> <p>"The DAB shall act, as far as reasonable and practicable, in the spirit of preventing potential problems or claims in between the Parties from becoming Disputes. The DAB shall take reasonable and relevant initiatives in this respect, including, but not necessarily limited to, suggesting the Parties to refer a matter to the DAB in accordance with this Sub-Clause. The DAB shall however not act in a way which may be inconsistent with its obligations under the agreement referred to in Sub-Clause 20.3 [<i>Appointment of the Dispute Adjudication Board</i>] and under Sub-Clause 20.6 [<i>Obtaining Dispute Adjudication Board's Decision</i>], and which may render any of its decision unenforceable for breach of natural justice or any other procedural shortcoming or matter. In particular, when acting under this Sub-Clause 20.5, the Dispute Board shall accordingly always meet the Parties jointly, and shall not meet a Party in the absence of the other Party."</p>
20.6	Obtaining Dispute Adjudication Board's Decision	<p><i>Replace the first paragraph of this Sub-Clause by the following:</i></p> <p>"If a Dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works during the Design-Build Period, including any Dispute as to any certificate, determination, instruction, opinion or valuation of the Employer's Representative, either Party may refer the Dispute in writing to the DAB for its decision, with copies to the other Party and the Employer's Representative. Such reference shall state that it is given under this Sub-Clause. The other Party shall then have 21 days to send a response to the DAB with copies to the referring Party and the Employer's Representative."</p>
20.8	Arbitration	<p><i>Replace the Sub-Clause in its entirety by the following:</i></p> <p>"Unless settled amicably, and subject to Sub-Clause 20.9 [<i>Failure to Comply with Dispute Adjudication Board's Decision</i>], any Dispute in respect of which the DAB's decision (if any) has not become final and binding shall be finally settled by arbitration.</p> <p>Arbitration shall be conducted as follows:</p> <p>a) If the Contract is with foreign contractors, arbitration with proceedings administered by the Singapore International Arbitration Centre (SIAC) and conducted under the SIAC Rules of Arbitration; in all cases by three arbitrators appointed in accordance with the said arbitration rules.</p> <p>b) If the Contract is with domestic contractors, arbitration with proceedings conducted in accordance with the laws of the Country.</p>

Sub-Clause	Section	Special Provision
		<p>The arbitration shall be conducted in the language for communications defined in Sub-Clause 1.4 [Law and Language] unless otherwise stated in the Contract Data.</p> <p>The arbitrator(s) shall have full power to open up, review and revise any certificate, determination, instruction, opinion or valuation of the Employer's Representative, and any decision of the DAB, relevant to the Dispute. Nothing shall disqualify representatives of the Parties, including the Employer's Representative, from being called as a witness and giving evidence before the arbitrator(s) on any matter whatsoever relevant to the Dispute.</p> <p>Neither Party shall be limited in the proceedings before the arbitrator(s) to the evidence or arguments previously put before the DAB to obtain its decision, or to the reasons for dissatisfaction given in its Notice of Dissatisfaction. Any decision of the DAB shall be admissible in evidence in the arbitration.</p> <p>a) Arbitration may be commenced prior to or after completion of the Works. The obligations of the Parties, the Employer's Representative and the DAB shall not be altered by reason of any arbitration being conducted during the progress of the Works."</p>
20.10	Dispute arising during the Operation Service Period	<p><i>Replace the Sub-Clause in its entirety by the following:</i></p> <p>"Disputes arising during the Operation Service Period which cannot be resolved between the Parties shall be settled by a one-person DAB ("Operation Service DAB"). Such person shall be jointly agreed and appointed by the Parties by the date 28 days after one Party has given Notice to the other Party of its intention to refer a Dispute to the DAB in accordance with this Sub-Clause.</p> <p>If the Parties cannot agree on the person who shall be the Operation Service DAB, then the person shall be appointed according to the provisions of Sub-Clause 20.4 [Failure to Agree Dispute Adjudication Board].</p> <p>The agreement between the Parties and the Operation Service DAB shall be based on the sample form included in the tender documents, and incorporate by reference the General Conditions of Dispute Adjudication Agreement in these General Conditions, with such amendments as are agreed between them.</p> <p>The terms of remuneration of the Operation Service DAB shall be mutually agreed upon by the Parties when agreeing the terms of appointment. Each Party shall be responsible for paying one-half of this remuneration.</p> <p>The procedure for obtaining a decision from the Operation Service DAB shall be in accordance with the provisions of Sub-Clause 20.6 [Obtaining Dispute Adjudication Board's Decision], and the DAB shall give its decision no later than 84 days after receiving the other Party's response or, if no such response is received, within 105 days after receiving the reference and the supporting documentation from the Party referring the Dispute.</p> <p>The appointment of the Operation Service DAB shall expire 28 days after it has given its decision in writing to both Parties.</p>

Sub-Clause	Section	Special Provision
		If either Party is dissatisfied with the decision of the Operation Service DAB, the provision of Sub-Clause 20.6 [Obtaining Dispute Adjudication Board's Decision], 20.7 [Amicable Settlement], 20.8 [Arbitration] and 20.9 [Failure to Comply with Dispute Adjudication Board's Decision] shall apply."

