



REQUEST FOR PROPOSAL
for
DEVELOPMENT OF SEWAGE TREATMENT PLANTS
ON HYBRID ANNUITY MODEL BASIS
AT BHAGALPUR, *STATE OF BIHAR*

July 2018

TABLE OF CONTENTS

SECTION I - INTRODUCTION.....14
SECTION II - ELIGIBILITY AND QUALIFICATION CRITERIA.....22
SECTION III - INSTRUCTION TO BIDDERS.....34
PART A. GENERAL34
PART B. BID SECURITY, PERFORMANCE SECURITY AND ESHS
PERFORMANCE SECURITY40
PART C. PREPARATION AND SUBMISSION OF BIDS.....42
PART D. OPENING AND EVALUATION OF BIDS48
PART E. AWARD OF PROJECT53

DISCLAIMER

The information contained in this RFP or any other information provided to the Bidders, whether verbally or in writing or in any other form, by or on behalf of the Bihar Urban Infrastructure Development Corporation Ltd (**BUIDCO**) (hereinafter referred to as BUIDCO or the Executing Agency) or NMCG and its employees or advisors is provided to the Bidders on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.

This RFP is not an agreement and further it is neither an offer nor an invitation by the Bihar Urban Infrastructure Development Corporation Ltd to the Bidders or any other Person. The purpose of this RFP is to provide the Bidders with information that may be useful to them in the preparation and submission of their Bids.

This RFP includes statements which reflect various assumptions and assessments arrived at by the Bihar Urban Infrastructure Development Corporation Ltd, NMCG and their advisors for the Project. Such assumptions, assessments and statements do not purport to contain all the information that the Bidders may require. The information contained in this RFP may not be appropriate for all Persons and it is not possible for the Bihar Urban Infrastructure Development Corporation Ltd, NMCG and their employees or advisors to consider the investment objectives, financial situation and particular needs of each Person who reads this RFP. The assumptions, assessments, statements and information contained in this RFP may not be complete, accurate, adequate or correct. Each Bidder should therefore conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP.

The information provided in this RFP to the Bidders is on a wide range of matters, some of which may depend upon interpretation of the law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of the law. The Bihar Urban Infrastructure Development Corporation Ltd, NMCG and their employees and advisors accept no responsibility for the accuracy or otherwise for any interpretation or opinion on laws expressed in this RFP.

The issue of this RFP does not imply that the Bihar Urban Infrastructure Development Corporation Ltd is bound to qualify any Bidder or to award the Project to any Bidder. The Bihar Urban Infrastructure Development Corporation Ltd reserves the right to reject all or any of the Bids without assigning any reasons whatsoever.

GLOSSARY

In this RFP, unless the context otherwise requires, capitalised terms shall have the meaning given to them in the table below. Capitalised terms not defined below shall have the meaning given to them in the Concession Agreement.

Addendum or Addenda	means an addendum or addenda to this RFP.
Additional Performance Security	means a performance security that must be submitted by the Selected Bidder to the <i>Executing Agency</i> together with the Performance Security and ESHS Performance Security to secure the obligations of the Concessionaire/Bidder in relation to the <i>clause 16.5 of the RFP document</i> .
Annexure	means an annexure to this RFP.
Appointed Date	means the date of signing of the Concession Agreement.
Associate	means, in relation to a Bidder or a Member of a Consortium, a Person who Controls, or is Controlled by such Bidder or Member of a Consortium.
Average Guaranteed Energy Consumption	means the <i>Bhagalpur Facility's</i> Average Guaranteed Energy Consumption as the context may require.
Bank	means [the International Bank for Reconstruction and Development (IBRD)/International Development Association (IDA)].
Bid	means a bid consisting of the Qualification Proposal and the Financial Proposal submitted by a Bidder for qualification and award of the Project, and Bids mean collectively, all the bids for the Project.
Bid Due Date	means the last date for submission of the Bids specified in the Bid Schedule, as may be extended from time to time in accordance with Clause 19.2.
Bid Price	means the aggregate of the <i>Bhagalpur Facility's</i> Bid Price as calculated in Bid Price Sheet.
Bid Price Sheet	means the sheet provided on the e-Procurement Portal, in which the Bidders shall quote, separately for the <i>Bhagalpur STP</i> and its associated infrastructures the: (a) Bid Project Cost (including all Taxes and Goods and Services Tax); (b) O&M Charges for the first month after COD (including all Taxes and Goods and Services Tax); (c) Guaranteed Energy Consumption for the O&M Period for the STPs and for the Associated infrastructures; and (d) Land Requirement, as required based on which the Bid Price will be calculated.
Bid Process	means the single-stage bidding process, with two sub-

	stages, undertaken by the <i>Executing Agency</i> to award the Project to the Selected Bidder on the terms and conditions set out in this RFP. The Bid Process has commenced with the issuance of this RFP and will end on the date that the Concession Agreement is executed with the Special Purpose Vehicle incorporated by the Selected Bidder for the Project.
Bid Project Cost	means the <i>Bhagalpur Facility's</i> Bid Project Cost as the context may require.
Bid Schedule	means the schedule of the Bid Process set out in Clause 2.14, as may be amended from time to time.
Bid Security	means a bid security that must be submitted by a Bidder along with its Bid in accordance with Clause 15.
Bidder	means an interested Company or a Consortium of Companies which submits a Bid to the <i>Executing Agency</i> in accordance with this RFP and includes each Member when the Bidder is a Consortium, and Bidders shall be construed accordingly.
BOD	means biochemical oxygen demand.
Capex Annuity	means the <i>Bhagalpur Facility's</i> Capex Annuity as the context may require.
Capital	means, in respect of the SPV that is incorporated by the Selected Bidder to act as the Concessionaire, the total capital of such SPV that will be raised by the issuance of equity shares, preference shares and convertible instruments.
Clause	means a clause of this RFP.
COD Certificate	means the certificate issued or deemed to be issued by the <i>Executing Agency</i> upon successful completion of the Trial Operations of the <i>Bhagalpur Facilities</i> , in accordance with the Concession Agreement.
Commercial Operations Date or COD	means the date on which the COD Certificate is issued or deemed to be issued to the Concessionaire in accordance with the Concession Agreement.
Companies Act	means the (Indian) Companies Act, 1956 or the (Indian) Companies Act, 2013, as amended from time to time, as the context may require.
Company	means a company incorporated under the Companies Act or a foreign company incorporated under the relevant statute of its jurisdiction.
Concession Agreement	means the tripartite concession agreement to be executed

	between NMCG, the <i>Executing Agency</i> and the Concessionaire. A draft of the Concession Agreement is attached to this RFP.
Concessionaire	means the Special Purpose Vehicle incorporated by the Selected Bidder to implement the Project.
Conflict of Interest	has the meaning ascribed to it in Clause 3.3.
Consortium	means any combination of Companies that have formed a consortium for the purpose of submitting a Bid and to implement the Project if such consortium is declared the Selected Bidder.
Construction Completion Date	means, with respect to the <i>any</i> Facility, the date on which the Construction Completion Certificate is issued or deemed to be issued to the Concessionaire and with respect to the <i>that facility</i> in accordance with the Concession Agreement and the reference to Construction Completion Date shall be construed accordingly.
Construction Period	means the period from the Effective Date until the Construction Completion Date.
Control	means, with respect to a Person: <ul style="list-style-type: none"> (a) the ownership, directly or indirectly, of more than 50% of the voting shares of such Person; or (b) the power, directly or indirectly, to direct or influence the management and policies of such Person by operation of law, contract or otherwise, and the term Controlled and Controlling shall be construed accordingly.
Effective Date	means the date on which all the Conditions Precedent have been satisfied by the <i>Executing Agency</i> , NMCG, and the Concessionaire in accordance with the Concession Agreement.
Eligibility Criteria	means the eligibility criteria set out in Clause 3 that a Bidder is required to satisfy (in addition to the Qualification Criteria), to be qualified for evaluation of the Financial Proposal.
e-Procurement Portal	means the e-procurement portal of the Government of Bihar available at the following url: https://eproc.bihar.gov.in
ESHS	means environment, social, health and safety.
ESHS Performance Security	means any location's ESHS Performance Security, as the

	context may require, and the term ' ESHS Performance Securities ' shall mean collectively, the ESHS Performance Security of all locations combined.
Facilities	means the <i>Bhagalpur</i> Facilities & its associated infrastructures or under any schedule, as the context may require, and the term Facility shall be construed accordingly.
Financial Capacity	means the financial capacity and strength of the Bidder, as determined in accordance with Clause 4.2.
Financial Proposal	means the financial proposal, comprising the Bid Price Sheet, to be submitted by a Bidder in accordance with this RFP.
Financial Year	means each 12-month period commencing on 1 April of one calendar year and ending on 31 March of the next calendar year; and if different for a Bidder, then the 12-month period for which such Bidder files its statutory audited accounts in the normal course of its business.
Ganga 2016 Order	has the meaning ascribed to it in Clause 1.2.
GoI	means the Government of India.
GoB	means the Government of Bihar
Guaranteed Energy Consumption	means the <i>Bhagalpur Facility's</i> Guaranteed Energy Consumption as the context may require.
Guidelines	has the meaning ascribed to it in Clause 1.8.
<i>Bhagalpur</i> STPs	means collectively, the <i>Bhagalpur</i> STP & its associated infrastructures
Information Memorandum	means the information memorandum for the Project set out in Schedule : Project Information Memorandum (PIM).
<i>Bhagalpur</i> Facilities Average Guaranteed Energy Consumption	has the meaning ascribed to it in Clause 2.5.
<i>Bhagalpur</i> Facilities Bid Price	means the price calculated for each Bidder, based on the values provided by such Bidder in the Bid Price Sheet, as a part of its Financial Proposal, to design, finance, develop, construct, operate, and maintain the <i>Bhagalpur</i> Facilities
<i>Bhagalpur</i> Facilities Bid Project Cost	means the cost of construction of the <i>Bhagalpur</i> Facilities, any power plant proposed to be set up by the Bidder, as quoted by a Bidder in its Bid, which must include the interest during construction, Taxes (other than service tax) and all other pre-operative expenses in relation to the <i>Bhagalpur</i> Facilities and the power plant, if any.

<i>Bhagalpur Facilities Capex Annuity</i>	means the amount to be specified in the Concession Agreement, which is payable to the Concessionaire per quarter during the O&M Period, towards reimbursement of 60% of the <i>Bhagalpur Facility's</i> Bid Project Cost, as adjusted to account for inflation in accordance with the Concession Agreement.
<i>Bhagalpur Facilities Construction Completion Certificate</i>	means the certificate issued to the Concessionaire to certify completion of construction of the <i>Bhagalpur Facilities</i> in accordance with the Concession Agreement.
<i>Bhagalpur Facilities ESHS Performance Security</i>	means a demand bank guarantee that must be submitted by the Selected Bidder or the Concessionaire to the <i>Executing Agency</i> , in accordance with Clause 16A, on or before execution of the Concession Agreement to secure the obligations of the Concessionaire to comply with the ESHS requirements in relation to the <i>Bhagalpur Facilities</i> , as set out in the Concession Agreement.
<i>Bhagalpur Facilities</i>	means collectively, the <i>Bhagalpur STP</i> , the online monitoring system, the on-site testing laboratory facilities, and such other facilities associated with the <i>Bhagalpur STP</i> , all associated infrastructures, required to be set up by the Concessionaire, as described in greater detail in the Scope of Work and Technical Specifications.
<i>Bhagalpur Facilities Guaranteed Energy Consumption</i>	means the maximum number of units of power quoted by a Bidder in its Financial Proposal, which it expects the Concessionaire to consume during the O&M Period (other than any units expected to be generated and consumed from any power plant proposed to be set up by the Concessionaire), to operate and maintain the <i>Bhagalpur Facilities</i> (at varying volumes and BOD of sewage).
<i>Bhagalpur Facilities Land Price</i>	means the price of the land required by the Bidder to develop the <i>Bhagalpur Facilities</i> , determined by multiplying the <i>Bhagalpur Facilities</i> Land Requirement quoted by such Bidder and the <i>Bhagalpur Land Rate</i> .
<i>Bhagalpur Land Rate</i>	means the cost per Acre of the land forming the <i>Bhagalpur Facilities</i> Site, which, for the purpose of this RFP shall be INR 23,727 per sq.m.
<i>Bhagalpur Facilities Land Requirement</i>	means the area required by the Selected Bidder at the <i>Bhagalpur Facilities</i> Site to construct, operate and maintain the <i>Bhagalpur Facilities</i> .
<i>Bhagalpur Facilities O&M Charges</i>	means the amount required by a Bidder per quarter (including all Taxes other than service tax) to operate and maintain the <i>Bhagalpur Facilities</i> , excluding the <i>Bhagalpur</i>

	<p><i>Facilities</i> Power Charges, during the O&M Period.</p> <p>The <i>Bhagalpur Facilities</i> O&M Charges for the first quarter after the COD will be determined on the basis of the O&M Charges quoted by the Bidder for the first month from the COD, in its Financial Proposal, which amount shall be adjusted to account for inflation, in accordance with the Concession Agreement.</p>
<i>Bhagalpur Facilities Payment Milestones</i>	means the 4 milestones listed in the Concession Agreement for release of 40% of the <i>Bhagalpur Facilities</i> Bid Project Cost (as adjusted to account for inflation in accordance with the Concession Agreement) to the Concessionaire.
<i>Bhagalpur Facilities Performance Security</i>	means a performance security that must be submitted by the Selected Bidder or the Concessionaire to the <i>Executing Agency</i> on or before execution of the Concession Agreement to secure the obligations of the Concessionaire in relation to the <i>Bhagalpur Facilities</i> during the Construction Period in accordance with Clause 16.
<i>Bhagalpur Facilities Power Charges</i>	<p>means the cost of the power consumed by the Concessionaire to operate and maintain the <i>Bhagalpur Facilities</i> during the O&M Period, which will be calculated in accordance with the Concession Agreement.</p> <p>For the purpose of evaluation of Bids, the '<i>Bhagalpur Facilities Power Charges</i>' means the cost of power (for operation and maintenance of the <i>Bhagalpur Facilities</i>) for each Bidder determined in accordance with the formula set out in the Bid Price Sheet.</p>
<i>Bhagalpur Facilities Site</i>	means the location for the proposed <i>Bhagalpur Facilities</i> , admeasuring 6.92 Acres in <i>Bhagalpur</i> as set out in more detail in the Information Memorandum provided in PIM.
<i>Bhagalpur STP</i>	means the STP of 45 MLD to be set up at <i>Bhagalpur Site</i> , as part of the Project.
<i>Proposed Bhagalpur STP Supporting Infrastructure</i>	means the supporting infrastructure facilities required for the operation of the <i>Bhagalpur Facilities</i> , which will be provided, operated and maintained by the <i>Executing Agency</i> during the term of the Concession Agreement.
<i>Executing Agency</i>	means the Bihar Urban Infrastructure Development Corporation Ltd (<i>BUIDCO</i>), a statutory body constituted under the [mention relevant legislation]
<i>Joint Bidding Agreement</i>	means a binding joint bidding agreement to be entered into by the Members of a Consortium that submits a Bid pursuant to this RFP, in the format set out at Annexure 1K.

Land Price	means the <i>Bhagalpur</i> Land Price, as the context may require.
Land Rate	means the <i>Bhagalpur</i> Land Price, as the context may require.
Land Requirement	means the <i>Bhagalpur</i> Land Requirement, as the context may require.
Lead Member	means the Member nominated by the Members of the Selected Bidder to act as the lead member.
LOA	means the letter of award that will be issued by the <i>Executing Agency</i> to the Selected Bidder in accordance with Clause 30.
Member	means a member of a Consortium.
MLD	means million litres per day.
MoWR	means the Ministry of Water Resources, River Development and Ganga Rejuvenation.
Net Worth	<p>means the net worth of a Bidder, which shall be determined as follows, in case of a:</p> <p>(a) <i>Company, means</i></p> <p style="padding-left: 40px;">(i) subscribed and paid up equity share capital; and</p> <p style="padding-left: 40px;">(ii) reserves</p> <p style="padding-left: 40px;">LESS</p> <p style="padding-left: 40px;">(iii) revaluation reserves;</p> <p style="padding-left: 40px;">(iv) miscellaneous expenditure not written off;</p> <p style="padding-left: 40px;">(v) reserves not available for distribution to equity shareholders; and</p> <p style="padding-left: 40px;">(vi) aggregate value of accumulated losses.</p> <p>(b) <i>trust or society</i>, means the sum of available corpus and reserves;</p> <p>(c) <i>partnership firm</i>, means the sum of the partners' capital account and undistributed profits;</p> <p>(d) <i>limited liability partnership</i>, means the sum of partners' capital account and undistributed profits as per the 'Statement of Account' prepared as per Limited Liability Partnership Rules, 2009;</p>

	<p>(e) <i>sole proprietorship</i>, means the value of all assets minus liabilities of the proprietorship but does not include the personal assets or liabilities of the sole proprietor; and</p> <p>(f) <i>individual</i>, means the sum of the value of all unencumbered assets owned by the individual minus the sum of the value of all liabilities of the individual.</p>
NMCG	means the National Mission for Clean Ganga, a statutory body constituted under the Environment (Protection) Act, 1986.
O&M	means operation and maintenance.
O&M Charges	means the <i>Bhagalpur Facilities</i> O&M Charges, as the context may require.
O&M Period	means the period of 15 years from the COD during which the Concessionaire is required to operate and maintain the Facilities.
Payment Milestones	means the <i>Bhagalpur Facilities</i> Payment Milestones, and Payment Milestone shall mean any one of them, as the context may require.
Performance Security	means the <i>Bhagalpur Facilities</i> Performance Security, as the context may require, and the term ' Performance Securities ' shall mean collectively, the <i>Bhagalpur Facilities</i> Performance Security.
Person	means any [individual,] company, corporation, partnership, joint venture, trust, society, sole proprietor, limited liability partnership, co-operative society, government company, unincorporated organization or any other legal entity.
Power Charges	means the <i>Bhagalpur STP's and its associated infrastructure's</i> Power Charges, as the context may require.
Power Unit Rate	means the cost per unit of power drawn from the grid (through the relevant distribution licensee for the Site), which for the purpose of evaluation of the Financial Proposals is INR 7.16 per kWh. For the purpose of reimbursement of Power Charges to the Concessionaire during the O&M Period, the Concessionaire will be paid on the basis of the then prevailing cost per unit of power charged by the relevant distribution licensee and/or the cost of fuel for any power consumed from any diesel generator back-up sets, installed by the Concessionaire.
PPP	means public private partnership.