Schedules to Section 8: Particular Conditions of Contract

- Schedule 1: Obligations of the Employer - supplement to GCC Clause 2
- Schedule 2: Obligations of the Contractor - supplement to GCC Clause 4
- Schedule 3: Contractor's Payments – supplement to GCC Clause 14
- Schedule 4: Terms of Reference (ToR) of Auditing Body – supplement to GCC Sub-Clause 10.3
- Schedule 5: Performance Targets and Measurement

Schedule 1: Obligations of the Employer

During the term of this Contract, the Employer shall have the following obligations:

1. The Employer (DJB) shall be providing required quantity and quality of treated clear water from the WTP Wazirabad under the jurisdiction of this Contract as specified in SECTION 6: Employers Requirements. This will be considered as primary obligation of the Employer during the Operation Service Period of the Contract. The payment to the Operator during the Operations Service period will be linked to the volume of water supplied in the project area measured as the guaranteed MLD of supply for the year as per SECTION 6: Employers Requirements.
2. The Employer should mobilize sufficient financial resources to meet the Asset Replacement Fund (GCC Clause No 14.18) and per the approved Asset Replacement Schedule (GCC Clause No 14.5) so that Contractor can provide uninterrupted Operations Services.
3. Not to allow third party to execute any work in the project area during the tenure of the Contract considering this is a Performance Linked Management Contract.
4. Manage the project roles and responsibilities, interfaces and resolution of problems arising out of them using appropriate level(s) of interface.
5. Employer will be providing all assistance to the Contractor in dealing with various departments and authorities in seeking permissions and licenses for getting the utility shifting and provide hindrance free right of way to the Contractor for meeting his obligations under the Contractor. However, the Contractor will be fully responsible getting such permission and approvals from the authorities.
6. Employer shall by or before the Commencement Date, grant, or procure for the benefit of the works the rights and powers to repair or replace the facilities, to lay pipes, construct civil structures, install equipment and machinery on its behalf and to carry out necessary excavations to do the works, to undertake necessary remedial works at the Water Works sites and pumping stations and new works, where appropriate, and to install connections and any other rights and powers reasonably required by the Contractor.
7. Employer shall provide free of charge sufficient space to construct Consumer Service Centers and other utility buildings to enable the Contractor to perform its obligations under this Contract.
8. All electricity costs and initial connection charges etc associated with operation services, including the electricity charges for the Customer Relation Management Centres, shall be paid by Employer directly to the electricity service provider.
9. Employer shall be responsible for and pay the land rent and the property taxes if any and the Contractor shall not be responsible for these charges. Employer will also bear the cost of any increase in such charges from time to time.
10. Upon receiving a request and confirmation of proof of payment of any statutory charges from a potential new Consumer, Employer shall grant the approval for providing service connections to such Consumers and inform the contractor within a reasonable time for making new connection
11. Employer shall assist the Contractor in identifying non-revenue connections and consumption and preparing invoices for non-revenue consumption if any.
12. To provide the essentiality Certificates for seeking any lawful exemption of excise / customs duties. However, getting the exemption is purely the responsibility of the Contractor and the Employer shall not be held responsible for non-receipt of exemptions and any financial implication thereof.

Schedule 2: Obligations of Contractor**1. Contractor Obligations****1.1. General Obligations of the Contractor**

- 1.1.1. The Contractor shall have the right and obligation to provide the Design – Build and Operation Services in the works site on an exclusive basis during the Contract period with all due diligence and efficiency, in accordance with generally accepted professional techniques and practices and shall observe sound management practices.
- 1.1.2. The Contractor shall maintain all contractor permits to perform the services throughout the period of term.
- 1.1.3. The Contractor shall perform the Design – Build and Operation and Maintenance Services in accordance with governing Laws (including all environmental legislations), Asian Development Bank policies and procedures, guidelines and agreements with Government of India and DJB, approved SIP, prudent industry practice, the Performance Standards, the urban poor services policies, gender policies and the locally applicable regulatory social policies if any.
- 1.1.4. The Contractor shall have care and custody of Works and Site during the term of this Contract under DJB's monitoring and control. The new works implementation and refurbishment works will be carried out by the contractor in a phased manner and on section basis, without affecting existing water supply.
- 1.1.5. Subject to Section 1.1.2 above, the Contractor shall have discretion in determining the means and methods to be used to perform the Design – Build and Operation Services.
- 1.1.6. These General Obligations can be considered as a supplement to the Contractor's General Obligation as per GCC Clause No 4.1.

1.2. Accounting, Audit

- 1.2.1. The Contractor shall maintain accurate and systematic accounts and records in respect of the Operation Service in such form and detail enabling clear identification of all relevant charges and cost incurred by the Contractor and the basis thereof as well as proper and timely technical and financial audits. Such accounts may be audited by external auditors as appointed by DJB or ADB.
- 1.2.2. Financial accounts shall be in accordance with the accepted Indian accounting principles.
- 1.2.3. The Contractor shall permit the Employer or its designated representative to semi-annually inspect such accounts and records and shall permit ADB to carry out technical and financial audits on an annual basis.

1.3. Conflict of Interests

- 1.3.1. Neither the Contractor nor its sub-contractors nor the Contractor personnel shall engage during the term of this Contract, either directly or indirectly in any business or professional activities in the Service Area which would conflict with the activities assigned to them under this Contract.

2. Standard of Design – Build and Operation Services Provided by the Contractor

- 2.1. The Contractor shall perform all the Design – Build and Operation Service from the Commencement Date until the Contract Completion Date in accordance with Section 6 Employer Requirements, Schedule 3 to the Particular Conditions of Contract – Contractor Payments and Schedule 5 to the Particular Conditions of Contract – Performance Targets and Measurements; as well as:

- a) All relevant permits set forth in GCC Sub-Clause 2.2 and other permits for services in force from time to time and;
- b) All governing Laws, in force from time to time.

- 2.2. The Contractor shall compile, monitor and document infrastructure and operational data including but not limited to service levels, state of assets, physical improvements made, customer service, billing, employee management, asset maintenance, record maintenance, connections and disconnections, systems and Procedures and training imparted.