Pre-Bid Meeting	means the meeting to be held in accordance with Clause 8.2.
Preferred Bidder	means the Bidder which: (a) meets the Qualification Criteria and the Eligibility Criteria; and (b) quotes the lowest Bid Price.
Project	means the design, development, finance, construction, operation and maintenance of the Facilities at the Site in accordance with the Concession Agreement.
Project Engineer	means the engineering firm appointed by NMCG for the Project, in accordance with the Concession Agreement.
Qualification Criteria	means the qualification criteria set out in Clause 4 that a Bidder is required to satisfy (in addition to the Eligibility Criteria), to be qualified for evaluation of the Financial Proposal.
Qualification Proposal	means the proposal to be submitted by each Bidder to demonstrate that it meets the Eligibility Criteria and the Qualification Criteria as set out in Clause 3 and Clause 4.
RFP	means this request for proposal dated [mentioned date] (as amended) along with its Schedules and Annexures and includes any Addenda, if issued.
Rupee or INR	means Indian National Rupees, the lawful currency of India.
Schedule	means a schedule of this RFP.
Scheduled Bank	means a bank as defined under section 2(e) of the Reserve Bank of India Act, 1934.
Scheduled Construction Completion Date	means the date which is 21 months from the Effective Date.
Scope of Work	means the scope of work for construction and O&M of the Facilities as set out in the Concession Agreement.
Second Preferred Bidder	means the Bidder who: (a) meets the Qualification Criteria and the Eligibility Criteria; and (b) quotes the second lowest Bid Price.
Section	means a section of this RFP.
Selected Bidder	means the eligible Bidder selected by the <i>Executing Agency</i> for award of the Project.
Site	means collectively, the <i>Bhagalpur Facilities Site</i>
SPV or Special Purpose Vehicle	means a company incorporated under the Companies Act by the Selected Bidder to carry out the obligations of the Concessionaire under the Concession Agreement.

STP	means a sewage treatment plant.
Supporting Infrastructure	means collectively, the <i>Bhagalpur STP</i> Supporting Infrastructure
Taxes	means all taxes, levies, imposts, cesses, duties and other forms of taxation, including (but without limitation) income tax, sales tax, value added tax, service tax, goods and services tax, octroi, entry tax, corporation profits tax, advance corporation tax, capital gains tax, residential and property tax, customs and other import and export duties, excise duties, stamp duty or capital duty, and any interest, surcharge, penalty or fine in connection therewith which may be payable by the Concessionaire.
Technical Capacity	means the technical capacity and experience of a Bidder, as determined in accordance with Clause 4.1.
Technical Specifications	means the technical specifications for design, construction, operation and maintenance of the Facilities, which the Concessionaire and/or its subcontractors must comply with, as set out in the Concession Agreement.
Trial Operations	means the operation of the Facilities on a trial basis for 3 months post the Construction Completion Date in accordance with the Concession Agreement.

SECTION I

INTRODUCTION

1. BACKGROUND

- 1.1 The GoI, recognizing that long-term rejuvenation of the river Ganga will have significant social and economic benefits on the lives of the 500 million people living along its basin, has identified cleaning of the river Ganga as one of its priorities. For this purpose, in May 2015, the GoI approved the flagship Namami Gange programme for cleaning, rejuvenation, and protection of the river Ganga. In January 2016, the GoI approved a hybrid annuity model to implement STP projects under the Namami Gange programme on a PPP basis.
- 1.2 Subsequently, the MoWR issued the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016 (**Ganga 2016 Order**) to constitute various authorities to assist the GoI in achieving its aim of effective abatement of pollution in the river Ganga. The Ganga 2016 Order applies to all states in the catchment of the river Ganga basin. The Ganga 2016 Order revised the legal status of NMCG (which was initially constituted as a registered society under the Societies Registration Act, 1860) to an authority constituted under the Environment (Protection) Act, 1986 and designated NMCG as the nodal agency for the implementation of the Ganga 2016 Order.
- 1.3 The Government of India has received loan (Loan number: IBRD- 8065-IN) and credit (Credit number: IDA – 4955-IN) (hereafter jointly or separately called “loan”) from the International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA) (hereafter interchangeably called “the Bank”) of the U.S. dollar amount **one Billion under** the National Ganga River Basin Project (NGRBP). The loan will be used in various currencies toward the cost of the Project **National Mission for Clean Ganga**. The Borrower intends to apply a portion of the proceeds of this loan to eligible payments under the contract for which this RFP is issued
- 1.4 The *Executing Agency* in association with the NMCG, has decided to undertake the development of one STP, with a proposed capacity of 45 MLD, at *Bhagalpur* on a PPP basis, through a hybrid annuity model. While the *Executing Agency* will be the principal executing agency and bidding authority for the Project, NMCG will be responsible for making payments to the Concessionaire.
- 1.5 The objectives that NMCG and the *Executing Agency* wish to achieve through the Project are to:
- (a) intercept raw sewage flowing into the river Ganga (sewage in the drains/ nala may be a mix of domestic sewage and industrial effluent from textile dyeing industry) and divert the raw sewage to the *Bhagalpur* STPs;
 - (b) treatment of the raw sewage at the *Bhagalpur* STPs;

- (c) implement viable technologies and international best practices for development, operation and maintenance of the *Bhagalpur* STP and lifting station and other Facilities; and
- (d) demonstrate large scale private sector participation and mobilisation of private sector investment to further the national aim of rejuvenation of the river Ganga.

1.6 The main features of the Project are set out below:

- (a) The *Executing Agency* will provide such part of the Site as required by the Concessionaire to develop the Facilities and implement the Project based on the Land Requirement quoted by the Selected Bidder, free of all encumbrances and encroachments, and along with all necessary rights of way.
- (b) The Concessionaire will be required to design, finance, construct and complete the Facilities on or prior to the Scheduled Construction Completion Date, in accordance with the Concession Agreement.
- (c) The *Executing Agency* will provide, operate and maintain the Supporting Infrastructure for the *Bhagalpur* STPs, to enable the Concessionaire to operate the *Bhagalpur* STPs in accordance with the Concession Agreement.
- (d) In order to meet its power consumption requirements for the *Bhagalpur* Facilities, the Concessionaire shall construct and operate a biogas power plant at the *Bhagalpur STP* Site, to utilise the bio gas generated from the treatment of raw sewage at the *Bhagalpur* STP to produce clean energy. The Concessionaire may also set up a rooftop solar project at the *Bhagalpur STP* Site and the *Bhagalpur STP* Site to meet its power consumption requirements.
- (e) On and from the COD and until the expiry of the O&M Period, the Concessionaire will be required to operate and maintain the Facilities in accordance with the Concession Agreement, such that the Facilities meet the key performance indicators specified in the Concession Agreement.
- (f) Upon the expiry of the O&M Period, the Facilities and any power plant set up by the Concessionaire, will be transferred to the *Executing Agency* after the rectification of any defects or deficiencies, in accordance with the Concession Agreement.
- (g) The construction and O&M of the Facilities must be in accordance with Applicable Laws, Applicable Permits and other requirements specified in the Concession Agreement.
- (h) Prior to the Effective Date, NMCG will appoint a Project Engineer to assist the *Executing Agency* in supervising the construction, operation and maintenance of the Facilities. The Project Engineer shall support the *Executing Agency* in monitoring compliance with the key performance indicators to be

specified in the Concession Agreement. NMCG will solely bear the costs of the Project Engineer.

- (i) The Concessionaire shall operate the Facilities at its risk for the term of the Concession Agreement.
 - (j) 40% of the Bid Project Cost will be reimbursed to the Concessionaire during the Construction Period, which will be linked to completion and certification of the works corresponding to specified Payment Milestones (refer clause 9.3 of Concession Agreement)
 - (k) From the COD, the Capex Annuity (along with interest) and the O&M Charges will be paid on a quarterly basis to the Concessionaire. Additionally, the Concessionaire will also be reimbursed on a quarterly basis for the Power Charges at actuals (subject to a cap of the Power Charges based on the Guaranteed Energy Consumption for the relevant Facility). If the Concessionaire consumes more power for O&M of a Facility than the Guaranteed Energy Consumption for such Facility in any given quarter, it will be liable to pay damages to the *Executing Agency* in accordance with the Concession Agreement.
 - (l) The NMCG will set up a revolving escrow account for the Project, and all Payment Milestone (refer linked construction payments, Capex Annuities (along with interest), O&M Charges and the Power Charges will be paid to the Concessionaire through this escrow account. From the Effective Date and until the Construction Completion Date, NMCG will ensure that the escrow account is funded with an amount equivalent to the construction payments due to the Concessionaire for the next 2 *Bhagalpur Facilities* Payment Milestones. From the COD and at all times thereafter until the expiry or termination of the Concession Agreement, NMCG shall keep the escrow account funded with the Capex Annuities (along with interest), the O&M Charges and the estimated Power Charges (based on the Guaranteed Energy Consumption) for the *Bhagalpur* Facilities for the subsequent 2 years.
 - (m) Subject to early termination, the Concession Agreement shall be valid until the expiry of the O&M Period (i.e., 15 years from the COD).
- 1.7 The *Executing Agency* is now inviting interested natural persons, Companies, other private entities and State-owned entities to submit Bids to implement the Project.
- 1.8 The bidding will be conducted through the International Competitive Bidding (ICB) procedures specified in the World Bank's *Guidelines: Procurement of Goods, Works and Non-consulting Services under IBRD Loans and IDA Credits & Grants, January 2011, revised July 2014 (Guidelines)* and is open to all Bidders from eligible source countries as defined in the Guidelines.
- 1.9 This RFP follows the General Procurement Notice for National Ganga River Basin Project (NGRBP) that was published on United Nations Development Business online

on March 30, 2011 and updated on January 31, 2014.

- 1.10 The Selected Bidder is required to incorporate a Special Purpose Vehicle to implement the Project and such Special Purpose Vehicle will be required to execute the Concession Agreement with the *Executing Agency* and NMCG in the format attached to this RFP.
- 1.11 The statements and explanations contained in this RFP are intended to provide the Bidders with an understanding of the subject matter of this RFP and the Project. Such statements and explanations should not be construed or interpreted as limiting in any way or manner:
 - (a) the scope of the rights and obligations of the Concessionaire, which will be set out definitively in the Concession Agreement; or
 - (b) [the *Executing Agency's* right to alter, amend, change, supplement or clarify the rights and obligations of the Concessionaire or the terms and conditions that will be set out in the Concession Agreement, in accordance with this RFP.]

[Consequently, any omissions, conflicts or contradictions between this RFP and the Concession Agreement are to be noted, interpreted and applied appropriately to give effect to this intent. NMCG and the *Executing Agency* will not entertain any claims on account of such omissions, conflicts or contradictions.]

2. BRIEF DESCRIPTION OF THE BID PROCESS

- 2.1 The *Executing Agency* has adopted a single-stage Bid Process for declaration of the Selected Bidder for award of the Project, which is divided into 2 sub-stages.
- 2.2 A complete set of bidding documents will be available on the website www.eproc.bihar.gov.in w.e.f. 23 August 2018. The bidders who are interested to participate in the bidding process can download the bid documents from the website. The RFP will appear on the e-Procurement Portal in the "Latest Active Tenders" section and will be available only until the specified time on the Bid Due Date. The *Executing Agency* is not responsible for the completeness of the RFP, if it is not downloaded directly from the e-Procurement Portal complete with Addenda, if issued and uploaded on the e-Procurement Portal by the bid inviting authority.
- 2.3 Each Bidder is required to submit a single Bid, which should consist of 2 parts: (a) the Qualification Proposal; and (b) the Financial Proposal.
- 2.4 **Evaluation stages**

The evaluation of the Bids will be carried out in 2 sub-stages:

- (a) The first sub-stage will involve qualification of the Bidders based on the evaluation of their Qualification Proposals to determine compliance with the Eligibility Criteria and the Qualification Criteria in accordance with Clauses 3 and 4. Only those Bidders who are found to meet the Eligibility Criteria and the Qualification Criteria will be qualified for the next sub-stage.
- (b) The second sub-stage will involve evaluation of the Financial Proposals of those Bidders whose Qualification Proposals meet the requirements set out in Clauses 3 and 4, to identify the Selected Bidder for the Project.

2.5 Bid parameter

Each Bidder will be required to quote in the Bid Price Sheet, separately for the *Bhagalpur* Facilities, the following 4 components: (a) the Bid Project Cost (including all Taxes & GST); (b) the O&M Charges for the first month after COD (including all Taxes & GST); (c) the Guaranteed Energy Consumption for the O&M Period; and (d) the Land Requirement.

For the purposes of calculation of the 'Guaranteed Energy Consumption' of the *Bhagalpur* Facilities, each Bidder will be required to quote in its Bid Price Sheet the maximum number of units of power (in kWh) per MLD which it expects the Concessionaire to consume to treat the varying volumes (expressed in MLD) and BOD of sewage, as specified in the format of the Bid Price Sheet for the *Bhagalpur* Facilities. Based on the number of units of power per MLD quoted by a Bidder for the varying volumes and BOD of sewage, the average number of units (in kWh) that the Concessionaire is expected to consume per MLD of sewage treated at the *Bhagalpur* STP will be calculated using the formula specified in the Bid Price Sheet (such average, the *Bhagalpur Average Guaranteed Energy Consumption*). The *Bhagalpur Facilities*' Average Guaranteed Energy Consumption will be used to calculate the *Bhagalpur Facilities* Power Charges of a Bidder in accordance with the Bid Price Sheet.

Bidder shall carefully quote the Land Requirement in the Financial Proposal. No additional Land shall be ordinarily allocated to the Concessionaire beyond the quoted Land in the Financial Proposal for the Construction of the Project. However under unavoidable circumstances and in the interest of the Project, the Executing Agency based on availability, may consider to allocate additional land for the construction of the Project upon the request of the Concessionaire and such allocation shall be subject to the payment of a sum equivalent to one hundred and fifty percentage of the Land Rate, for each additional acres of Land and part thereof. If the additional land requirement changes position of the Selected Bidder/Concessionaire vis a vis the Second Preferred Bidder, then the Concessionaire shall pay to the Executing Agency, a sum of equivalent to (a) one hundred and fifty percentage of the Land Rate for each additional acres of Land and part thereof; OR (b) the difference between Bid Price of Second Preferred Bidder and the revised Bid Price of the Selected Bidder; whichever is higher.

Based on the 4 components quoted by the Bidders in the Bid Price Sheet for the

Bhagalpur Facilities, the *Bhagalpur Facilities* Bid Price, and the overall Bid Price will be calculated as per the formula in the Bid Price Sheet.

The only criterion for evaluation and comparison of Financial Proposals will be the Bid Price.

- 2.6 The Bidder shall quote the Bid Project Cost in Rupees. However, for any inputs required by the Bidder from outside India during the Construction Period, the Bidder may specify in its [Financial Proposal] the percentage of the Bid Project Cost that it would want to receive in a foreign currency. Payments for such inputs required from outside India may be quoted in up to 3 foreign currencies using RBI selling (exchange) rate prevailing 28 days prior to the Bid Due Date. It is clarified that the aggregate construction payments due to the Concessionaire during the Construction Period shall not exceed 40% of the Bid Project Cost, as quoted by the Selected Bidder in Rupees and adjusted for inflation under the Concession Agreement, on account of a percentage of the Bid Project Cost being paid to the Concessionaire in foreign currencies.
- 2.7 The Preferred Bidder shall be the one which: (a) meets the Qualification Criteria and the Eligibility Criteria; and (b) quotes the lowest Bid Price. Generally, the Preferred Bidder shall be the Selected Bidder for the Project. If the Preferred Bidder withdraws its Bid or is not selected for any reason, then the *Executing Agency* may, in its discretion, select the Second Preferred Bidder as the Selected Bidder or annul the Bid Process.
- 2.8 Bidders are required to submit the Bid Security along with their Bids. The Bidders shall provide the Bid Security in the form of a bank guarantee issued by a Scheduled Bank in India or by a foreign bank listed with the Reserve Bank of India and payable at *Patna* in favour of "Bihar Urban Infrastructure Development Corporation Ltd" represented by the Managing Director in the format set out at Annexure II. The original Bid Security must be submitted to the *Executing Agency* at the address mentioned in Clause 24.11 below before the date/time of opening of the Bids (Qualification Proposals), either by registered/speed post/courier or by hand, failing which the Bid will be declared non-responsive. A scanned copy of the Bid Security must be uploaded by the Bidders on the e-Procurement Portal along with their Bids.
- 2.9 All Bids are required to be prepared and submitted electronically in accordance with the terms of this RFP on or before the Bid Due Date.
- 2.10 The Bidders may inspect the Site and carry out, at their own cost, such inspections as may be required to submit their respective Bids at any time prior to the date specified in the Bid Schedule. The *Executing Agency* shall facilitate such site visits provided that the Bidder gives the *Executing Agency* at least 2 days' prior written notice of its intention to visit the Site.

2.11 It will be assumed that the Bidders have accounted for all relevant factors, including technical data, status and condition of the Supporting Infrastructure, the Site conditions, climate, weather conditions, availability of power (including the requirement of any power back-up), water and other utilities for construction of the Facilities, access to the Site, handling and storage of materials, Applicable Laws and Applicable Permits while submitting their Bids. The Bidders will be deemed to have full knowledge of the Project, including the scope of activities required to be undertaken by the Bidders to undertake the Project.

2.12 **e-Procurement**

- (a) The Bid Process will be conducted by way of e-tendering. In order to participate in the Bid Process, a Bidder must procure a digital signature certificate (class II or III) and register on the e-Procurement Portal using its digital signature. A digital signature certificate may be procured from a registered certifying authority as stipulated by Controller of Certifying Authorities, GoI.
- (b) In case of a Consortium, the Bidder must register with the e-Procurement Portal in the name of the Lead Member, using the digital signature certificate issued in the name of the authorized signatory of the Lead Member.
- (c) The Bidders must: (i) upload a soft copy/scanned copy of their Qualification Proposal, including a copy of the Bid Security and the demand draft/cashier's cheque for the Bid processing fee on the e-Procurement Portal in PDF format; and (ii) populate the Bid Price Sheet provided on the e-Procurement Portal, (iii) submit physically, the Bid Security, Power of Attorney, Joint Bidding Agreement, receipt towards payment of Bid Processing Fee (Beltron), etc. before the specified time on the Bid Due Date. Upon submitting the Qualification Proposals and the Financial Proposals on the e-Procurement Portal, the Bidders must affix their digital signature both to the Qualification Proposals and the Financial Proposals.
- (d) The Bidders are encouraged to visit the e-Procurement Portal to acquaint themselves with the process of submitting their Bids online.
- (e) For the purposes of determining the cut-off time for submission of queries and Bids, the central server time displayed on the clock on the e-Procurement Portal will be followed by the Bidders and the *Executing Agency*.

2.13 Any queries or requests for additional information relating to this RFP should be submitted by the Bidder on the e-Procurement Portal on or before the specified time and date mentioned in the Bid Schedule.

2.14 The *Executing Agency* shall endeavour to adhere to the following schedule for the Bid Process:

S. No.	Event	Date/Location
1.	Issue of RFP	<i>From 23 August 2018 Through website www.eproc.bihar.gov.in Bihar Urban Infrastructure Development Corporation, Patna</i>
2.	Site Visit	<i>Up to 30 August 2018, 2PM</i>
3.	Last date for receiving queries from Bidders	<i>Date: 03 September 2018 Time: 18.00 Hrs Email: mdbuidco@gmail.com, buidcopd3@gmail.com – Project Director, BUIDCO cmgbuidco@gmail.com – Chief General Manager, BUIDCO</i>
4.	Pre-Bid Meeting	<i>Date: 06 September 2018 Time: 10.00 Hrs BUIDCO office, Khadya Bhawan, 2nd floor, Daroga Rai Path, R. Block Road No.-2, Patna-800 001</i>
5.	Issue of Addendum/Revised RFP and Concession Agreement by Executing Agency latest by	<i>20 September 2018</i>
6.	Bid Due Date	<i>Date 18 October 2018. up to 15.30 Hrs</i>
7.	Opening of Bids (Qualification Proposals)	<i>18 October 2018. Time: 16.00 Hrs</i>
8.	Notification of qualified Bidders	<i>Within 7 days from the date of opening of Qualification Proposals</i>
9.	Opening of Financial Proposals	<i>Within 7 days from the date of notification of qualified Bidders</i>
10.	Issue of LOA	<i>Within 30 days from the date of opening of Financial Proposals</i>
11.	Signing of the Concession Agreement	<i>Within 45 days from the date of acceptance of LOA by the Selected Bidder</i>

SECTION II

ELIGIBILITY AND QUALIFICATION CRITERIA

3. ELIGIBILITY OF BIDDERS

3.1 Nature of Bidder

- (a) A Bidder may be a natural person, a Company registered under the Companies Act or an equivalent law outside India, or any other private entity or State-owned entity, acting in its individual capacity or as a Consortium. The term Bidder used in this RFP shall apply to both a single entity as well as a Consortium.

However, Bidders that are Government-owned enterprises or institutions in the Executing Agency's country may participate only if they can establish that they (i) are legally and financially autonomous (ii) operate under commercial law, and (iii) are not dependent agencies of NMCG or the Executing Agency.

To be eligible, a government-owned enterprise or institution shall establish to the Bank's satisfaction, through all relevant documents, including its Charter and other information the Bank may request, that it: (i) is a legal entity separate from the government (ii) does not currently receive substantial subsidies or budget support; (iii) operates like any commercial enterprise, and, inter alia, is not obliged to pass on its surplus to the government, can acquire rights and liabilities, borrow funds and be liable for repayment of its debts, and can be declared bankrupt; and (iv) is not bidding for a contract to be awarded by the department or agency of the government which under their applicable laws or regulations is the reporting or supervisory authority of the enterprise or has the ability to exercise influence or control over the enterprise or institution.

- (b) Eligible countries:
- (i) In accordance with paragraph 1.10 of the Guidelines, the Bank permits firms and individuals from all countries to offer goods, works and services for Bank-financed projects. As an exception, firms of a country or goods manufactured in a country may be excluded if:
- (A) Paragraph 1.10 (a)(i): as a matter of law or official regulation, India prohibits commercial relations with that country, provided that the Bank is satisfied that such exclusion does not preclude effective competition for the services required under the Project; or
- (B) Paragraph 1.10 (a)(ii): 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, India prohibits any import of

goods from that country or any payments to persons or entities in that country.

- (ii) For the information of Bidders, at the present time, firms, goods and services from the following countries are excluded from this bidding:
 - (A) With reference to paragraph 1.10(a)(i) of the Guidelines: *none*
 - (B) With reference to paragraph 1.10(a)(ii) of the Guidelines: *none*
- (c) If a Bidder is a Consortium, then the Consortium and its Members shall comply with the following conditions:
 - (i) The number of Members in such Consortium shall not exceed 3.
 - (ii) The Bid submitted by the Consortium should contain the required information for each Member and a brief description of the roles and responsibilities of each Member.
 - (iii) The Consortium will nominate one of the Members as the Lead Member. Such nomination will be supported by a power of attorney from each Member of the Consortium and will be in the format set out in Annexure 1J. The Lead Member will have the authority to represent and bind all the Members during the Bid Process.
 - (iv) The Members of the Consortium shall enter into a binding Joint Bidding Agreement, in the format set out in Annexure 1K, and shall appoint one of the Members to represent the Consortium. All Members shall be jointly and severally liable for the performance of the Project till the end of the term of the Concession Agreement or till the date of exit from the Concessionaire subject to clause 3.2(b)(iii) of the RFP document, whichever is earlier. The Members will not be permitted to amend or terminate the Joint Bidding Agreement, at any time during the validity of the Bid without the prior consent of the *Executing Agency*.

3.2 Lock-in Restrictions and Change in Control

- (a) Each Bidder (whether a single entity or Consortium) is required to incorporate a Special Purpose Vehicle to implement the Project.
- (b) If the Selected Bidder is a Consortium, then the Members are required to comply with the following conditions with respect to the SPV to be incorporated by the Selected Bidder to implement the Project:
 - (i) the Lead Member shall hold not less than 26% of the total Capital and voting rights of the Concessionaire until 3 years after the COD;

- (ii) any Member, other than the Lead Member, whose Technical Capacity or Financial Capacity is being assessed for the purpose of qualification, shall hold at least 26% of the total Capital and voting rights of the Concessionaire for 3 years after the COD; and
 - (iii) after the expiry of 3 years from the COD, the Lead Member and/or other Members can exit the Concessionaire, subject to: (A) the Member who demonstrated the O&M experience for the purposes of qualification continuing to be part of the Concessionaire; or (B) the entity acquiring the shareholding of the Lead Member/any other Member in the Concessionaire meeting the technical qualification criteria set out in Clause 4.1 (b); or (C) the Concessionaire appointing an O&M contractor who complies with the technical qualification criteria set out in Clause 4.1 (b).
- (c) If the Selected Bidder is a single entity, then:
- (i) the Selected Bidder shall hold at least 51% of the total Capital and voting rights of the Concessionaire until the COD, and at least 26% of the total Capital and voting rights of the Concessionaire for 3 years after the COD; and
 - (ii) after the expiry of 3 years from the COD, the Selected Bidder can exit the Concessionaire, subject to: (A) the entity acquiring the shareholding of the Selected Bidder in the Concessionaire meeting the technical qualification criteria set out in Clause 4.1 (b); or (B) the Concessionaire appointing an O&M contractor who complies with the technical qualification criteria set out in Clause 4.1 (b).
- (d) If, post submission of the Bid, any Associate, whose credentials have been taken into consideration for determining Technical Capacity, ceases or will cease to be an Associate of the Bidder or such Member, then, the Selected Bidder shall seek the approval of the *Executing Agency* for such occurrence. If the *Executing Agency* is of the view that such occurrence is likely to affect the Technical Capacity of the Bidder adversely, then the *Executing Agency* may disqualify the Bidder from participation in the Bid Process; or, if the Bidder has been declared as the Selected Bidder, withdraw the LOA or treat such occurrence as a Concessionaire event of default in accordance with the Concession Agreement, without the *Executing Agency* incurring any liability towards the Selected Bidder or the Concessionaire for such withdrawal or possible termination. While the *Executing Agency* will not unreasonably withhold or delay such approval, the decision of the *Executing Agency* will be final in this regard.

3.3 Conflict of Interest

Any Bidder found to have a conflict of interest (**Conflict of Interest**) shall be disqualified. A Bidder, a Member (in case of a Consortium), its Group Companies or Associates may be considered to have a Conflict of Interest with one or more Bidders, its Members, its Group Companies or Associates in this Bid Process if, as indicated in this Clause 3.3:

- (a) they have a common Controlling partner, except that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in the Companies Act, 2013. Bidder can view the Companies Act, 2013 at <http://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf>. The current list of Public Financial Institutions is annexed at Annexure 6. The Bidders are advised to ascertain the updated list of Public Financial Institutions from the available sources; 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 access to information about or influence the Bid of another Bidder, or influence the decisions of the *Executing Agency* regarding this Bid Process; or
- (e) the Bidder participates in more than one Bid for the same Project (as described in Clause 17); or
- (f) the Bidder, or any of its Group Companies or Associates participated as a consultant in the preparation of any documents, design or technical specifications of the Project that are subject of the Bid; or
- (g) the Bidder or any of its Group Companies or Associates has been hired (or is proposed to be hired) by the *Executing Agency* as project manager for the Project.
- (h) The Bidder or any of its Group Companies or Associates has a close business or family relationship with a professional staff of NMCG (or of the *Executing Agency*, or of a recipient of a part of the loan) who: (i) are directly or indirectly involved in the preparation of the bidding documents or specifications of the contract, and/or the bid evaluation process of such contract; or (ii) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Bank throughout the Bid Process and execution of the Concession Agreement.

3.4 Fraud and Corruption: It is the Bank's policy to require that Borrowers (including

beneficiaries of Bank loans), bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.¹ In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;²;
 - (ii) “fraudulent practice” is 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;³
 - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;⁴
 - (iv) “coercive practice” is 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;⁵
 - (v) “obstructive practice” is
 - (aa) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or 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
 - (bb) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under paragraph 1.16(e) below.

¹ In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

² For the purpose of this sub-paragraph, “*another party*” refers to a public official acting in relation to the procurement process or contract execution. In this context, “*public official*” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

³ For the purpose of this sub-paragraph, “*party*” refers to a public official; the terms “*benefit*” and “*obligation*” relate to the procurement process or contract execution; and the “*act or omission*” is intended to influence the procurement process or contract execution.

⁴ For the purpose of this sub-paragraph, “*parties*” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

⁵ For the purpose of this sub-paragraph, “*party*” refers to a participant in the procurement process or contract execution.

- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;
- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,⁶ including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated⁷;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.”

3.4.1 Inspection and Audit

In further pursuance of the policy referred to in ITB 3.4 above, Bidders shall permit and shall cause its agents (whether declared or not), sub-contractors, sub-consultants, service providers, or suppliers and any personnel thereof, to permit the Bank to inspect all accounts, records and other documents relating to any prequalification process, bid submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Bank.

3.5 Other Eligibility Criteria

⁶ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

⁷ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

- (a) A Bidder or any Member of a Consortium that has been sanctioned by the Bank in accordance with the Bank's Guidelines on Preventing and Combating Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, shall be ineligible to be awarded a Bank-financed contract, or benefit from a Bank-financed contract, financially or otherwise, during such period of time as the Bank shall determine.
- (b) If the Bidder or any Member (in case of a Consortium) is party to any litigation (required to be disclosed as per Annexure 1H), in which, any subsequent ruling/judgement by any court/judicial authority after the submission of bid affects or could have a material adverse effect on the financial condition, prospects or business of such Bidder or Member or its ability to fulfil its obligations under the Concession Agreement, the Bid will not be evaluated further by the *Executing Agency*.
- (c) If a Company has entered into a contract for operation of the e-Procurement Portal, which is currently valid and subsisting, then such Company and its Associates will not be eligible to submit a Bid. [The e-Procurement portal is operated by Beltron.]
- (d) If any contract of the Bidder or any Member (in case of a Consortium) has been suspended or terminated and/or performance security has been called by an employer for reasons related to the non-compliance by the Bidder with any ESHS requirements or safeguard in the past 5 years (required to be disclosed as per Annexure 1L), which, in the *Executing Agency's* opinion, affects or could have a material adverse effect on the financial condition, prospects or business of such Bidder or Member or its ability to fulfil its obligations under the Concession Agreement, the Bid will not be evaluated further by the *Executing Agency*.

Bidders will provide such evidence of their continued eligibility as the *Executing Agency* may request at any time during or after the Bid Process.

If a Bidder is a Consortium, then the term "**Bidder**" as used in Clause 3.3, Clause 3.4 and Clause 3.5 shall include each Member of such Consortium, and the term "**Associate**" as used in Clause 3.3, Clause 3.4 and Clause 3.5 shall include Associates of each Member of the Consortium.

4. QUALIFICATION CRITERIA

The Bidders should satisfy the following minimum technical criteria and financial criteria set out in Clause 4.1 and Clause 4.2 respectively to qualify for evaluation of the Financial Proposals:

4.1 **Technical Criteria**

To demonstrate its technical capacity and experience (**Technical Capacity**), the Bidder must have the following experience:

(a) Development/Design and Construction experience

(i) *Sewage Treatment Plant Experience:* The Bidder shall have (A) developed and/or (B) designed and constructed 1 STP of at least 36 MLD capacity or 2 STPs of at least 27 MLD capacity each or 3 STPs of at least 18 MLD capacity each, which shall each:

(A) have been developed or designed and constructed using [any technology];

(B) have been (A) developed or (B) designed and constructed in the 7 years preceding the Bid Due Date, as evidenced by the issuance of a completion certificate by the relevant government authority/client, certifying that the STP(s) have been completed in terms of the concession agreement or similar contract executed for such STP(s); and

(C) have been successfully operational for any 24 consecutive months in the 7 years preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP(s), as evidenced by a certificate from the relevant government authority.

(ii) *Sewage network Experience:* The bidder shall have (I) developed and/or (II) designed and constructed and / or (III) constructed sewerage network(s), which shall satisfy each of the following criteria

(1) at least one sewerage network of minimum 12 (twelve) km and

(2) at least 400m of sewerage network should be more than or equal to 1200 (one thousand two hundred) mm diameter

The Bidder may rely on the experience of different projects for demonstrating experience under 4.1(a)(ii)(1), and 4.1.1(a)(ii)(2).

With regards to the design and construction experience being claimed under 4.1.1(a)(ii)(I) and/or 4.1.1(a)(ii)(II), if a Bidder has only construction experience but not design experience, then the same can be claimed via a nominated subcontractor. Such nominated subcontractor will be engaged for designing the proposed Project, if the Bidder is declared the Selected Bidder, and will be required to provide a consent letter in the format set out in Annexure 6 (along with certificate(s) from the relevant government authority/ client).