Schedule 3: Contractor's Payment

1. The total Contractor Payments comprises of two components:

- a. Payment for Design-Build Contract Period; and
- b. Payments for Operation Services Contract Period.

2. Payments for Design-Build Contract Period: The eligibility of payment shall be as follows:

- a. For Rising mains, common feeder mains and other pipelines including all pipeline accessories
 - i. 60% of the cost of pipeline on supply and stacking of material at site, maximum upto 5 Km
 - ii. 20% of the cost of pipeline on laying, jointing, sectional hydro testing of pipes and restoration of road as specified in bid document which will be suitable for vehicle movement
 - iii. 20% on commissioning and successful demonstrating of the performance for the 3 months testing period
- b. For Mechanical/ Electrical, Instrumentation and other items
 - i. 60% of the agreed price, against supply and storage of material at Site;
 - ii. 20% on installation of the equipment;
 - iii. 10% on testing and trial run completed successfully; and
 - iv. 10% on commissioning of the equipment.
- c. For civil works and other items: Progressive payment as per progress of work

3. Payment for Operation Services Period:

Payment for the Operation Services would comprise two components, namely Fixed payment and Performance payment, as follows:

For the Period post Final Taking Over

- a. Fixed Payment equal to 75% of the eligible Total Payment for Operation Services with service delivery in water supply
- b. Performance Payment equal to 25% of the eligible Total Payment for Operation Services with service delivery in water supply system **as per Schedule 5: Performance Targets and Measurement**

The unit for payment of Operation Services should be as follows:

- **For the period between Final Taking Over Date to Contract Completion:** Based upon the MLD of water supplied to the all 11 nos. UGR's measured at the inlet of UGR's.

In the event of water supplied is less than the guaranteed minimum volume for the month during the Operation Services Period the payment will be made as below:

- For the actual volume of water supplied by DJB : Payment will be made As per Fixed and Variable portion of payments as stipulated in the contract.
- Only fixed payment equivalent to 80% of guaranteed minimum volume for the shortfall below 80% of guaranteed minimum volume will be paid to the contractor and no other claim in this regard will be applicable

3.1 Fixed Payment

The Fixed Payment shall be paid to the Contractor on a monthly basis subject to fulfilment of the following conditions:

- (i) Maintaining the minimum personnel as specified in contract during the previous month.
- (ii) Compliance with the obligations under the Contract.
- (iii) Providing daily water supply to the citizens in the service area (in case of water supply except the extraordinary situation where water is not supplied by DJB).

3.2 Performance payment, incentives and damages

A maximum of 25% of the total agreed Payment for Operation Services for the period post Final Taking Over date will be based on achieving performance as shown in **Schedule 5: Performance Target and Measurement** during Operation Services under the contract.

Contractor is eligible to get performance payment i.e 25%, as applicable, if he meets the threshold limits of all the performance indicators. The breakdown of performance payment related to performance indicators are listed in sub sections 3.2.1 and 3.2.2 below.

3.2.1 Performance based payment for Water Supply System

Breakup for various criteria in water supply system is as given below:

For the Period Post Final Taking Over Date

S.N.	Parameter & reference	% of eligible monthly Operation Service payment
1	<i>Real Physical losses in transmission i.e. leakage in the transmission main through pipe joints or vales etc.</i>	25 %
2	<i>Guaranteed Electrical Power Consumption. - To be applicable for Pumping stations as and when same are commissioned</i>	<i>As per clause 4.19 of Particular conditions.</i>
	TOTAL	—

3.2.2 The following are the details of the applicable Penalties or Incentives towards meeting of the Performance Targets.**1. Real Physical losses in transmission i.e. leakage in the transmission main through pipe joints or vales etc.:**

To be achieved at the end of commissioning date and maintained throughout the O&M contract period till the end of the Contract.

The following are payment milestones and penalty proposed for this SLB/KPI.

Physical losses in transmission	Payment payable to the Operator (As percentage of total agreed O&M payment for the billing period)
2 % of clear water input into the transmission main	25%
From more than 2% to 4%	15%
From more than 4% to 6%	5%
From more than 6%, penalty will be deducted from the other due payments	
From more than 6% to 8%	-5.0%
From more than 8% to 10%	-10.0%
From more than 10% to 12%	-15.0%
From more than 12%	-25.0%

2. Guaranteed Electrical Power Consumption:

To be achieved at the end of commissioning date and maintained throughout the O&M contract period till the end of the Contract.

The Bidders' attention is directed to the fact that the operating costs for low efficiency Pumps and equipment will be substantially higher than the operating costs for high efficiency Pumps and equipment, and that the cost differential over the ten year period used in this calculation will, in all probability, greatly exceed any incremental capital cost savings which may be realised by offering lower efficiency Pumps & equipment. Bidders are encouraged to offer Pump and equipment which has high efficiencies at the specified operating conditions.

The bidder is required to submit the Guaranteed Electrical Power Consumption at clear water Pumping stations as per format of Tech-1 under section 4 along with his bid.

The Energy consumption for the entire O&M period is guaranteed by contractor to be not more than the figures given in Table-1 above.

Further bidders may note that the Cost of Guaranteed Power Consumption and life cycle cost of Operation and maintenance calculated as per procedure stipulated **at para 1.7 at section 2** will be added to the Bid Price (Design Build costs) to obtain the Evaluated Bid Price upon which the decision for award of contract will be based.

The following penalty will be imposed for this SLB/KPI.

Any cost of electricity over and above the guaranteed power consumption by the Contractor will be deducted by Employer from the operations services payment due to the Contractor.

Penalty/ Amount to be deducted (INR) = Rate of Power (INR per kWh) X Excess Power consumed (Kwh)

The rate of Power at any particular period shall be as per tariff notified / charged by power utility company for that particular period.