(iii) To claim development experience for STP and *Sewage network* as mentioned in Clause 4.1(a).(i) and Clause 4.1(a).(ii) respectively, the entity claiming the experience shall have held, in the company developing the STP, a minimum of 26% equity share capital as on the commercial operations date of such project.

- (iv) To claim design and construction experience for STP and *Sewage network* as mentioned in Clause 4.1(a).(i) and Clause 4.1(a).(ii) respectively, the entity claiming experience should have been appointed as the principal contractor (i.e., the contractor hired directly by the owner of the project/entity developing the relevant STP/SPS) and any other subcontractor experience is not permitted for claiming Technical Capacity for STP design and construction.
- (v) The Bidder may develop the Bhagalpur STP using different technologies, provided that each such technology should be the same as the technology adopted for at least one of the STP(s) for which experience is being claimed under this Clause 4.1(a)(i) to demonstrate Technical Capacity

(b) Operation and maintenance experience

- (i) The Bidder shall have successfully operated and maintained 1 STP of at least 36 MLD capacity or 2 STPs of at least 27 MLD capacity each or 3 STPs of at least 18 MLD capacity each for any 24 consecutive months in the 7 years immediately preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP(s). The STP(s) for which the Bidder is claiming O&M experience should have been developed using any technology.
- (ii) For this purpose, the Company claiming the experience will be required to submit a certificate issued by the relevant government authority.

(c) It is clarified that:

- (i) the Bidder must demonstrate both development/design and construction experience specified in Clause 4.1(a) above and O&M experience specified in Clause 4.1(b) above to be technically qualified for evaluation of the Financial Proposals;
- (ii) the Bidder/Member may rely on the experience of its Associate(s) for demonstrating the Technical Capacity (including, if applicable, under Clause 4.1(d)). However a Bidder claiming the experience of the Associates for Technical Capacity, shall submit a Letter of Commitment from such Associate that the expertise of the Associate will be made available during the development and operation of the Project ;
- (iii) in case of a Consortium, the development/design and construction experience set out in Clause 4.1(a) must be demonstrated by one Member and the O&M experience set out in Clause 4.1(b) may be claimed by a different Member;

- (iv) in case of a Consortium, if the Consortium is claiming O&M experience on the basis of more than 1 STP, then each of the STPs should have been operated and maintained by the same Member;
 - (v) if the development/design and construction experience and the O&M experience is being claimed by a different Member, then the Member who demonstrates development/design and construction experience and the Member who demonstrates the O&M experience must each hold 26% of the total Capital and voting rights of the Concessionaire for 3 years post COD;
 - (vi) the development/design and construction experience and the O&M experience may be claimed in relation to the same STP. If, however, the development/design and construction experience and the O&M experience is being claimed for different STPs, then it is clarified that the STP for which O&M experience is being claimed may be based on a technology which is different from the technology used in the STP(s) for which development/design and construction experience is being claimed; and
 - (vii) for certificates claiming development/design and construction and O&M experience that are issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the certificate is being issued. However, the certificates provided by the Bidders from countries that have signed the Hague Legislation Convention, 1961 are not required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.
- (d) the Bidder/Member will be required to demonstrate its experience (in the format set out in Annexure 2) in developing or designing and constructing a biogas power plant, which should have:
- (A) a capacity of at least 0.25 MW;
 - (B) been based on STP effluent;
 - (C) been developed or designed and constructed in the 7 years preceding the Bid Due Date, as evidenced by the issuance of a completion certificate by the relevant government authority, certifying that the biogas power plant has been completed in terms of the relevant contract executed for such biogas power plant; and
 - (D) successfully operational for any 24 consecutive months in the 7 years preceding the Bid Due Date, in accordance with the relevant contract executed for such biogas power plant, as evidenced by a certificate from the relevant government authority;

If the Bidder or any Member of the Consortium does not have any experience of having developed or designed and constructed a biogas power plant, the Bidder will be required to nominate an experienced power plant developer which has developed and/or designed a biogas power plant, which meets the criteria set out in (A) to (D) above. The nominated Subcontractor will be engaged to develop the power plant for the Project, if the Bidder is declared the Selected Bidder, and will be required to provide a consent letter in the format set out in Annexure 3 (along with certificate(s) from the relevant government authority).

4.2 **Financial Criteria**

To demonstrate its financial capacity to undertake the Project (**Financial Capacity**), the Bidder must meet each of the financial qualification criteria specified in this Clause 4.2.

- (a) Net worth
- (i) In each of the 3 Financial Years immediately preceding the Bid Due Date, the Bidder's Net Worth (as per the annual financial statements) shall be at least INR 40 Cr (INR Forty Crore only).
 - (ii) If the Bidder is a Consortium, then the Net Worth, as required in Clause 4.2 (a)(i) above will be demonstrated cumulatively, i.e., the Consortium as a whole should meet the requirement. Provided further that if the Bidder is subsequently declared the Selected Bidder for the Project, then any Member of the Consortium whose Net Worth was assessed for the purposes of demonstrating that the Consortium has the Financial Capacity to undertake the Project, shall hold at least 26% of the total Capital and voting rights of the Concessionaire for 3 years post the COD.
 - (iii) The calculation of Net Worth must be based on the unconsolidated audited annual accounts of the Bidder for the preceding Financial Year. If the annual accounts for the Financial Year immediately preceding the Bid Due Date are not audited, the Bidder shall provide the provisional annual accounts for such Financial Year. The provisional annual accounts shall be accompanied by an undertaking by the Bidder to the effect that:
 - (A) if it is chosen as the Selected Bidder, the Bidder will submit the audited annual accounts for the Financial Year immediately preceding the Bid Due Date prior to the Effective Date; and
 - (B) the Net Worth as per such audited annual accounts shall not vary by more than 5% from the provisional accounts submitted by it with its Bid.

A Bidder or a Member of a Consortium is not permitted to rely on the Net Worth of its Associate for demonstrating its Financial Capacity.

- (b) The Bidder (and in case of a Consortium, any Member) is not affected by and has not been affected by any of the following events, conditions or circumstances in the 3 Financial Years immediately preceding the Bid Due Date, as certified by the statutory auditor of the Bidder (and in case of a Consortium, the statutory auditor of a Member):
 - (i) the Bidder having been categorized as a willful defaulter in accordance with Applicable Laws or laws of the country of its incorporation;
 - (ii) the Bidder being subject to proceedings for declaration of or being declared bankrupt, being wound up, or having its affairs administered or conducted by any court, administrator, receiver; or
 - (iii) the Bidder having been declared by a court or other competent authority as being unable to pay its debts, or having made any composition or arrangements with creditors or having had the repayment of its debts suspended.

- (c) The Bidder (and in case of a Consortium, any Member) has not been convicted or otherwise being found responsible (or having any of its directors, partners, trustees, officers or managers convicted or being found responsible) by any court, tribunal, regulatory, public or other competent authority for a breach of any laws or regulations which:
 - (i) related to any act of fraud or dishonesty for which a fine, penalty, damages, compensation or other payment was levied against the Bidder or any of its directors, partners, trustees, officers or managers; or
 - (ii) resulted in the permanent or temporary suspension of the rights of the Bidder to provide any service or carry on any type of business or operations.

SECTION III

INSTRUCTION TO BIDDERS

PART A. GENERAL

5. SCOPE OF RFP

5.1 The *Executing Agency* wishes to receive Bids in accordance with this RFP for award of the Project.

5.2 The RFP must be read as a whole. If any Bidder finds any ambiguity or lack of clarity in this RFP, the Bidder must inform the *Executing Agency* at the earliest. The *Executing Agency* will then direct the Bidders regarding the interpretation of the RFP. If any discrepancy, ambiguity or contradiction arises between the terms of the RFP and the Concession Agreement in relation to:

- (a) the Bid Process, the provisions of the RFP shall prevail; and
- (b) the scope of services or any other terms or conditions of the Concession Agreement, including Technical Specifications, the provisions of the Concession Agreement shall prevail.

6. ACKNOWLEDGEMENT BY THE BIDDER

6.1 It shall be deemed that by submitting the Bid, the Bidder has:

- (a) made a complete and careful examination of the RFP (including all instructions, forms, terms and specifications) and any other information provided by the *Executing Agency* under this RFP and the Bidder acknowledges that its submission of a Bid that is not substantially responsive to the RFP in every respect will be at the Bidder's risk and may result in rejection of the Bid;
- (b) received all relevant information requested from the *Executing Agency* and NMCG;
- (c) accepted the risk of inadequacy, error or mistake in the information provided in the RFP or furnished by or on behalf of the *Executing Agency*;
- (d) satisfied itself about all things, matters and information, necessary and required to submit a Bid;
- (e) acknowledged and agreed that inadequacy, lack of completeness or

incorrectness of information provided in the RFP or ignorance of any matter in relation to the Project shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations or loss of profits or revenue from the *Executing Agency* or NMCG, or a ground for termination of the Concession Agreement;

- (f) satisfied itself regarding the suitability of the Site conditions to undertake the Project; and
- (g) agreed to be bound by the undertakings provided by it under and in terms of this RFP.

6.2 The *Executing Agency* shall not be liable for any omission, mistake or error in respect of any of the above or on account of any matter or thing arising out of or relating to the RFP or the Bid Process.

7. RIGHTS OF THE EXECUTING AGENCY

7.1 The *Executing Agency*, in its sole discretion and without incurring any obligation or liability, reserves the right, at any time, to:

- (a) suspend the Bid Process and/or amend and/or supplement the Bid Process or modify the dates or other terms and conditions relating thereto;
- (b) consult with any Bidder in order to receive clarification or further information at any stage of the Bid Process;
- (c) retain any information, documents and/or evidence submitted to the *Executing Agency* by and/or on behalf of any Bidder;
- (d) independently verify, disqualify, reject and/or accept any and all documents, information and/or evidence submitted by or on behalf of any Bidder;
- (e) reject any Bid, if:
 - (i) at any time, a material misrepresentation is made or uncovered; or
 - (ii) the Bidder in question does not provide, within the time specified by the *Executing Agency*, the supplemental information sought by the *Executing Agency* for evaluation of the Bid; or
- (f) accept or reject a Bid, annul the Bid Process and reject all Bids, at any time, without any liability or any obligation for such acceptance, rejection or annulment and without assigning any reasons whatsoever to any Person, including the Bidders.

If the *Executing Agency* annuls the Bid Process and rejects all Bids, it may in its sole discretion invite fresh Bids for the Project.

- 7.2 If the *Executing Agency* exercises its right under this RFP to reject a Bid and consequently, the Preferred Bidder for the Project gets disqualified or rejected, then the *Executing Agency* reserves the right to:
- (a) select the Second Preferred Bidder as the Selected Bidder for the Project; or
 - (b) take any such measure as may be deemed fit in the sole discretion of the *Executing Agency*, including inviting fresh Financial Proposals from the qualified Bidders or annulling the entire Bid Process.
- 7.3 If it is found during the Bid Process, at any time before signing the Concession Agreement that one or more of the Qualification Criteria and/or the Eligibility Criteria have not been met by a Bidder or that the Bidder has ceased to meet them, or a Bidder has made material misrepresentations or has given any materially incorrect or false information, then such Bidder will be disqualified.

If such Bidder has been declared as the Selected Bidder or has already been issued the LOA or has entered into the Concession Agreement, the LOA or the Concession Agreement, as the case may be, shall be liable to be terminated, by a notice in writing from the *Executing Agency* to the Selected Bidder.

Upon any disqualification, cancellation or termination in accordance with this Clause 7.3, the *Executing Agency* will not be liable in any manner whatsoever to the Bidder. Additionally, the *Executing Agency* will have the right to forfeit and appropriate the Bid Security or, as the case may be, appropriate an equivalent amount from the Performance Security if the Concession Agreement has been executed, as a mutually agreed genuine pre-estimate of the loss suffered by the *Executing Agency* for, amongst others, the *Executing Agency's* time, cost and efforts in conducting the Bid Process. Such forfeiture will be without prejudice to any other right or remedy that the *Executing Agency* may have under the RFP, the Concession Agreement or Applicable Laws.

8. **CLARIFICATIONS ON THE RFP**

8.1 **Clarifications and Queries**

- (a) If a Bidder requires any clarification on or has any query in relation to the RFP, it should submit such query or request for clarification to the *Executing Agency* on the e-Procurement Portal before the specified time and date mentioned in the Bid Schedule. All queries or clarification requests should be received on or before the date and time mentioned in the Bid Schedule.
- (b) The *Executing Agency* shall make reasonable efforts to respond to the queries or requests for clarifications on or before the date mentioned in the Bid Schedule. The *Executing Agency's* responses (including an explanation of the query but not identification of its source) will be made available to all the Bidders and shall be uploaded on the e-Procurement Portal.

- (c) The *Executing Agency* may, on its own initiative, if deemed necessary, issue clarifications to all the Bidders. All clarifications and interpretations issued by the *Executing Agency* shall be deemed to be part of this RFP. Should the *Executing Agency* deem it necessary to amend the RFP as a result of a request for clarification, it will do so following the procedure under Clause 9.
- (d) It shall be the responsibility of the Bidders to check the e-Procurement Portal for the response to the queries or requests for clarifications.
- (e) Verbal clarifications and information given by NMCG, the *Executing Agency* or any other Person for or on its behalf shall not in any way or manner be binding on NMCG or the *Executing Agency*.

8.2 Pre-Bid Meeting

- (a) All interested Companies shall be invited to attend the Pre-Bid Meeting on the date, time and place mentioned in the Bid Schedule. The purpose of the Pre-Bid Meeting will be to clarify issues and answer questions on any matter relating to the RFP, the Bid Process and the Project.
- (b) All interested Companies may nominate up to 3 authorized representatives to participate in the Pre-Bid Meeting, by confirming the participation of its authorized representatives at the Pre-Bid Meeting at least 3 days prior to the date of the Pre-Bid Meeting. Such confirmation shall be sent by e-mail to buidcopd3@gmail.com.
- (c) During the course of the Pre-Bid Meeting, all interested Companies will be free to seek clarifications and make suggestions to the *Executing Agency*.
- (d) Non-attendance at the Pre-Bid Meeting will not be a cause for disqualification of an interested Company from participating in the Bid Process.

9. AMENDMENT OF THE RFP

9.1 Up until the date that is mentioned in the Bid Schedule, the *Executing Agency* may, for any reason, whether on its own initiative or in response to a query raised or clarifications requested by a Bidder, amend the RFP by issuing an Addendum or an amended RFP and amended draft Concession Agreement. The addendum will appear on the e-Procurement Portal under “Latest Corrigendum” and email notification is also automatically sent to those bidders who have moved this tender to their “My Tenders” area. Any addendum thus issued shall be part of the bidding documents and deemed to have been communicated to all the bidders who have moved this tender to their “My Tenders” area.

9.2 All Addenda/amendments and amended RFP & amended draft Concession Agreement will be uploaded on the e-Procurement Portal.

- 9.3 The Bidders are required to visit the website before submission of the Bid so as to take into account with any Addenda/amendments that may be issued in accordance with this Clause 9.
- 9.4 Each Addendum/amendment will be binding on the Bidders, whether or not the Bidders convey their acceptance of the Addendum/amendment.
- 9.5 Any oral statements made by NMCG or the *Executing Agency* or its advisors regarding the Bid Process, the RFP or on any other matter, shall not be considered as amending the RFP.
- 9.6 The *Executing Agency* will assume that the information contained in the Addendum/amendments will have been taken into account by the Bidder in its Bid. The *Executing Agency* assumes no responsibility for the failure of a Bidder to submit the Bid in accordance with the terms of the Addendum/amendments or for any consequent losses suffered by the Bidder.

10. AVAILABILITY OF INFORMATION

- 10.1 The information relating to or in connection with the Project, the Bid Process and this RFP, including all notices issued by the *Executing Agency* to all Bidders in accordance with this RFP; queries and responses or clarifications and any Addenda will be uploaded on the e-Procurement Portal.
- 10.2 All such information will be made available for review by the Bidders until the Bid Due Date.
- 10.3 If a Bidder faces any technical issue or technical error in accessing the e-Procurement Portal, the Bidder may seek assistance from the *Executing Agency* by sending an e-mail request to buidcopd3@gmail.com, no later than 3days prior to the Bid Due Date.
- 10.4 The *Executing Agency* will use its best endeavours to respond to a written e-mail request and resolve the technical issue or error or provide an alternative solution to the Bidder within 3 days of receipt of such request.

11. CORRESPONDENCE WITH BIDDERS

Save as expressly provided in this RFP, NMCG and the *Executing Agency* will not entertain any correspondence with the Bidders, whether in connection with the acceptance or rejection of their Bids or otherwise.

12. CONFIDENTIAL INFORMATION AND PROPRIETARY DATA

12.1 **Proprietary Data**

All documents and other information provided by the *Executing Agency* or submitted by a Bidder to the *Executing Agency* will remain or become the property of the *Executing Agency*, as the case may be. Bidders are required to treat all information

provided by the *Executing Agency* in the RFP as strictly confidential and not to use them for any purpose other than for preparation and submission of their Bids.