4. Adjustment for changes in costs:

Price Variation shall be applicable for Design Build and works portion (Asset Replacement Fund) of the Operation Services Contract. This shall also include extension in the Stipulated Date of completion on account of reasons other than those attributable to the Contractor. No price variation will be made where the extension in Stipulated Date of Completion is because of default of Contractor. The decision of Employer shall be final and binding on the Contractor.

In case of extension in the date of completion of Works Contract, the compensation underprice variation shall be limited to indices prevailing at the time of Stipulated period of Completion or as prevailing for the period under consideration, whichever is less, provided that, if an extension of time is granted in accordance with Sub-Clause 9.3 [Extension of Time for Completion], the above provision shall apply to the extended Time for Completion.

The amount payable to the Contractor and valued at base prices in accordance with the payment Schedule shall be adjusted for rise or fall in the cost of labor and material by the addition or deduction of the amounts determined by the formulae given in this Sub-Clause and shall be based on Reserve Bank of India (RBI) indices for material and labour. In cases where the "currency of index" is not the relevant currency of payment, each index shall be converted into the relevant currency of payment at the selling rate, established by the central bank of the Country, of this relevant currency on the above date for which the index is required to be applicable. This clause is operative both ways, i.e. if the price variation as calculated is on the plus side, payments on account of the price variations shall be allowed to the contractor and if it is on the negative side, the Employer shall be entitled to recover the same from the Contractor and the amount shall be deductible from any amounts due and payable under the Contract. To the extent that full compensation for any rise or fall in costs to the Contractor is not covered by the provision of this or any other clause in the Contract, the Contract Price shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

The amount to be added to or deducted from Interim Payment Certificates for changes in cost and legislation shall be determined from formulae for the currency in which the Contract Price is payable and for each of the civil works, electrical and mechanical works, installation, testing and commissioning work and Operation Services Contract as priced in the Schedule.

Adjustment Formula-The Price Adjustment factor shall be determined in general by the following formula.

Increase or decrease in the cost of component shall be calculated quarterly. The first statement of price adjustment shall be prepared at the end of three months from the month in which the work was deemed to be started and the work done from the date of start to the end of this period shall be taken into account. For subsequent statements, the cost of work done during every quarter shall be taken into account. At the completion of work, the work done during the last quarter or portion thereof shall be taken into account.

For the purposes of reckoning the work done during any period, the bills prepared during the period shall be considered. The dates of recording measurements in the measurement book by the Engineer shall be the guiding factor to decide the bills relevant to any period. The date of completion, as finally recorded by the Engineer in the measurement book, shall be the criterion.

For working out the weightage of the values of components in the work, fixed weightage of 0.15 for non-adjustable component is to be taken and sum of weightage of all adjustable components should be taken as 0.85. Total weightage of all components should be taken as 1.0 including weightage of non-adjustable and adjustable components. The base date shall be taken as 28 days before the last date of submission of final bid by the bidders.

(a) LABOUR

$$VL = L \times R (IL1 - ILo) / ILo$$

VL = Increase or decrease in the cost of work during the quarter under consideration

R = Value of the work done during the quarter under consideration.

ILo= Base Price which is Consumer Price Index for Industrial Workers (CPI -IW) for Delhi issued by Labour Bureau, Government of India on the base date.

IL1= Final price which is Consumer Price Index for Industrial Workers (CPI -IW) for Delhi issued by Labour Bureau, Government of India (average for the quarter under consideration)

L= Weightage of labour components.

(Note: In case of revision of minimum wages by the Government or other competent authority, nothing extra would be payable except the price escalation permissible under this Clause).

(b) Cement (excluding material supplied by the department).

$$Vc = C \times R (Lei - Leo) / Leo$$

Vc= Increase or decrease in the cost during the quarter under consideration.

R= Value of the work done during the quarter under consideration excluding the cost of material supplied by the department.

Leo= Base price which is Wholesale Price Index for Cement and Lime issued by Reserve Bank of India Journal on the base date

Lei= Final price which is the Wholesale Price Index for Cement and Lime issued by Reserve Bank of India (average for the quarter under consideration)

C= Weightage of Cement component.

- (c) Steel, Metallic Pipes and Specials (excluding material supplied by the department).

$$V_s = S \times R (L_{si} - L_{so}) / L_{so}$$

V_s = Increase or decrease in the cost during the quarter under consideration.

R = Value of the work done during the quarter under consideration excluding the cost of material supplied by the department.

L_{so} = Base price which is the Wholesale Price Index for mild steel - long products issued by Reserve Bank of India on the base date

L_{si} = Final price (average for the quarter under consideration) which is the Wholesale Price Index for mild steel - long products issued by Reserve Bank of India

S= Weightage of steel component.

- (d) MDPE/PVC Pipes and Specials:

$$V_p = H \times R (F_i - F_a) / F_a$$

V_p = Increase or decrease in the cost of work during the quarter under consideration.

R= The value of the work done during the quarter under consideration excluding the cost of materials supplied by the department.

F_a = Base price which is the Wholesale Price Index for Rubber and Plastic Product issued by Reserve Bank of India on the base date.

F_i = Final price (average for the quarter under consideration) which is the Wholesale Price Index for Plastic Products issued by Reserve Bank of India.

H= Weightage of HDPE/PVC resin.

- (e) Plant and Machinery and Spares:

$$V_t = PM \times R (P_i - P_o) / P_o$$

V_t = Increase or decrease in the cost of work during the quarter under consideration.

R= The value of the work done during the quarter under consideration excluding the cost of materials supplied by the department.

P_o = Base price which is Wholesale Price Index for Machinery and Machine Tools issued by Reserve Bank of India on the base date.