12.2 Confidentiality Obligations of the *Executing Agency*

The *Executing Agency* will treat all information, submitted as part of a Bid as confidential and will require all those who have access to such material to treat it in confidence. The *Executing Agency* may not divulge any such information or any information relating to evaluation of Bids or the qualification of Bidders unless:

- (a) such publication is contemplated under this RFP;
- (b) such publication is made to any Person who is officially involved with the Bid Process or is a retained professional advisor advising the *Executing Agency*, NMCG or the Bidder on matters arising out of or in connection with the Bid Process;
- (c) it is directed to do so by any statutory authority that has the power under law to require its disclosure;
- (d) such publication is to enforce or assert any right or privilege of the statutory authority and/or the *Executing Agency* and/or NMCG or as may be required by law (including under the Right to Information Act, 2005); or
- (e) in connection with any legal process.

13. GOVERNING LAW AND JURISDICTION

13.1 Governing Law

The Bid Process, this RFP and the Bids shall be governed by, and construed in accordance with, the laws of India.

13.2 Exclusive Jurisdiction

The competent courts at *Patna* shall have jurisdiction over all disputes arising under, pursuant to and/or in connection with the Bid Process, this RFP and the Bids.

14. VALIDITY OF THE BIDS

14.1 The Bids shall remain valid for a period of 180 days from the Bid Due Date. A Bid valid for a shorter period shall be rejected by the *Executing Agency* as being non-responsive.

14.2 In exceptional circumstances, prior to the expiry of the Bid validity period, the *Executing Agency* may request Bidders to extend the Bid validity period. The request and the responses shall be made in writing. A Bidder may refuse the *Executing*

Agency's request to extend the validity period of its Bid, without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its bid.

PART B. BID SECURITY, PERFORMANCE SECURITY AND ESHS PERFORMANCE SECURITY

15. BID SECURITY

15.1 The Bidder shall furnish as part of its Bid, a bid security for the Project (the **Bid Security**). The Bid Security shall be for an amount equivalent to INR 2 Crore (Rupees Two Crores only) or US\$ 307,600 or an equivalent amount in a freely convertible currency

15.2 The Bid Security shall remain valid for 45 days beyond the Bid validity period specified in Clause 14.

15.3 The Bidder shall provide the Bid Security in the form of a bank guarantee issued by a Scheduled Bank in India or by a foreign bank listed with the Reserve Bank of India having its branches in India. The Bid Security shall be issued in favour of the "Bihar Urban Infrastructure Development Corporation Ltd ", represented by the *Managing Director, BUIDCO*, payable at *Patna* and in the format set out in Annexure 11.

The Bid Security of a Consortium/JV shall be in the name of the Consortium/JV that submits the Bid. If the JV has not been legally constituted into a legally enforceable Consortium/JV at the time of Bidding, the Bid Security shall be in the names of all future members as named in the Joint Bidding Agreement.

15.4 Unless forfeited in accordance with Clause 15.5 below, the Bid Security of the unsuccessful Bidders will be returned by the *Executing Agency* no later than 30 days from the date of execution of the Concession Agreement with the SPV incorporated by the Selected Bidder.

The Bid Security of the Selected Bidder will be returned upon the SPV incorporated by the Selected Bidder furnishing the *Bhagalpur Facilities* Performance Security in accordance with Clause 16 and ESHS Performance Security in accordance with Clause 16A.

15.5 The Bid Security shall be forfeited and appropriated by the *Executing Agency* as mutually agreed genuine pre-estimated compensation and damages payable to the *Executing Agency* for time, cost and effort of the *Executing Agency*, without prejudice to any other right or remedy that may be available to the *Executing Agency* hereunder or otherwise, under the following conditions:

- (a) if a Bidder is disqualified in accordance with, Clause 3.2 (*Lock-in Restrictions and Change in Control*), Clause 3.3 (*Conflict of Interest*), Clause 3.5 (*Other Eligibility Criteria*), Clause 7.3 (*Rights of the Executing Agency*), Clause 17 (*Number of Bids*) and Clause 31.3 (*Execution of Concession Agreement*);

- (b) if, after the Bid Due Date, a Bidder withdraws its Bid during the Bid validity period; or
- (c) if a Bidder is selected as the Selected Bidder and it fails, within the specified time limit, to:
 - (i) sign and return, as acknowledgement, the duplicate copy of the LOA;
 - (ii) cause the Concessionaire to furnish the Performance Security in accordance with Clause 16;
 - (iii) cause the Concessionaire to furnish the ESHS Performance Security in accordance with Clause 16A;
 - (iv) fulfil any other condition precedent to the execution of the Concession Agreement; or
 - (v) cause the Concessionaire to execute the Concession Agreement.

16. PERFORMANCE SECURITY

- 16.1 The Selected Bidder shall cause the Concessionaire to furnish to the *Executing Agency* the *Bhagalpur Facilities* Performance Security for a value equal to 9 % of the *Bhagalpur Facilities* Bid Project Cost, on or before execution of the Concession Agreement to secure the obligations of the Concessionaire under the Concession Agreement.
- 16.2 The Performance Security/Securities shall remain valid until 1 month⁸ from the Effective Date or 3 month from the COD, whichever is later.
- 16.3 The Selected Bidder shall cause the Concessionaire to provide the Performance Security/Securities in the form of bank guarantee(s) issued by a Scheduled Bank in India. The Performance Security/Securities shall be issued in favour of "Bihar Urban Infrastructure Development Corporation Ltd", represented by the Managing Director, payable at *Patna* and in the format set out in Annexure 4.
- 16.4 If the Selected Bidder fails to cause the Concessionaire to furnish the Performance Security /Securities in accordance with this Clause 16 on or before the execution of the Concession Agreement, then the *Executing Agency* shall have the right to forfeit the Bid Security of the Selected Bidder in accordance with Clause 15.5(d).
- 16.5 During evaluation of Financial Proposal and before award of the Project, if it is found that the Selected Bidder has submitted an unreasonable or a front-loaded Bid for the entire Project or for any components thereof, the *Executing Agency* reserves right to seek Additional Performance Security over and above that is mentioned in the Clause 16.1. The quantum of such Additional Performance Security will be determined by the *Executing agency* on the

⁸ Construction period plus 3 months

basis of reasonable assessment of various Project components and after seeking suitable justifications/clarifications on the price components of the Bid from the Selected Bidder. The Selected Bidder shall submit this Additional Performance Security together with the Performance Security and ESHS Performance Security. The Additional Performance Security shall be in force till the end of Construction period if the Bid Project Cost is found to be unreasonable and till the end of the Concession Period if O & M Charges are found to be unreasonable. The Additional Performance Security shall be liable to be forfeited either fully or partially as it deems fit for the reasons mentioned in Clause 16.1 of the draft Concession agreement.

16A. ESHS PERFORMANCE SECURITY

16A.1 The Selected Bidder shall cause the Concessionaire to furnish to the *Executing Agency*, the *Bhagalpur Facilities* ESHS Performance Security for a value equal to 1% of the *Bhagalpur Facilities* Bid Project Cost, on or before execution of the Concession Agreement to secure due performance of the ESHS obligations of the Concessionaire under the Concession Agreement.

16A.2 The ESHS Performance Security/Securities shall remain valid for the entire term of the Concession Agreement.

16A.3 The Selected Bidder shall cause the Concessionaire to provide the ESHS Performance Security/Securities in the form of bank guarantees issued by a Scheduled Bank in India. The ESHS Performance Security/Securities shall be issued in favour of "Bihar Urban Infrastructure Development Corporation Ltd", represented by the Managing Director, payable at *Patna* and in the format set out in Annexure 5.

16A.4 If the Selected Bidder fails to cause the Concessionaire to furnish the ESHS Performance Security/Securities in accordance with this Clause 16A on or before the execution of the Concession Agreement, then the *Executing Agency* shall have the right to forfeit the Bid Security of the Selected Bidder in accordance with Clause 15.5(d).

PART C. PREPARATION AND SUBMISSION OF BIDS

17. NUMBER OF BIDS

Each Bidder shall be permitted to submit only 1 Bid for the entire Project, either individually or as a Member of a Consortium. A Bidder applying individually or as a Member of a Consortium shall not be entitled to submit another Bid either individually or as a Member of any other Consortium, as the case may be. A Bidder who submits or participates in more than 1 Bid for the Project shall cause all the Bids with the Bidder's participation to be disqualified.

18. LANGUAGE OF BIDS AND CORRESPONDENCE

18.1 The Bid prepared by the Bidder and all correspondence and documents related to the Bid exchanged by the Bidder and the *Executing Agency* shall be in English.

18.2 Any document furnished by the Bidder may be in another language, as long as such document is accompanied by an English translation, in which case, for purposes of interpretation of the Bid, the English translation shall take precedence. If any document submitted by a Bidder is in a local language, then the English translation must be certified by an advocate and notarised in India. If any document submitted by a Bidder is in a foreign language, then the English translation must be certified by the embassy/consulate/high commission of the relevant foreign country in India or the Ministry of Foreign/External Affairs of the relevant foreign country where the project is situated. Supporting materials which are not translated into English or certified/notarised in accordance with this Clause 18.2 may not be considered by the *Executing Agency*.

19. BID DUE DATE

19.1 The Bid shall be submitted on or before the date, time and place specified in the Bid Schedule.

19.2 The *Executing Agency* may, at its discretion and for any reason, extend the Bid Due Date for all Bidders by issuing an Addendum in accordance with Clause 9, in which case all rights and obligations of the *Executing Agency* and the Bidders will thereafter be subject to the Bid Due Date as extended.

19.3 Bidders should note that the electronic bidding system would not allow any late submission/uploading of Bid after the Bid Due Date and time as per server time.

20. QUALIFICATION PROPOSAL

The Bidder shall submit Bids online in two separate Folders/Envelopes as under:

Folder I - for submission of Qualification Proposal; and

Folder II – for submission of Financial Proposals

20.1 The Qualification Proposal submitted by a Bidder shall comprise scanned copies of the following:

- (a) bid letter in the format set out in **Annexure 1A**;
- (b) description of the Bidder/Members in the format set out in **Annexure 1B**;
- (c) Power of Attorney in the format set out in **Annexure 1C**, executed by the Bidder or the Lead Member authorizing the signatory of the Bid to commit the Bidder;
- (d) certificate issued by the statutory auditor of the Bidder, in the format set out in **Annexure 1D**, certifying the Net Worth of the Bidder and compliance with other financial qualification criteria specified in Clause 4.2;
- (e) details of the eligible STP(s) for which development/design and construction

experience is being claimed in the format set out in **Annexure 1E – Part 1** and details of the eligible STP(s) for which O&M experience is being claimed in the format set out in **Annexure 1E – Part 2**;

- (f) certificate from the statutory auditor certifying the shareholding of the Bidder (or in case of a Consortium, the relevant Member) in the Company developing the STP(s) for which development is being claimed by the Bidder in the format set out in **Annexure 1F**;
- (g) self-attested certificate regarding Associate, if applicable, in the format set out in **Annexure 1G**;
- (h) information on any litigation that the Bidder is a party to, in the format set out at **Annexure 1H**;
- (i) Bid Security in the format set out at **Annexure 1I**;
- (j) experience certificate for a biogas power plant in the format set out at **Annexure 2** or a consent letter for a biogas power plant in the format set out at **Annexure 3**, along with certificate(s) from the relevant government authority;
- (k) for each STP, certificate from the relevant government authority/client certifying that the STP has been completed/commissioned in accordance with the concession agreement or similar contract executed for such STP;
- (l) for each STP, certificate from the relevant government authority certifying that the STP has been completed and has been successfully operational for 24 consecutive months in the 7 years immediately preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP;⁹
- (m) for each STP, certificate from the relevant government authority certifying that the Bidder (or, in case of a Consortium, the relevant Member) has successfully operated and maintained the STP for which O&M experience is being claimed, for at least 24 consecutive months in the 7 years immediately preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP;
- (n) annual financial statements of the Bidder (including profit and loss statements) for the 3 Financial Years immediately preceding the Bid Due Date;
- (o) self-attested copies of the certificate of incorporation, memorandum of association and articles of association. If the Bidder is a Consortium, then each Member shall submit self-attested copies of its certificate of incorporation,

⁹ It is clarified that in case the Bidder is claiming development experience, the Bidders may submit a consolidated certificate from the relevant government authority for Clause 20.1(j) and Clause 20.1(k) above.

memorandum of association and articles of association;

- (p) declaration listing the contract(s) of the Bidder or each Member (in case of a Consortium) that has/have been suspended or terminated and/or performance security that has been called by an employer for reasons related to the non-compliance by such Bidder or Member(s) with any ESHS requirements or safeguard in the past 5 years, in the format set out at **Annexure II**.

20.2 If the Bidder is a Consortium, it will also be required to submit the following documents:

- (a) Power of Attorney in the format set out at **Annexure 1J**, executed by the Members of the Consortium authorizing the Lead Member of the Consortium to act on behalf of and commit the Consortium.
- (b) Joint Bidding Agreement in the format set out at **Annexure 1K**.

21. FINANCIAL PROPOSAL

21.1 The Financial Proposal submitted by a Bidder shall comprise the Bid Price Sheet provided on the e-Procurement Portal.

21.2 The Bidders shall quote in the Bid Price Sheet, the: (a) Bid Project Cost (including all Taxes and GST); (b) O&M Charges for the first month after COD (including all Taxes and GST); (c) Guaranteed Energy Consumption for the O&M Period; and (d) Land Requirement. Based on these 4 components quoted by a Bidder, the Bid Price is calculated by the system using the formula set out in Clause 2.5.

21.3 The Bidder shall quote 1 (one) figure for any of the components of the Bid Price after all discounts the Bidder wishes to offer on any or all of the components of the Bid Price.

21.4 Bidders may like to ascertain availability of excise/custom duty exemption benefits available in India to the contracts financed under World Bank loan/credits. They are solely responsible for obtaining such benefits which they have considered in their bid and in case of failure to receive such benefits for reasons whatsoever, the *Executing Agency* will not compensate the bidder (Operator). The bidder shall furnish along with his bid a declaration to this effect in the Declaration Format provided in Annexure 7 of the bidding documents.

21.5 Where the bidder has quoted taking into account such benefits, he must give all information required for issue of certificates in terms of the Government of India Central Excise Notification and Customs Notification as per form stipulated in Annexure 7 of the bidding documents. In case the bidder has not provided the required information or has indicated to be furnished later on in the Declaration Format, the same shall be construed that the goods/equipment for which certificate is required is Nil.

- 21.6 To the extent the *Executing Agency* determines the quantities indicated therein are reasonable keeping in view the work schedule, construction programme and methodology, the certificates will be issued and no subsequent changes will be permitted. The certificate will be issued within 60 days of signing of the Concession Agreement for material, equipment and machinery.
- 21.7 If the bidder has considered the customs/excise duty exemption for materials/construction equipment to be bought for the work, the bidder shall confirm and certify that the Bihar Urban Infrastructure Development Corporation Ltd will not be required to undertake any responsibilities of the Government of India Scheme or the said exemptions being available during the contract execution, except issuing the required certificate.
- 21.8 The bids which do not conform to the above provisions or any condition by the bidder which makes the bid subject to availability of customs duty/Tax exemption for materials/construction equipment or compensation on withdrawal of any variations to the said exemptions will be treated as non-responsive and rejected.
- 21.9 Any delay in procurement of the construction equipment /machinery/goods as a result of the above shall not be entertained as a reason for granting any extension of time.

22. COST AND CURRENCY OF BIDS

22.1 **Cost of the Bid**

The Bidders will bear their own costs associated with or relating to the preparation and submission of their Bids, including copying, postage, delivery charges and expenses associated with any presentations which may be required by the *Executing Agency* or NMCG or any other costs incurred in connection with or relating to their Bids, including any costs incurred on conducting any due diligence. All such costs and expenses will be borne by the Bidders and the *Executing Agency*, NMCG and their employees and advisors will not be liable in any manner whatsoever for such costs and expenses, regardless of the conduct or outcome of the Bid Process.

22.2 **Currency of the Bid**

All amounts in the Bid should be stated in Rupees.

23. SIGNING OF BIDS

- 23.1 Each Bidder (and in case of a Consortium, the Lead Member) must affix the digital signature of its authorised signatory to the soft copies of both the Qualification Proposal and the Financial Proposal, upon uploading the soft copy of the Qualification Proposal and submission of the Financial Proposal to the e-Procurement Portal.