P_i = Final price (average for the quarter under consideration) which is the Wholesale Price Index for Machinery and Machine Tools issued by Reserve Bank of India.

PM= Weightage of Construction machinery component.

(f) Other Material:

$$VM = O \times R (IM1 - IMo) / IMo$$

VM= Increase or decrease in the cost during the quarter under consideration.

R= Value of the work done during the quarter under consideration excluding the cost of materials supplied by the department.

IMo= Base price which is Wholesale price index (all commodities) published in Reserve Bank of India Journal on the base date.

IM1= Final price (average for the quarter under consideration) which is the wholesale price index (all commodities) published in Reserve Bank of India Journal.

O=Weightage of other material components

The cost indices or reference prices stated in the table of adjustment data in section 4 shall be used.

Adjustment for changes in Cost will be applicable for the amount of work carried out by the Contractor with in stipulated completion period or extended contract period for which delay is not attributable to the Contractor.

The price adjustment will be calculated on the date of removing hindrance for the cost of actual work done up to the stipulated completion period or the extended contract period for which delay is not attributable to the Contractor, as the case may be. It is further clarified that there may be hindrances that on handling may not lead to overall delay in the project and there can be hindrances which might lead to contract period being extended with delay not attributable to the Contractor.

Adjustment for the work items valued on the basis of Cost or current prices or new rate items shall be applicable from the next quarter in which new rate has been given.

Adjusted Amount: The adjusted amount of each Payment Certificate may be subject to any deductions there from for liquidated damages, and any other monies due to the Employer from the Contractor including the recovery of advance amounts, if any.

Items not to be included in the Price Adjustment Calculation: The following items are not to be included in the price adjustment calculation:

- (a) Liquidated damages.
- (b) Retention withheld and released.
- (c) Advance payments in the form of loans and their repayments.
- (d) Payment to 'nominated' Sub-Contractors included as 'provisional sums'.

5. Adjustment for changes in costs for Operation Services:

For working out the weightage of the values of components in the work, fixed weightage of 0.15 for non-adjustable component is to be taken and sum of weightage of all adjustable components should be taken as 0.85. Total weightage of all components should be taken as 1.0 including weightage of non-adjustable and adjustable components. The base date shall be taken as 28 days before the last date of submission of final bid by the bidders.

All Operation Services under this Contract shall be governed in accordance to the adjustments for change in costs as provided in above clauses and based on following formula :

(A) LABOUR

$$VL = L \times R (IL1 - ILo) / ILo$$

VL = Increase or decrease in the cost of work during the quarter under consideration

R = Value of the work done during the quarter under consideration.

ILo= Base Price which is Consumer Price Index for Industrial Workers (CPI -IW) for Delhi issued by Labour Bureau, Government of India on the base date.

IL1= Final price which is Consumer Price Index for Industrial Workers (CPI -IW) for Delhi issued by Labour Bureau, Government of India (average for the quarter under consideration)

L= Weightage of labour components.

(Note: In case of revision of minimum wages by the Government or other competent authority, nothing extra would be payable except the price escalation permissible under this Clause).

(B) Other Material:

$$VM= O \times R (IM1 - IMo) / IMo$$

VM= Increase or decrease in the cost during the quarter under consideration.

R= Value of the work done during the quarter under consideration excluding the cost of materials supplied by the department.

IMo= Base price which is Wholesale price index (all commodities) published in Reserve Bank of India Journal on the base date.

IM1= Final price (average for the quarter under consideration) which is the wholesale price index (all commodities) published in Reserve Bank of India Journal.

O=Weightage of other material components

Schedule 4: Terms of Appointment of Auditing Body

Introduction

The Auditing Body shall be appointed following a competitive selection process, in accordance with ADB's Guidelines on the Use of Consultants, to carry out an independent and impartial audit during the Operation Service.

Notwithstanding that the Auditing Body is engaged by the Employer, the Auditing Body shall act independently and impartially.

Scope of the Services of the Auditing Body

The scope of services of the Auditing Body shall include the following:

- a. To assess the overall performance of the Contractor and confirm that it is meeting its obligations under the contract, including:
 - i. undertaking audits of the reports and plans furnished by the Contractor;
 - ii. undertaking audits to determine whether the Contractor has met the Minimum Service Levels and Performance Standards;
 - iii. reviewing the Contractor's procedures for water quality testing and reporting;
 - iv. reviewing the Contractor's customer and commercial management activities;
 - v. commenting on the quality of Contractor and Employer records and audit trails;
 - vi. Reviewing the adequacy of the Contractor's management and staff and assessing whether its training procedures are adequate.
- b. To make recommendations for improvements on the water services provided by the Contractor, including:
 - i. improvements to the Contractor's management and execution of the contract;
 - ii. improvements in the Employer's management and oversight of the Contract;
 - iii. improvements to the cooperation between the Contractor and the DJB
- c. To monitor the Employer's obligations and ensure that the Employer has:
 - i. not interfered with or attempted to improperly influence the Auditor in the
 - ii. performance of any of the Services
 - iii. made available to the Auditor all information, assistance, documentation, models and particulars relating to the Services reasonably requested by the Auditor within the time (if any) required by the or, where no period is specified, as soon as practicable; and
 - iv. attended regular meetings with the Auditing Body and the Contractor as may be reasonably required;
 - v. enabled the Auditing Body in carrying out the Services as reasonably necessary;
 - vi. provided explanations and additional information relating to any document, notice or information provided to the Auditing Body;
 - vii. paid the Auditing Body of the fee payable for the Services during a month in accordance with the contract; and

- viii. timely approved relevant information or documents submitted by the Contractor;
 - ix. Timely processed the Contractor's request for payment; and
 - x. Performed all its obligations under the Contract.
- d. To recommend matters that should be referred to the DAB for resolution.
 - e. To prepare a draft annual performance report for discussion with the Parties.
 - f. To prepare a final annual performance audit report.