24. SUBMISSION OF BIDS

- 24.1 Each Bidder is required to upload a soft copy/scanned copy of its Bid on the e-Procurement Portal.
- 24.2 While uploading the Bid on the e-Procurement Portal, Bidder must ensure that files containing the Qualification Proposal and scanned copies of the Bid Security and the demand draft/cashier's cheque for the Bid processing fee are uploaded separately under the relevant heads in a PDF format. The Bidder shall be required to fill all mandatory forms and fields indicated in the e-Procurement Portal at the time of uploading its Bid.
- 24.3 The Bidders should ensure the legibility of the documents uploaded to the e-Procurement Portal.
- 24.4 The Bidder shall upload the Bid sufficiently before the specified time on the Bid Due Date to avoid any technical issues or malfunction in the network caused by heavy traffic of Bidders on the Bid Due Date. The *Executing Agency* and NMCG will not be responsible for any failure, malfunction or breakdown of the electronic system during the e-procurement process.
- 24.5 The Bidder should check the system generated summary of its Bid submission to confirm successful uploading of its Bid.
- 24.6 All Bids uploaded to the e-Procurement Portal will be encrypted and the encrypted Bids can only be opened by the authorised representatives of the *Executing Agency* at or after the date/time specified for opening of the Bids (Qualification Proposals).
- 24.7 Each Bidder shall submit a hard copy of the original Bid Security, Power of Attorney, Joint Bidding Agreement, receipt towards payment of Bid Processing Fee (Beltron), etc to the *Executing Agency*, before the date and time specified in clause: 2.12(c)

It is clarified that the Bidder will not be required to submit a hard copy of its Financial Proposal, and if a hard copy of the Financial Proposal is submitted, then the Bid submitted by such Bidder shall be rejected as being non-responsive.

- 24.8 The Bid will contain no alterations, omissions or additions, unless such alterations, omissions or additions are signed by the authorized signatory of the Bidder/Lead Member. Any interlineations, erasures, or overwriting will be valid only if they are signed by the authorized signatory of the Bidder/Lead Member.
- 24.9 The hard copy of the original Bid Security, Power of Attorney, Joint Bidding Agreement, receipt towards payment of Bid Processing Fee (Beltron), etc will be duly sealed in an envelope, which will be super-scribed as follows:

**"Bhagalpur STP PPP PROJECT
QUALIFICATION PROPOSAL
DO NOT OPEN BEFORE SPECIFIED TIME ON BID DUE DATE"**

And submitted to the Executing Agency before the Bid Due Date specified in clause 2.14.

- 24.10 The sealed envelope Bid Security, Power of Attorney, joint bidding agreement, etc will clearly indicate the name, address and contact details of the Bidder. If the envelope is not sealed, marked and submitted as instructed in this Clause 24, the *Executing Agency* assumes no responsibility for the misplacement or premature opening of the contents of the Qualification Proposal and consequent losses, if any, suffered by the Bidder.
- 24.11 The hard copy of the Bid Security, Power of Attorney, Joint Bidding Agreement, etc will either be hand delivered or sent by registered post acknowledgement due or courier to the address below:

Bihar Urban Infrastructure Development Corporation Ltd
Chief General Manager,
2nd Floor, Khadya Bhawan, Road no.2,
Daroga Rai Path
R Block, Patna 800001, Bihar

Bids submitted by fax, telex, telegram or e-mail shall not be entertained and will be rejected.

25. SUBSTITUTION/WITHDRAWAL/MODIFICATION OF BIDS

- 25.1 Bidders may modify their bids by using the appropriate option for bid modification on e-Procurement Portal, before the deadline for submission of bids. For bid modification and consequential re-submission, the Bidder is not required to withdraw his bid submitted earlier. The last modified Bid submitted by the Bidder within the Bid Due Date shall be considered as the Bid. For this purpose, modification/withdrawal by other means will not be accepted. In online system of bid submission, the modification and consequential re-submission of Bid is allowed any number of times. A bidder may withdraw his Bid by using the appropriate option for Bid withdrawal, before the deadline for submission of Bids. However, if the Bid is withdrawn, re-submission of the Bid is not allowed.
- 25.2 Bids requested to be withdrawn in accordance with ITB 25.1 shall not be opened.
- 25.3 No Bid may be withdrawn, substituted, or modified in the interval between the Bid Due Date and the expiration of Bid validity period specified by the Bidder in the Bid Letter or any extension thereof. This will result in the forfeiture of the Bid Security pursuant to ITB 15.5.

PART D. OPENING AND EVALUATION OF BIDS

26. PUBLIC OPENING OF BIDS

- 26.1 The *Executing Agency* will publicly open all Bids that are submitted on or before the specified time on the Bid Due Date and this could be viewed by the Bidders online.

- 26.2 The *Executing Agency* will open the soft copy of the Bids (Qualification Proposals) at the time and on the date specified in the Bid Schedule at the following address:

Bihar Urban Infrastructure Development Corporation Ltd
2nd Floor, Khadya Bhawan, Road no.2,
Daroga Rai Path
R Block, Patna 800001, Bihar

The Financial Proposals of the Bids shall remain unopened in the e-Procurement System, until the subsequent public opening in accordance with Clause 28 following the evaluation of the Qualification Proposals of the Bids.

The Bids will be opened in the presence of the Bidders whose designated representatives choose to be present. The Bidders can also view the summary of opening of Bids by logging on to the e-Procurement Portal.

- 26.3 If the specified date for opening the Qualification Proposals is declared a holiday in Executing Agency's office, then the Qualification Proposals will be opened at the specified time and location on the next working day which will be notified through an addendum.
- 26.4 The *Executing Agency* will prepare a record of the opening of the Bids that will include, as a minimum, the names of the Bidders from whom Bids have been received. The Bidders' representatives who are present will be requested to sign the record. The omission of a Bidder's representative's signature on the record will not invalidate the contents and effect of the record.
- 26.5 Once all the Qualification Proposals have been opened, they will be evaluated for responsiveness and to determine whether the Bidders are qualified for opening of the Financial Proposals. The procedure for evaluation of the Qualification Proposals is set out in Clause 27.
- 26.6 Once the Qualification Proposals have been evaluated, all Bidders whose Qualification Proposals meet the Qualification Criteria and the Eligibility Criteria, will be informed of a date, time and place for opening of their Financial Proposals. The Financial Proposals will be opened in the presence of the representatives of the qualified Bidders that choose to be present. The procedure for evaluation of the Financial Proposals is set out in Clause 28.
- 26.7 The qualification of Bidders will be entirely at the discretion of the *Executing Agency*. Bidders will be deemed to have understood and agreed that no explanation or justification on any aspect of the Bid Process or selection will be given.
- 26.8 Any information contained in a Bid will not in any manner be construed as binding on the *Executing Agency*, its agents, successors or assigns; but will be binding on the

Bidder.

27. DETERMINATION OF RESPONSIVENESS AND EVALUATION OF QUALIFICATION PROPOSALS
- 27.1 The *Executing Agency* will examine the Qualification Proposals to determine whether they are complete, whether the documents have been properly signed, and whether the Qualification Proposals are generally in order. If any Bidder is found to be disqualified in accordance with the terms of the RFP or if any Qualification Proposal is found to be non-responsive or not meeting the Technical Capacity or the Financial Capacity, the Bid comprising such Qualification Proposal will be rejected by the *Executing Agency* and not included for further consideration. No request for alteration, modification, substitution or withdrawal shall be entertained by the *Executing Agency* in respect of such Bid.
- 27.2 Prior to evaluation of the Qualification Proposals, the Qualification Proposals will be evaluated to determine responsiveness to the RFP. A Qualification Proposal, shall be considered responsive only if:
- (a) the Qualification Proposal and all documents specified in Clause 20 are received in the prescribed formats and original documents are received as specified in Clause 24.7;
 - (b) the Bid is received by the specified time on the Bid Due Date;
 - (c) it is signed, marked, and uploaded as stipulated in Clauses 23 and 24;
 - (d) it contains all the information and documents (complete in all respects) as requested in this RFP; and
 - (e) it does not contain any condition or qualification.
- 27.3 The *Executing Agency* shall then evaluate and determine whether the Bidders who have submitted responsive Qualification Proposals satisfy the Eligibility Criteria and the Qualification Criteria set out at Clause 3 and Clause 4 respectively.
- 27.4 In order to determine whether the Bidder satisfies the Eligibility Criteria set out at Clause 3 and the Qualification Criteria, the *Executing Agency* will review the documentary evidence of the Bidder's eligibility and qualifications submitted by the Bidder and any additional information which the *Executing Agency* seeks from the Bidder.
- 27.5 Where any information provided by a Bidder is found to be patently false or amounting to a material misrepresentation, the *Executing Agency* reserves the right to reject the Bid submitted by such Bidder.
- 27.6 Upon completion of evaluation of the Qualification Proposals, and issuance of the Bank's no objection (if applicable), the *Executing Agency* will notify in writing those

Bidders whose Bids were considered non-responsive to the RFP or failed to meet the Qualification Criteria set out in this RFP, advising them of the following information:

- (a) their Qualification Proposals of Bid failed to meet the requirements of the RFP and the reasons for disqualification;
- (b) their Financial Proposals of Bid shall not be opened; and
- (c) notify them of the date and time for public opening of Financial Proposals of the Bids.

27.7 The *Executing Agency* shall, simultaneously, notify in writing those Bidders whose Qualification Proposals have been evaluated as substantially responsive to the RFP and met all Qualifying Criteria, advising them of the following information:

- (a) their Qualification Proposal has been evaluated as substantially responsive to the RFP and met the Qualification Criteria;
- (b) their Financial Proposal of Bid will be opened at the public opening of the Financial Proposals; and
- (c) notify them of the date and time on which their Financial Proposals will be opened.

[The opening date shall be not less than 10 days from the date of announcement of the results of the evaluation of Qualification Proposal.]

28. PUBLIC OPENING AND EVALUATION OF FINANCIAL PROPOSALS

28.1 The *Executing Agency* shall open the Financial Proposals of only those Bidders whose Qualification Proposals meet the criteria set out in this RFP.

28.2 The Financial Proposals of the Bids shall be opened publicly in the presence of Bidders' designated representatives and anyone who chooses to attend, and this could also be viewed by the Bidders online.. The *Executing Agency* shall open the Financial Proposal of each qualified Bidder and announce the Bhagalpur Facilities Bid Price and the aggregate Bid Price. The *Executing Agency* shall prepare the minutes of the online opening of the Financial Proposals which will be signed by the representatives of the Bidders present at the time of opening and upload these minutes for viewing online.

28.3 Evaluation of Financial Proposals

(a) Following the opening of the Financial Proposals, the *Executing Agency* shall evaluate the Financial Proposals for responsiveness. If any Financial Proposal is found:

- (vi) not to be complete in all respects;
- (vii) not duly signed by the authorized signatory of the Bidder;
- (viii) not to be in the prescribed format; or

then such Financial Proposal shall be deemed to be substantially non-responsive.

(b) Financial Proposals, which are substantially responsive to the Bidding Documents (comprising RFP and Concession Agreement), shall be evaluated for each STP

included in the scope of work, by adding various components of quoted Bid Prices for each STP as under:

- (i) Design-Build Price (Bid Project Cost) including all taxes & GST;
- (ii) O&M prices for 15 years
= (O&M Charges including all taxes & GST for first month after COD) * 180

- (iii) Cost of Energy Consumption during 15 years of O&M = Average Guaranteed Energy Consumption per MLD flow rate * Base Energy Tariff Rate * Average Effluent Flow Rate * Number of days of the O&M period

For the purpose of this calculation of energy cost:

Average Guaranteed Energy Consumption per MLD flow rate = Average of different guaranteed energy consumption figures in KWh quoted in Bid Price Sheet for treating various combinations of effluent flow rates and BOD;

Base Energy Tariff Rate = INR 6.08 /KWh;

Average Effluent Flow Rate = 45 MLD; and

Number of days of the O&M period = 5475

- (iv) Cost of Land required for the STP = Land Requirement in Acres as quoted by the Bidder (in acres) * Land Price per Acre

For the purpose of evaluation, land price = INR 23,727 per square meter

Total Evaluated Bid Price for the STP = (i) + (ii) + (iii) + (iv)

If Scope of Work stipulated in the RFP includes more than one STP, Evaluated Bid Prices determined in the above manner for each STP will be aggregated to arrive at the Total Evaluated Bid Price.

- (c) The Executing Agency shall compare the Total Evaluated Bid Prices of all substantially responsive Financial Proposals to determine the Lowest Evaluated Bid.

- (d) The Bidder whose Bid has been determined to be the Lowest Evaluated Bid, will be the Preferred Bidder, and shall be selected for award.

29. CLARIFICATION ON BIDS

29.1 To facilitate evaluation of the Bids, the *Executing Agency* may, in its sole discretion, seek clarifications and/or any additional information from any Bidder regarding its Bid (including if the Bid is not signed, marked and sealed in accordance with Clauses 23 and 24). Such clarification(s) will be provided within the time specified by the *Executing Agency* for this purpose. Any request for clarification(s) and all responses to such clarification(s) will be in writing. Any clarification submitted by a Bidder that is not in response to a request by the *Executing Agency* will not be considered.

29.2 If a Bidder does not provide clarifications and/or any additional information sought under Clause 29.1 within the prescribed time, its Bid may be liable for rejection. If the Bid is not rejected, the *Executing Agency* may proceed to evaluate the Bid by construing the particulars requiring clarification to the best of its understanding, and the Bidder will be barred from subsequently questioning such interpretation of the

Executing Agency.

PART E. AWARD OF PROJECT

30. LETTER OF AWARD (LOA)

30.1 After declaration of the Selected Bidder, the *Executing Agency* will issue the LOA to the Selected Bidder in duplicate:

- (i) declaring it as the Selected Bidder;
- (ii) accepting its Financial Proposal;
- (iii) requesting it to sign and return, as acknowledgement, a copy of the LOA within 15 days of receipt of the LOA;
- (iv) requesting it to submit the Performance Securities in accordance with Clause 16 and 16A; and
- (v) requesting it to incorporate the Special Purpose Vehicle, which will act as the Concessionaire.

30.2 If the Selected Bidder fails to return a duly signed copy of the LOA to the *Executing Agency* within 15 days of receipt of the LOA, then the *Executing Agency* may, unless it consents to an extension, without prejudice to any of its rights under the RFP or law, disqualify the Selected Bidder, revoke the LOA, and forfeit the Bid Security. If the *Executing Agency* elects to disqualify such Bidder and revoke the LOA, then the procedure set out in Clause 7.2 shall follow.

30.3 After notification of award in accordance with Clause 30.1, the *Executing Agency* shall also notify all other Bidders of the results of the bidding, and shall publish in UNDB online and the Procurement Portal, results of the bidding process and the following information:

- (i) name of each Bidder who submitted a Bid;
- (ii) results of evaluation of Qualification Proposals;
- (iii) names of bidders whose Qualification Proposals were rejected and the reasons for their rejection
- (iv) bid prices as read out at opening of Financial Proposals;
- (v) name and evaluated prices of each Bid that was evaluated;
- (vi) names of bidders whose Financial Proposals were rejected and the reasons for their rejection; and
- (vii) name of the Selected Bidder, the Price it offered and summary scope of the contract awarded.

30.4 The *Executing Agency* shall promptly respond in writing to any unsuccessful Bidder who, after notification of award in accordance with Clause 30.3, requests in writing the grounds on which its bid was not selected.

31. EXECUTION OF THE CONCESSION AGREEMENT

31.1 The Special Purpose Vehicle incorporated by the Selected Bidder shall execute the Concession Agreement in the draft form provided by the *Executing Agency*, with minimal changes or amendments to reflect facts or to correct minor errors. The *Executing Agency* shall, within 15 days of the acceptance of the LOA by the Selected

Bidder, provide the Selected Bidder with the final execution draft of the Concession Agreement.

- 31.2 The *Executing Agency* shall not entertain any request from the Selected Bidder for negotiations of or deviations to the final execution draft of the Concession Agreement provided by the *Executing Agency* under Clause 31.1.
- 31.3 If the Selected Bidder seeks to materially negotiate or seeks any material deviations from the final execution draft of the Concession Agreement, the *Executing Agency* may elect to disqualify the Selected Bidder and revoke the LOA issued to the Selected Bidder. If the *Executing Agency* elects to disqualify such Bidder and revoke the LOA, then the procedure set out in Clause 7.2 shall follow.
- 31.4 Subject to satisfaction of the conditions specified in Clause 30.1 and any other conditions specified in the LOA, the Special Purpose Vehicle incorporated by the Selected Bidder shall execute the Concession Agreement within 45 days from the date of acceptance of the LOA by the Selected Bidder.
- 31.5 If the Special Purpose Vehicle fails to execute the Concession Agreement on or before the date specified in Clause 31.4, the *Executing Agency* may, unless it consents to an extension, without prejudice to any of its rights under the RFP or law, disqualify the Selected Bidder, revoke the LOA and forfeit the Bid Security. If the *Executing Agency* elects to disqualify such Bidder and revoke the LOA, then the procedure set out in Clause 7.2 shall follow.

ANNEXURE 1A
FORMAT OF BID LETTER

INSTRUCTIONS TO BIDDERS: DELETE THIS BOX ONCE YOU HAVE COMPLETED THE DOCUMENT

The Bidder must prepare this Letter of Bid on stationery with its letterhead clearly showing the Bidder's complete name and business address.

Note: All italicized text is to help Bidders in preparing this form which should be deleted from the final document.

Date of this Bid submission: *[insert date (as day, month and year) of Bid submission]*

Invitation for Bid No.: *[insert identification]*

To,

Name of Office/Unit

[Executing Agency]

Bhagalpur Facilities

Bhagalpur

Sub: **Bid for *Bhagalpur* STP PPP Project**

Sir/Madam,

We, the undersigned, hereby submit our Bid in respect of the above mentioned project and complying with the Request for Proposal (RFP) issued by the *[Executing Agency]*, in two separate Folders in accordance with ITB 20 as under:

- (i) Qualification Proposal, as submitted through this letter in accordance with ITB 20; and
- (ii) Financial Proposal – comprising the Bid Price Sheet, which has been filled and submitted online in the separate Folder.

In submitting the Qualification Proposal, we make the following declarations:

- (a) **No reservations:** We have examined and have no reservations to the bidding documents, namely Request (RFP) and the Concession Agreement issued by the *[Executing Agency]*, including Addenda issued in accordance with Instructions to Bidders (ITB 9);

- (b) **E**
ligibility: We meet the eligibility requirements and have no conflict of interest in accordance with ITB 3;
- (c) **C**
onformity: We submit this offer to qualify as a Bidder and to execute the contract for the design, finance, construction, completion, operation and maintenance of the Facilities in accordance with the Concession Agreement.
- (d) **B**
id Validity Period: Our Bid shall be valid for a period specified in ITB 14.1 (or as amended if applicable) from the Bid Due Date as specified in ITB 19 (or as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (e) **P**
erformance Security: If our Bid is accepted, we commit to obtain a Performance Security and an Environmental, Social, Health and Safety (ESHS) Performance Security, in accordance with ITB 16;
- (f) **O**
ne Bid Per Bidder: We are not submitting any other Bid(s) as an individual Bidder or as a subcontractor, and we are not participating in any other Bid(s) as a Member of a Consortium or Joint Venture member, and meet the requirements of ITB17;
- (g) **N**
o Separate Bid from Associates: We declare that we and our Associates are not submitting separate Bids;
- (h) **S**
uspension and Debarment: We, along with any of our subcontractors, suppliers, consultants, manufacturers, associates or service providers for any part of the contract, are not subject to, and not controlled by any entity or individual that is subject to, a temporary suspension or a debarment imposed by the World Bank Group or a debarment imposed by the World Bank Group in accordance with the Agreement for Mutual Enforcement of Debarment Decisions between the World Bank and other development banks. Further, we are not ineligible under the Executing Agency's country laws or official regulations or pursuant to a decision of the United Nations Security Council;
- (i) **State-owned enterprise or institution:** *[select the appropriate option and delete the other] [We are not a state-owned enterprise or institution] / [We are a state-owned enterprise or institution but meet the requirements of ITB 3.1 (a)];*
- (j) **B**
inding Contract: We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract, until a formal contract is prepared and executed;
- (k) **N**
ot Bound to Accept: We understand that you are not bound to accept the lowest evaluated Bid, the Preferred Bid or any other Bid that you may receive;
- (l) **I**
 n the event being declared as the Selected Bidder, we agree to incorporate a Special Purpose Vehicle, which will enter into a Concession Agreement provided by the

[Executing Agency]. We agree not to seek any changes in or deviations from the aforesaid draft Concession Agreement and agree to abide by the same; and

(m)

F

raud and Corruption: We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption.

Name of the Bidder: **[insert complete name of person signing the Bid]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder: *** [insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid: *[insert complete title of the person signing the Bid]*

Signature of the person named above: *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* **day of** *[insert month]*, *[insert year]*

*: In the case of the Bid submitted by Consortium/Joint Venture specify the name of the Joint Venture as Bidder

** : Person signing the Bid shall have the power of attorney given by the Bidder to be attached with the Bid

**ANNEXURE 1B
DESCRIPTION OF THE BIDDER**

1. (a) Name:
- (b) Country of incorporation:
- (c) Principal Address:
- (d) Date of incorporation and/or commencement of business:

2. Brief description of the Bidder including details of its main lines of business: [*Note. Such description shall not exceed 5 type-written pages.*]

3. Details of individual(s) who will serve as the point of contact/communication for [*Executing Agency*] and NMCG:
 - (a) Name:
 - (b) Designation:
 - (c) Address:
 - (d) Telephone Number:
 - (e) E-mail Address:
 - (f) Fax Number:

4. In case of a Consortium:
 - (a) The information above (1-3) should be provided for all the Members of the Consortium.
 - (b) Additional information regarding each Member of the Consortium should be provided as per table below:

S. No.	Name of Member	Proposed percentage holding in the total Capital of the SPV
1.		
2.		
3.		

ANNEXURE 1C
FORMAT OF POWER OF ATTORNEY AUTHORISING THE SIGNATORY OF
THE BID

(on Stamp Paper)

Know all men by these presents, We (*name of the Company and address of the registered office*) do hereby irrevocably constitute, nominate, appoint and authorise Mr./ Ms. (*name*), son/daughter/wife of and presently residing at, who is presently employed with us/the Lead Member of our Consortium and holding the position of, as our true and lawful attorney (hereinafter referred to as the **Attorney**) to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our Bid for the *Bhagalpur STP PPP Project* proposed or being developed by the *Executing Agency* and the National Mission for Clean Ganga (**NMCG**), including but not limited to signing and submission of all Bid documents and other documents and writings, participate in investor consultations and other conferences and providing information/responses to the [*Executing Agency*], representing us in all matters before the [*Executing Agency*] and NMCG, signing and execution of all contracts including the Concession Agreement and undertakings consequent to acceptance of our Bid, and generally dealing with the [*Executing Agency*] and NMCG in all matters in connection with or relating to or arising out of our Bid for the Project and/or upon award of the Project to us and/or till the entering into of the Concession Agreement with the [*Executing Agency*] and NMCG.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE,, THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF, 20.....

For

.....
(Signature, name, designation and address)

Witnesses:

- 1.
- 2.

(Notarised)

Accepted

.....

(Signature)

(Name, Title and Address of the Attorney)

Instructions:

- (1) The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*
- (2) Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*

ANNEXURE 1D

**FORMAT OF CERTIFICATE FROM THE STATUTORY AUDITOR FOR NET
WORTH AND COMPLIANCE WITH OTHER FINANCIAL QUALIFICATION
CRITERIA**

(On the letter head of the statutory auditor of the Bidder/Member)

Based on the books of accounts of *(insert name of the Bidder/Member)* **(Bidder/Member)** and other published information authenticated by it, this is to certify that:

- (a) As on *(insert date)*, the Bidder's/Member's Net Worth is Rs..... (Rupees).

Further, the annual Net Worth as per the balance sheets of past 3 Financial Years (including the above) exceeds Rs. *[mention amount in figures and words]*. The details are provided below:

Financial Year	Net Worth (Rs. Crores)
Financial Year []	
Financial Year []	
Financial Year []	

The Net Worth of has been calculated in accordance with the terms set out in the Request For Proposal **(RFP)** issued by the *[Executing Agency]* on *[insert date]*.

- (b) The Bidder/Member has had Net Cash Accruals for each of the 3 Financial Years immediately preceding the Bid Due Date.
- (c) The Bidder/Member has had Net Profits for each of the 3 Financial Years immediately preceding the Bid Due Date.
- (d) The Bidder/Member is not affected by and has not been affected by any of the following events, conditions or circumstances in the 3 Financial Years preceding the Bid Due Date:
- (i) undergoing any corporate debt restructuring or similar process under the laws of the country of its incorporation;
 - (ii) having been categorized as a willful defaulter in accordance with Applicable Laws;
 - (iii) being subject to proceedings for declaration of or being declared bankrupt, being wound up, or having its affairs administered or conducted by any court, administrator, receiver; or

- (iv) having been declared by a court or other competent authority as being unable to pay its debts, or having made any composition or arrangements with creditors or having had the repayment of its debts suspended.

Name of the auditor:

Seal of the auditor:

Signature:

Name:

Membership Number:

Designation:

Date:

ANNEXURE 1E
PART I
FORMAT OF DETAILS OF THE ELGIBLE SEWAGE TREATMENT PLANT

Item (1)	Refer Instruction	Details of the Project
Entity claiming experience		
Capacity of the project and technology		
Entity for which project was developed/developed and constructed	(2)	
Project Cost		
Location		
Date of award, completion/ commissioning of project/Status of project	(3), (4)	
Whether credit is being taken for the experience of an Associate (Yes/No)	(5)	
In case of development experience, shareholding in the company developing and owning the project	(6)	
Confirmation that the STP is or was successfully operational for at least 24 consecutive months in the 7 years immediately preceding the Bid Due Date	(7)	

Instructions:

- (1) *Bidders are expected to provide information in respect of the projects for which they are claiming design and construction/development experience. A separate sheet should be filled for each project.*
- (2) *In case of development experience, details such as name, postal address, email address and contact details of the authority/implementing agency (i.e., concession grantor) should be provided. In case of design and construction experience, details such as name, postal address, email address and contact details of both the developer (i.e., the concessionaire) and the authority/implementing agency (i.e., the concession grantor) should be provided.*
- (3) *The date of award of the project and completion or commissioning of the project, as the case may be, should be indicated.*

- (4) *In case of development experience, the completion certificate/commissioning certificate issued by the relevant government authority and signed by the executive engineer or an equivalent officer, certifying the date of award of the project, the date of completion/commissioning of the project and that the project has been commissioned and completed (as required under the relevant concession agreement or similar contract) should be provided.*
- In case of design and construction experience, the completion certificate/commissioning certificate issued by the client and signed by a duly authorized officer, certifying the date of award of the project, the date of completion/commissioning of the project and that the project has been successfully commissioned and completed (as required under the relevant concession agreement or similar contract for the STP) should be provided.*
- (5) *In the event that credit is being taken for the experience of an Associate, the Bidder should also provide a certificate in the format set out at Annexure 1G.*
- (6) *A certificate from the statutory auditor should be furnished stating the shareholding in the entity developing the project in the format set out at Annexure 1F.*
- (7) *A certificate issued by the relevant government authority specifying the number of years for which the STP has been successfully operational, in accordance with the relevant concession agreement or similar contract executed for the STP, should be provided.*
- (8) *Experience for any activity relating to a project shall not be claimed by two or more Members of the Consortium. In other words, no double counting by a Consortium in respect of the same experience shall be permitted in any manner whatsoever.*
- (9) *It may be noted that in the absence of any detail in the above format and/or the certificate(s) issued by the relevant government authority/client, the information would be considered inadequate and could lead to exclusion of the relevant project in determining whether the Bidder meets the Qualification Criteria.*

**ANNEXURE 1E
PART II**

**FORMAT OF DETAILS OF THE OPERATION AND MAINTENANCE (O&M) OF
ELIGIBLE SEWAGE TREATMENT PLANT**

Item (1)	Refer Instr uctio n	Details of the Project
Entity claiming experience		
Capacity of the project and technology		
Entity for which project being operated and maintained	(2)	
Location		
Duration for which O&M experience is being claimed (From month, year to month, year)	(3)	
Whether credit is being taken for the experience of O&M as an Associate (Yes/No)	(4)	

Instructions:

- (1) *Bidders are expected to provide information in respect of the STPs for which they are claiming operations and maintenance experience. A separate sheet should be filled for each project.*
- (2) *Details such as name, postal address, email address and contact details of the client and the relevant government authority (i.e., the implementing agency) should be provided.*
- (3) *The duration of the O&M experience must be at least 24 consecutive months in the 7 years immediately preceding the Bid Due Date.
A certificate issued by the relevant government authority (i.e., the implementing agency) and signed by the executive engineer or an equivalent officer certifying the Bidder/Member/Associate that the Bidder/Member/Associate has successfully operated and maintained the STP for at least 24 consecutive months in the 7 years immediately preceding the Bid Due Date, in accordance with the relevant concession agreement or similar contract executed for such STP, should be provided.*
- (4) *In the event that credit is being taken for the experience of an Associate, the Bidder should also provide a certificate in the format set out at Annexure 1G.*
- (5) *It may be noted that in the absence of any detail in the above format and the certificate(s) issued by the relevant government authority, the information would be considered inadequate and could lead to exclusion of the relevant project in determining whether the Bidder meets the Qualification Criteria.*

ANNEXURE 1F
FORMAT OF CERTIFICATE FROM THE STATUTORY AUDITOR REGARDING
DEVELOPMENT EXPERIENCE

Based on its book of accounts and other published information authenticated by it, this is to certify that (*name of the Bidder/Member/Associate*) is/was an equity shareholder in (*title of the project company*) which developed an STP of [*Insert capacity of STP*] MLD at [*Insert location of STP*] for [*Insert name of implementing agency*] and held/holds Rs. cr. (Rupees crore) of equity (which constitutes% of the total paid up and subscribed equity capital) of [*Insert name of the project company*] as on the [Bid Due Date/commercial operations date/date of issuance of the completion certificate or any other equivalent certificate by the relevant government authority.] for such STP.

Name of the audit firm:

Seal of the audit firm: (Signature, name and designation of the authorised signatory)

Date:

ANNEXURE 1G
FORMAT OF SELF-ATTESTED CERTIFICATE REGARDING ASSOCIATE

Self-Attested Certificate regarding Associate

Based on the authenticated record of [*Insert name of the Company*], this is to certify that [more than 50% (fifty per cent) of the subscribed and paid up voting equity of (name of the Bidder/Member/ Associate) is held, directly or indirectly, by (name of Bidder/Member/Associate)

By virtue of the aforesaid, the latter exercises control over the former, who is an Associate.]

[..... (name of Bidder/Member/Associate) has the power, directly or indirectly, to direct or influence the management and policies of (Bidder/Member) by operation of law, contract or otherwise]. By virtue of the aforesaid, the former exercises control over the latter, who is an Associate.]

A brief description of the said equity held, directly or indirectly, is given below:

{Describe the share-holding of the Bidder/Member and the Associate. In the event the Associate is under common Control with the Associate/Consortium Member or the Control is exercised by operation of law, the relationship may be suitably described and similarly certified herein.}

Name of the Bidder/Member:

Seal of the Bidder/Member:

(Signature, name and designation of the authorised signatory).

Date:

ANNEXURE 1H
FORMAT OF INFORMATION ON LITIGATION

(To be provided by the Bidder/each Member)

S. No.	Name	Forum and Counterparty	Brief Description of the matter	Estimated financial liability	Current Status of Litigation	Orders passed against the Bidder/Member

ANNEXURE 11
FORM OF BID SECURITY (BANK GUARANTEE)

(in stamp paper)

B.G.No:

Dated:

WHEREAS,(*name of Bidder including names of all Joint Venture Participants*) (hereinafter called “the Bidder”) has submitted its Bid (hereinafter called the “Bid”) dated (*date*) for the performance of (*name of Contract*).

KNOW ALL PEOPLE by these presents that We (*name of Bank*) of (*name of country*) having our registered office at (hereinafter called “the Bank”) are bound unto (hereinafter called “the Owner”) in the sum offor which payment well and truly to be made to the said Owner, the Bank binds itself, its successors, and assigns by these presents.

[The Bidder should insert the amount of the guarantee in words and in figures. This figure should be the same amount as set out in ITB Section 15.1 and the Bid Data Sheet. The details related to the Bid Security are set out in the same ITB Section 15.]

The CONDITIONS of this obligation are:

- a. if the Bidder withdraws its Bid during the Bid Validity Period; or
- b. if the Bidder, having been notified of the acceptance of its Bid by the Owner during the period of Bid validity,
 1. fails to sign the Form of Contract in accordance with and when required by ITB Section 31; or
 2. fails to provide the performance security to the Owner in accordance with and when required by ITB Section 16 and 16A.

We undertake to pay to the Owner up to the above amount upon receipt of its first written demand, without the Owner having to substantiate its demand, provided that in its demand the Owner will note that the amount claimed by it is due to it owing to the occurrence of one or more of the conditions set out above, specifying the occurred condition or conditions. This Guarantee will remain in full force up to and including 45 days after the expiry of the Bid Validity Period and it may be extended by the Owner in accordance with the Bidding Documents, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date or the extended date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.

SEALED with the Common Seal of the said
Bank this day of, [*Year*].

WITNESS
(signature, name and address)

SIGNATURE OF THE BANK
SEAL

Name: _____

Position: _____

ANNEXURE 1J
FORMAT OF POWER OF ATTORNEY FOR APPOINTING LEAD MEMBER
(On Requisite Stamp Paper)

Whereas the *[Executing Agency]* (the *[Executing Agency]*) has invited Bids from interested parties for the **NMCG- *[Executing Agency]* Bhagalpur STP PPP Project** (the **Project**).

Whereas,,, and (collectively, the **Consortium**) being Members of the Consortium are interested in submitting a Bid for the Project in accordance with the terms and conditions of the Request for Proposal (**RFP**) issued by the *[Executing Agency]* on *[Insert Date]*, and

Whereas, it is necessary for the Members of the Consortium to designate one of them as the Lead Member with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium's Bid for the Project and its implementation.

NOW, THEREFORE, KNOW ALL MEN BY THESE PRESENTS

We, having our registered office at, having our registered office at, and having our registered office at, (hereinafter collectively referred to as the **Principals**) do hereby irrevocably designate, nominate, constitute, appoint and authorise having its registered office at, being one of the Members of the Consortium, as the Lead Member and true and lawful attorney of the Consortium (hereinafter referred to as the **Attorney**). We hereby irrevocably authorize the Attorney (with power to sub-delegate) to conduct all business for and on behalf of the Consortium and any one of us during the Bid Process and, in the event the Consortium is awarded the Project, during the implementation of the Project and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the submission of the Consortium's Bid for the Project, including but not limited to signing and submission of all Bid related documents and other documents and writings, participate in bidders and other conferences, respond to queries, submit information/documents, sign and execute contracts and undertakings consequent to acceptance of the bid of the Consortium and generally to represent the Consortium in all its dealings with *[Executing Agency]* and the National Mission for Clean Ganga, and/or any other government agency or any person, in all matters in connection with or relating to or arising out of the Consortium's Bid for the Project and/or upon award of the Project and/or till the Concession Agreement is entered into with the *[Executing Agency]* and the National Mission for Clean Ganga.