The draft and final annual performance reports shall be submitted simultaneously to the Contractor and Employer.

Schedule 5: Performance Target and Measurement

A. Definitions

- i. **Water Supply Services** shall include but not limited to, the operation, maintenance and repairs of all existing and new assets created for the water transmission system to be kept in operation to deliver the services in the project area to the supply of metered drinking water at UGR end. This involves operation & maintenance of transmission lines from WTP to UGR, UGR's at WTP, Pumping stations at WTP etc.
- ii. **Potable Water** means water meeting the Water Quality as per the standards specified in IS 10500-1991.
- iii. **Physical losses** is the difference between the NRW and the combined volume of unbilled authorized consumption, unauthorized consumption and meter inaccuracies within a defined boundary limit and defined time line. It is leakage in the transmission main through pipe joints or vales etc.
- iv. **Performance Achieved**
Performance Achieved = (Total Number of Successful Incidents/ Total Number of Incidents) *100

B. Performance Targets / Key Performance Indicators (KPI)

The Operator must meet following Performance Targets on monthly basis:

- i. Real Physical losses in transmission
- ii. Guaranteed Energy consumption

C. Methodology for Measurement of Performance

The Contractor shall develop a robust methodology and framework for measurement and monitoring of Performance Standards stipulated under this clause and proposed as part of the Service Improvement Plan (SIP). The Employer shall review the same and upon agreement between the Parties, the agreed methodology shall form the basis for monitoring the performance of the Contractor and apply the Performance Payment.

D. Parameter, Minimum Service Level, Measurement and Monitoring System of Performance Indicators/Standards

S. No.	Description	Details
1.	Parameter	(B-i) Real Physical losses in transmission i.e. leakage in the transmission main through pipe joints or vales etc
	Maximum level	1. For the Period between Final taking over Date to Contract Completion Maximum physical losses 2% of the Volume of water To be achieved for complete stretch of transmission main starting from WTP to the end of outfalls at 11 no. UGR's and maintained throughout the contract period till the end of the Contract. More than 6% compliance will attract penalty.
	Measured By	"Real Physical losses in transmission" hereby means transmission Water Loss and is measured as below: $\text{Transmission Water Loss (\%)} = \frac{X - A - B}{X} \times 100$

S. No.	Description	Details
		<p>Where,</p> <p>X = Volume of input water supplied from WTP to UGR's through transmission main</p> <p>A = Sum of Volume of water delivered / received at all 11 nos. UGR's during the period,</p> <p>B = Volume of water used for operational & testing purpose (scouring, jetting, dust suppression, etc.) during the period.</p>
	Monitored By	<p>An electronic registry maintained by the Contractor; the registry shall include detailed database and summary tables volume of water logs at each of the UGR</p> <p>The volume of water log database shall include:</p> <ul style="list-style-type: none"> ▪ Time and date ▪ Flowmeter identification number ▪ Rate of flow of water ▪ Cumulative volume of water transmitted
	Allowable Exclusions	<ul style="list-style-type: none"> i. Interruption due to mains bursts not exceeding 12 hours ii. Shortage of bulk water supplied by bulk supply provider iii. Third party causes like fire fighting
2.	Parameter	(B-ii) Guaranteed Electrical Power Consumption. - To be applicable for Pumping stations as and when they are commissioned
	Maximum level	<p>The Energy consumption is guaranteed to be not more than the figures committed by contractor as given in Form PC under section 4 for the entire project.</p> <p>To be achieved at the clear water pumping station at WTP and maintained throughout the O&M contract period till the end of the Contract.</p> <p>Cost of guaranteed power consumption as provided by bidder under column 4 of Form PC under section 4 shall be added to the bid price quoted by bidder for the evaluation of price bids.</p> <p>Any cost of electricity over and above the guaranteed power consumption by the Contractor will attract penalty.</p>
	Measured By	<p>The Guaranteed power consumption during particular month will be first adjusted proportional to the actual volume of water supplied during that month.</p> <p>Excess power consumed over and above Guaranteed power consumption will be calculated as below</p> <p>Excess Power Consumption (Kwh) = Actual units of Power Consumed during month (kWh)- Guaranteed power consumption during month (kWh)</p>
	Monitored By	<p>An electronic registry maintained by the Contractor; the registry shall include detailed database and summary tables of a) volume of water logs at each of the UGR and b) Power meter log at Clear Water Pumping station at WTP.</p> <p>The volume of water log and Power meters log database shall include:</p> <ul style="list-style-type: none"> ▪ Time and date ▪ Flowmeter and power meter identification number ▪ Rate of flow of water ▪ Cumulative volume of water transmitted ▪ Cumulative Power Consumed
	Allowable Exclusions	NIL

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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Tender Security
Performance Security
Advance Payment Guarantee

Sample Forms of Tender and Agreement

LETTER OF ACCEPTANCE

Name of Contract:

Contract Number:

To:

Date:

Your Reference:

Our Reference:

We thank you for your Tender dated ____ for the design, execution and completion of the Works comprising the above-named Contract and remedying of defects therein so that they are fit for the purposes defined in the Contract, and for the operation and maintenance thereof under licence for the period of years, all in conformity with the terms and conditions contained in the Contract as amended by the attached Memorandum, signed by you and ourselves.

We have pleasure in accepting your Tender (as corrected/adjusted in accordance with the Memorandum) for the Accepted Contract Amount of:

(Currency and amount in figures)
(Currency and amount in

words)

This amount is made up of the following components:

For the Design-Build of the Works, the amount of:

(Currency and amount in figures)
(Currency and amount in

words)

For the Operation Service, the amount of:

(Currency and amount in figures)
(Currency and amount in words)

For the Asset Replacement Fund, the amount of:

(Currency and amount in figures)
(Currency and amount in words)

In consideration of you properly and truly performing the Contract, we agree to pay you the Accepted Contract Amount or such other sums to which you may become entitled under the terms of the Contract, at such times and as prescribed by the Contract.

We acknowledge that this Letter of Acceptance creates a binding Contract between us, and we undertake to fulfil all our obligations and duties in accordance with the terms of this Contract.

Signed by: _____
(Signature)

For the behalf of: _____

Date: _____

CONTRACT AGREEMENT

This Agreement made the _____ day of _____, 20____
 _____, between _____
 (name of Employer)
 of _____ (address of Employer)
 (herein called "the Contractor"), of the other part:

and _____ (name of Contractor) of _____
 (address of Contractor) (herein called "the Contractor"), of the other part:

Whereas the Employer desires that the Works known as
 _____ (name of Contract)

should be designed, executed and operated by the Contractor and has accepted a Tender from the Contractor for the design, execution, completion and operation and maintenance of these Works, and the remedying of any defects therein,

The Employer and the Contractor agree as follows:

1. In this Agreement, the works and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as a part of this Agreement:
 - (a) The Letter of Acceptance dated _____
 - (b) The Letter of Tender dated _____
 - (c) The Addenda Nos. _____
 - (d) The Conditions of Contract _____
 - (e) The Employer's Requirements _____
 - (f) The completed Schedules _____
 - (g) The Operating License, and _____
 - (h) The Contractor's Proposal _____
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to design, execute, complete, operate and maintain the Works and remedy any defects therein in conformity with the provisions of the Contract and the Operating Licence granted by the Employer.
4. The Employer hereby covenants to pay the Contractor, in consideration of the design, execution, completion, operation and maintenance of the Works and the remedying of defects therein, the Contract Price at the times and in the manner prescribed by the Contract, and to grant the Contractor a royalty-free licence to enable him to operate and maintain the Works during the Operation Service Period.

In witness whereof the Parties hereto have caused this Agreement to be executed on the day and year first above written.

Signed by: _____
 (Signature)
 for and on behalf of the Employer in the
 presence of
 Witness: _____
 (Signature)
 Name: _____
 Address: _____
 Date: _____

Signed by: _____
 (Signature)
 for and on behalf of the Contractor in the
 presence of
 Witness: _____
 (Signature)
 Name: _____
 Address: _____
 Date: _____

AGREEMENT FOR DISPUTE ADJUDICATION BOARD MEMBERS

[All italicized text and any enclosing square brackets is for use in preparing the form and should be deleted from the final product].

Name of Contract: _____

This Agreement made the _____ day of _____, 20 _____,
between

Name and address of Employer: _____

Name and address of Contractor: _____

Name and address of DAB Member: _____

Whereas the Employer and the Contractor have entered into a Contract and desire jointly to appoint the above-named Member to act on the DAB as *[delete where not applicable]* sole adjudicator/one of three adjudicators/chairman of the DAB,

And whereas the Member accepts the appointment.

The Employer, Contractor and Member jointly agree as follows:

1. The conditions of this Dispute Adjudication Agreement comprise the "General Conditions of Dispute Adjudication Agreement" which are appended hereto, and the following provisions. In these provisions, which include amendments and additions to the "General Conditions of Dispute Adjudication Agreement", words and expressions shall have the same meanings as are assigned to them in the "General Conditions of Dispute Adjudication Agreement".
2. *[Details of any amendments or additions or deletions from the "General Conditions of Dispute Adjudication Agreement" should be given here or in an attachment hereto.]*
3. In accordance with Clause 6 of the "General Conditions of Dispute Adjudication Agreement", the Member shall be paid as follows: A retainer fee of _____ per calendar month, and A daily fee of _____ per day spent on Site visits, hearings, and other time in connection with submissions to the DAB made in accordance with the provisions of the Contract between the Employer and the Contractor.
4. In consideration of these fees and other payments to be made by the Employer and the Contractor in accordance with Clause 6 of the "General Conditions of Dispute Adjudication Agreement", the Member undertakes to act as the DAB Member in the capacity above mentioned in accordance with the terms of this Dispute Adjudication Agreement.
5. The Employer and the Contractor jointly and severally undertake to pay the Member in consideration for his acting as the DAB Member as aforementioned in accordance with this Dispute Adjudication Agreement.
6. This Dispute Adjudication Agreement shall be governed by the law of: _____

Signed by: _____
(Signature)

Signed by: _____
(Signature)

Signed by: _____
(Signature)

for and on behalf of the employer
in the presence of
Witness: _____
(signature)

for and on behalf of the
Contractor in the presence of
Witness: _____
(signature)

The Member in the Presence
Witness : _____
signature)

Name: _____
Address: _____
Date: _____

Name: _____
Address: _____
Date: _____

Name : _____
Address: _____
Dates : _____

AGREEMENT FOR OPERATION SERVICE DISPUTE ADJUDICATION BOARD

[All italicized text and any enclosing square brackets is for use in preparing the form and should be deleted from the final product.]

Name of Contract: _____

This Agreement made the _____ day of _____, 20 _____,
between

Name and address of Employer: _____

Name and address of Contractor: _____

Name and address of DAB

Member: _____

Whereas the Employer and the Contractor have entered into a Contract and desire jointly to appoint the above-named Member to act as the sole adjudicator on the Operation Service DAB for a period of five (5) years from the date of this Agreement.

And whereas the Member accepts the appointment.

The Employer, Contractor and Member jointly agree as follows:

1. The conditions of this Dispute Adjudication Agreement comprise the "General Conditions of Dispute Adjudication Agreement" which are appended hereto, and the following provisions. In these provisions, which include amendments and additions to the "General Conditions of Dispute Adjudication Agreement", words and expressions shall have the same meanings as are assigned to them in the "General Conditions of Dispute Adjudication Agreement".
2. *[Details of any amendments or additions or deletions from the "General Conditions of Dispute Adjudication Agreement" should be given here or in an attachment hereto.]*
3. In accordance with Clause 6 of the "General Conditions of Dispute Adjudication Agreement", the Member shall be paid as follows: A retainer fee of _____ per calendar month, and A daily fee of _____ per day spent on Site visits, hearings, and other time in connection with submissions to the DAB made in accordance with the provisions of the Contract between the Employer and the Contractor.
4. In consideration of these fees and other payments to be made by the Employer and the Contractor in accordance with Clause 6 of the "General Conditions of Dispute Adjudication Agreement", the Member undertakes to act as the DAB Member in the capacity above-mentioned in accordance with the terms of this Dispute Adjudication Agreement.
5. The Employer and the Contractor jointly and severally undertake to pay the Member in consideration for his acting as the DAB Member as aforementioned in accordance with this Dispute Adjudication Agreement.
6. This Dispute Adjudication Agreement shall be governed by the law of: _____

Signed by:

(Signature)

for and on behalf of the
Employer in the presence of

Signed by:

(Signature)

for and on behalf of the
Employer in the presence of

Signed by:

(Signature)

for and on behalf of the
Employer in the presence of

Witness: _____
(Signature)

Name: _____

Address: _____

Date: _____

Witness: _____
(Signature)

Name: _____

Address: _____

Date: _____

Witness: _____
(Signature)

Name: _____

Address: _____

Date: _____

OPERATING LICENCE

Aide Memoire

The Operating Licence is a document which is issued by the Employer to the Contractor at the time of issuing the Letter of Acceptance in accordance with Sub-Clause 1.7 [*Operating Licence*] of the Conditions of Contract, although it will not come into effect until the issue of the Commissioning Certificate.

The purpose of the Operating Licence is to give the Contractor unhindered legal access to the Works and the facility, and the legal right to operate the facility during the Operation Service Period in compliance with his obligations under his Contract with the Employer.

The terms of the licence must ensure that it is royalty-free and is issued without cost to the Contractor. It will automatically come into full force- and effect upon the issue of the Commissioning Certificate, and it shall remain in full force and effect until the issue of the Contract Completion Certificate.

The proposed format and wording of the licence should be included in the tender documents so that tenderers know how it will function during the Operation Service Period.

The nature and format of the Operating Licence must clearly define the requirements of the Employer and must be a legally secure commitment from the Employer to allow the Contractor unhindered access to the facility for the duration of the Operation Service Period. Whatever the name or status of the document which the Employer provides for this purpose, all references in the Contract to Operating Licence shall be deemed to refer to that document.

Sample Forms of Security and Guarantee

TENDER SECURITY

Name of Contract/Contract No.: _____

Name and address of Beneficiary "the Employer": _____

We have been informed that: _____
(*name of Tenderer*)

(hereinafter called the "Principal") is submitting an offer for the above-named Contract in response to your invitation, and the conditions of your invitation require that his offer is supported by a tender security.

At the request of the Principal, we: _____
(*name of bank*)

Hereby irrevocable undertake to pay you, the Beneficiary/Employer, any sum or sums not exceeding in total the amount of _____ (in words: _____) upon receipt by us of your demand in writing and your written statement (in the demand) stating that:

- (a) the Principal has, without your agreement, withdrawn his offer after the latest time specified for its submission and before the expiry of its period of validity, or
- (b) the Principal has refused to accept the correction of errors in his offer in accordance with the conditions of your invitation, or
- (c) you awarded the Contract to the Principal and he has failed to comply with Sub-Clause 1.6 [Contract Agreement] of the Conditions of Contract, or
- (d) you awarded the Contract to the Principal and he has failed to comply with Sub-Clause 4.2 [Performance Security] of the Conditions of Contract.

Any demand for payment must contain your signature(s) which must be authenticated by your bankers or by a notary public. The authenticated demand and statement must be received by us at this office on or before _____ (*the date 35 days after the expiry of the validity of the Letter of Tender*) _____, when this guarantee shall expire and shall be returned to us.

This guarantee is subject to the Uniform Rules for Demand Guarantees, published as number 458 by the International Chamber of Commerce, except as stated above.

Signed by: _____ Signed by _____
(*signature*) (*signature*)

(*name*) (*name*)

Date: _____

Performance Security

..... *Bank's name, and address of issuing branch or office*²

Beneficiary: *Name and address of the 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 words*³ (*amount in figures*.) 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 ,⁴, 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.⁵

.....
Signature(s) and seal of bank (where appropriate)

Note to Bidder

1. 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.
2. The Contractor has to submit separate Performance Securities for the Design Build Scope of the Contract and for the Operations Services Contract.

² All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

³ 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.

⁴ 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."

⁵ Or the same or similar to this clause specified in the Uniform Rules for Demand Guarantees, ICC Publication No. 758 where applicable.

Advance Payment Guarantee

..... *Bank's name, and address of issuing branch or office*⁶

Beneficiary: *Name and address of the 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 words*⁷. (. *amount in figures*.) 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 words*⁸. (. *amount in figures*.) 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 ,⁹, 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).

.....
Signature(s) and seal of bank (where appropriate)

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.

⁶ All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

⁷ 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.

⁸ Footnote 2.

⁹ 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."