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/Consortium.

IN WITNESS WHEREOF WE THE PRINCIPALS ABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF, 20.....

For
(Signature)

.....
(Name & Title)

For
(Signature)

.....
(Name & Title)

Witnesses:

- 1.
- 2.
-

(To be executed by all the Members of the Consortium)

(Notarised)
Accepted
.....

(Signature)

(Name, Title and Address of the Attorney)

Instructions:

- (1) *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*
- (2) *Also, wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*
- (3) *For a power of attorney executed and issued overseas, the document will also have to be legalised by the Indian Embassy and notarised in the jurisdiction where the power of attorney is being issued. However, the power of attorney provided by the Bidders from countries that have signed the Hague Legislation Convention, 1961 are not*

required to be legalised by the Indian Embassy if it carries a conforming Apostille certificate.

ANNEXURE 1K
FORMAT OF JOINT BIDDING AGREEMENT

THIS JOINT BIDDING AGREEMENT ("**Agreement**") is entered into on this [●] Day of [●] 201[●]

AMONGST

1. [●], with its registered office at (referred to as the **First Part** which expression will, unless repugnant to the context include its successors and permitted assigns);

AND

2. [●], with its registered office at (referred to as the **Second Part** which expression will, unless repugnant to the context include its successors and permitted assigns);

[[AND

3. [●], with its registered office at [●] (referred to as the **Third Part** which expression will, unless repugnant to the context include its successors and permitted assigns).]

The above mentioned parties of the FIRST [and] [,] SECOND, [and] [,] [THIRD] are collectively referred to as the **Parties** and each is individually referred to as a **Party**.

WHEREAS

- (A) [*Executing Agency*] (referred to as the [*Executing Agency*], which expression will, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) has invited Bids by its Request for Proposal No. [___] dated [___] (the **RFP**) for selection of a Bidder for the design, finance, construction, completion, operation and maintenance of the Facilities in *Bhagalpur*, on a hybrid annuity PPP basis in accordance with the Concession Agreement (the **Project**).
- (B) The Parties are interested in jointly bidding for the Project as Members of a Consortium and in accordance with the terms and conditions of the RFP.
- (C) It is a necessary condition under the RFP that the Members will enter into a Joint Bidding Agreement and furnish a copy of it with the Bid.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and interpretations

In this Agreement, the capitalised terms will, unless the context otherwise requires, have the meaning ascribed thereto under the RFP.

2. Consortium

- 2.1 The Parties do hereby irrevocably constitute a consortium (the **Consortium**) for the purposes of jointly participating in the Bid Process for the Project.
- 2.2 The Parties hereby undertake to participate in the Bid Process only through this Consortium and not individually and or through any other consortium constituted for the Project, either directly or indirectly or through any of their Associates.

3. Covenants

- 3.1 The Parties hereby undertake that in the event the Consortium is declared the Selected Bidder and awarded the Project, it will incorporate a special purpose vehicle (**SPV**) under the Companies Act for entering into the Concession Agreement with NMCG and *[Executing Agency]* for undertaking the Project.
- 3.2 The Members of the Consortium undertake that they shall be jointly and severally responsible and liable for all matters arising out of or in relation to this RFP.

4. Role of the Parties

- 4.1 The Parties hereby agree that Party of the First Part will be the Lead Member of the Consortium and will have the power of attorney from all Parties and bind all Parties for and in conducting all business for and on behalf of the Consortium during the Bid Process and, if the Consortium is declared as the Selected Bidder, during the execution of the Project.
- 4.2 Party of the Second Part will be [].
- 4.3 Party of the Third Part will be [].]

5. Shareholding in the SPV

- 5.1 The Parties agree that the proportion of shareholding among the Parties in the SPV will be as follows:

First Party:
Second Party:
[Third Party:]

- 5.2. The Parties undertake that:
 - (a) the First Party, acting as the Lead Member of the Consortium, will control the SPV and subscribe for and hold a minimum of 26% of the total Capital and voting rights of the SPV from the Effective Date until 3 years after the COD; and

- (b) the [Second and/or the Third] Party, whose [Technical Capacity and/or Financial Capacity] is being assessed, will hold at least 26% of the total Capital and voting rights of the SPV from the Effective Date until 3 years after the COD.

5.3. The Parties undertake that they will comply with all equity lock-in requirements set out in this Agreement and in the Concession Agreement.

6. Representations of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

- (a) such Party is duly organised, validly existing and in good standing under the laws of its incorporation and has all requisite power and authority to enter into this Agreement;
- (b) the execution, delivery and performance by such Party of this Agreement has been authorised by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Consortium Member is annexed to this Agreement, and will not, to the best of its knowledge:
 - (i) require any consent or approval not already obtained;
 - (ii) violate any applicable law presently in effect and having applicability to it;
 - (iii) violate the memorandum and articles of association, by-laws or other applicable organisational documents;
 - (iv) violate any clearance, permit, concession, grant, license or other governmental authorisation, approval, judgment, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or
 - (v) create or impose any liens, mortgages, pledges, claims, security interests, charges or encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;

- (c) this Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it;
- (d) there is no litigation pending or, to the best of such Party's knowledge, threatened to which it or any of its Associates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfilment of its obligations under this Agreement; and
- (e) there is no suspension or termination of any contract of any Party and/or calling of any performance security by an employer for reasons related to the non-compliance by such Party with any ESHS requirements or safeguard in the past 5 years that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfilment of its obligations under this Agreement.

7. Termination

This Agreement will be effective from the date hereof and will continue in full force for the entire duration of the Project in accordance with the Concession Agreement, in case the Project is awarded to the Consortium. However, in case the Consortium is not selected for award of the Project, the Agreement will stand terminated upon return of the Bid Security as per the RFP.

8. Miscellaneous

- 8.1 This Agreement will be governed by the laws of India.
- 8.2 The Parties acknowledge and accept that this Agreement will not be amended by the Parties without the prior written consent of *[Executing Agency]*.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.

SIGNED, SEALED AND DELIVERED For and on behalf of the PARTY OF THE FIRST PART by:	SIGNED, SEALED AND DELIVERED For and on behalf of the PARTY OF THE SECOND PART by:
Signature) (Name) (Designation) (Address)	Signature) (Name) (Designation) (Address)
SIGNED, SEALED AND DELIVERED For and on behalf of the PARTY OF THE THIRD PART by:	

Signature) (Name) (Designation) (Address)	
--	--

In the presence of:

1

2.

Instruction:

1. *The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*

**ANNEXURE 1L
 FORMAT OF ENVIRONMENTAL, SOCIAL, HEALTH, AND SAFETY
 PERFORMANCE DECLARATION**

[The following table shall be filled by the Bidder or each Member, in case of a Consortium]

Bidder's Name: *[insert full name]*

Date: *[insert day, month, year]*

Member: *[insert full name]*

RFP No. and title: *[insert RFP number and title]*

Page *[insert page number]* of *[insert total number]* pages

Environmental, Social, Health, and Safety Performance Declaration in accordance with Section II, Eligibility and Qualification Criteria			
<input type="checkbox"/> No suspension or termination of contract: An employer has not suspended or terminated a contract and/or called the performance security for a contract for reasons related to Environmental, Social, Health, and Safety (ESHS) performance since the <i>[insert the date]</i> specified in Section II, Eligibility and Qualification Criteria, Clause 3.5(d).			
<input type="checkbox"/> Declaration of suspension or termination of contract: The following contract(s) has/have been suspended or terminated and/or performance security called by an employer(s) for reasons related to Environmental, Social, Health and Safety (ESHS) performance since the <i>[insert the date]</i> specified in Section II, Eligibility and Qualification Criteria, Clause 3.5(d).			
Year	Suspended or terminated portion of contract	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for suspension or termination: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
<i>[insert year]</i>	<i>[insert amount and percentage]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for suspension or termination: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>
...	...	<i>[list all applicable contracts]</i>	...
Performance security called by an employer(s) for reasons related to ESHS performance			

Year	Contract Identification	Total Contract Amount (current value, currency, exchange rate and US\$ equivalent)
<i>[insert year]</i>	Contract Identification: <i>[indicate complete contract name/ number, and any other identification]</i> Name of Employer: <i>[insert full name]</i> Address of Employer: <i>[insert street/city/country]</i> Reason(s) for calling of performance security: <i>[indicate main reason(s)]</i>	<i>[insert amount]</i>

ANNEXURE 2
EXPERIENCE CERTIFICATE FOR BIOGAS POWER PLANT

(On the letter head of the Bidder/ Member)

From

[insert name of Bidder/Member]
[insert address of Bidder/Member]

Date: *[insert date]*

To

[Executing Agency]
 []

Dear Sir,

Sub: Experience Certificate for Biogas Power Plant for the Namami Gange *Bhagalpur* STPs PPP Project

We, the undersigned *[insert name of the Bidder/ Member]* having read, examined and understood in detail the RFP for development of the Project, hereby confirm that we have *[developed]/[designed and constructed]*¹⁰ the following biogas power plant based on STP effluent:

Capacity of the biogas power plant	Location	Entity for which biogas plant was set up	Date of completion	Duration for which O&M experience is being claimed (From month, year to month, year)

The certificate(s) issued by relevant government authorities to demonstrate that: (1) the biogas power plant was developed or designed and constructed in the 7 years immediately preceding the Bid Due Date in accordance with the contract executed for the biogas power plant; and (2) the biogas power plant *[was/has been]* in successful operation for at least 24 months in the 7 years immediately preceding the Bid Due Date; have been attached.

¹⁰ Delete as applicable.

If selected as the Selected Bidder, we undertake that the Concessionaire shall set up a biogas power plant in accordance with the Concession Agreement.

Dated the _____ day of _____ 2017.

Thanking you,

Yours truly,

.....

(Name and signature of Authorized Signatory)

ANNEXURE 3
CONSENT LETTER FOR EXPERIENCE BIOGAS POWER PLANT

(On the letter head of the entity issuing the consent letter)

From

[insert name of the entity issuing the consent letter]
[insert address of the entity issuing the consent letter]

Date: *[insert date]*

To
[Executing Agency]
 []

Dear Sir,

Sub: Consent Letter for Experience for Biogas Power Plant for the *Bhagalpur* STPs PPP Project

We, the undersigned *[insert name of the entity issuing the consent letter]* hereby confirm that we have *[developed]/[designed and constructed]*¹¹ the following biogas power plant based on STP effluent:

Capacity of the biogas power plant	Location	Entity for which biogas plant was set up	Date of completion	Duration for which O&M experience is being claimed (From month, year to month, year)

The certificate(s) issued by relevant government authorities to demonstrate that: (1) the biogas power plant was developed or designed and constructed in the 7 years immediately preceding the Bid Due Date in accordance with the contract executed for the biogas power plant; and (2) the biogas power plant *[was/has been]* in successful operation for at least 24 months in the 7 years immediately preceding the Bid Due Date; have been attached.

¹¹ Delete as applicable.

We hereby agree that if [*Insert name of the single Bidder/details of Consortium*] is selected as the Selected Bidder, we shall enter into a contract with the special purpose vehicle incorporated by the Selected Bidder to develop a biogas power plant at the [*Bhagalpur*] Site in accordance with the Concession Agreement:

Dated the _____ day of _____ 2017.

Thanking you,
Yours truly,

.....
(Name and signature of Authorized Signatory)

ANNEXURE 4
FORM OF PERFORMANCE SECURITY

_____ [Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: _____ [Name and Address of Owner]

Date: _____

PERFORMANCE GUARANTEE NO.: _____

We have been informed that ___[name of Operator] (hereinafter called "the Bidder") has entered into Contract No. ___[reference number of the contract] dated ___with you, concerning a contract to design, build, operate and transfer STP, New/Replace Outfall/Interceptor sewer Line Pumping Stations, all appurtenant structures and allied works in Rishikesh (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 Operator, we ___[name of Bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ___[amount in figures] (___) [amount in words], upon receipt by us of your first demand in writing accompanied by a written statement stating that the Operator is in breach of its obligations 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 earlier of:

- (a) six months after the End Date, as defined in the Contract; or
- (b) six months after the date of termination of the Contract pursuant to its terms.

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 (URDG) 2010 Revision, ICC Publication No. 758 except that the supporting statement under Article 15(a) is hereby excluded.

Yours truly,
[Name of Bank]

Authorised Signature

ANNEXURE 5

FORMAT OF ENVIRONMENTAL, SOCIAL, HEALTH AND SAFETY (ESHS) PERFORMANCE SECURITY

ESHS Demand Guarantee

[On requisite stamp paper]

[Guarantor letterhead or SWIFT identifier code]

Beneficiary: *[Executing Agency]* with its registered office –2nd Floor, Khadya Bhawan,
Daroga Rai Path, Patna, Bihar 800001

Date: *[Insert date of issue]*

ESHS PERFORMANCE GUARANTEE No.: *[Insert guarantee reference number]*

Guarantor: *[Insert name and address of place of issue, unless indicated in the letterhead]*

We have been informed that _____ (hereinafter called **the Applicant**) has been selected as the Selected Bidder for award of contract by the Beneficiary for undertaking the Project (hereinafter called the **Contract**).

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee to secure the Concessionaire's ESHS obligations is required to be submitted by the Applicant prior to signing of the Contract.

At the request of the Applicant, we as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of INR [] (Rupees []) (*Insert amount equal to [1%] of the relevant Bid Project Cost*), such sum being payable in the types and proportions of currencies in which the contract price is payable, upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Applicant is in breach of its Environmental, Social, Health and Safety (ESHS) obligation(s) under the Contract, without the Beneficiary needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall be valid for the term of the Contract, and any demand for payment under it must be received by us at this office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

[signature(s)]

ANNEXURE 6

LIST OF PUBLIC FINANCIAL INSTITUTIONS

Presently the following institutions have been declared as Public Financial Institutions:

1. The Industrial Credit and Investment Corporation of India Limited, a company formed and registered under the Indian Companies Act, 1913;
2. The Industrial Finance Corporation of India, established under section 3 of the Industrial Finance Corporation Act, 1948;
3. The Industrial Development Bank of India, established under section 3 of the Industrial Development Bank of India Act, 1964;
4. The Life Insurance Corporation of India, established under section 3 of the Life Insurance Corporation Act, 1956;
5. The Unit Trust of India, established under section 3 of the Unit Trust of India Act, 1963.
6. The Infrastructure Development Finance Company Limited, a company formed and registered under the Companies Act, 1956.
7. The Industrial Reconstruction Corporation of India;
8. The General Insurance Corporation of India;
9. The National Insurance Company Limited;
10. The New India Assurance Company Limited;
11. The Oriental Fire and General Insurance Company Limited;
12. The United Fire and General Insurance Company Limited;
13. Tourism Finance Corporation of India Limited;
14. IFCI Venture Capital Funds Limited;
15. Technology Development and Information Company of India Limited;
16. Power Finance Corporation Limited;
17. National Housing Bank;
18. Small Industries Development Bank of India;
19. Rural Electrification Corporation Ltd.;
20. Indian Railway Finance Corpn. Ltd.;
21. Industrial Finance Corporation of India Ltd.;
22. Andhra Pradesh State Financial Corporation;
23. Assam Financial Corporation;
24. Bihar State Financial Corporation;
25. Delhi Financial Corporation;
26. Gujarat State Financial Corporation;
27. Haryana Financial Corporation;
28. Himachal Pradesh Financial Corporation;
29. Jammu & Kashmir State Financial Corporation;
30. Karnataka State Financial Corporation;
31. Kerala Financial Corporation;
32. Madhya Pradesh Financial Corporation;
33. Maharashtra State Financial Corporation;
34. Orissa State Financial Corporation;

35. Punjab Financial Corporation;
36. Rajasthan Financial Corporation;
37. Tamilnadu Industrial Development Corporation Limited;
38. Uttar Pradesh Financial Corporation;
39. West Bengal Financial Corporation;
40. Indian Renewable Energy Development Agency Ltd.;
41. North Eastern Development Finance Corpn. Ltd.;
42. Housing & Urban Development Corpn. Ltd.;
43. Export-Import Bank of India;
44. National Bank for Agriculture & Rural Development (NABARD);
45. National Co-operative Development Corporation (NCDC);
46. National Dairy Development Board;
47. Pradeshiya Industrial and Investment Corporation of U.P. Limited;
48. Rajasthan State Industrial Development and Investment Corporation Limited;
49. SICOM Limited;
50. West Bengal Industrial Development Corporation Limited;
51. Tamil Nadu Industrial Development Corporation Limited;
52. Punjab State Industrial Development Corpn. Ltd. (PSIDC);
53. EDC Limited;
54. Tamil Nadu Power Finance and Infrastructure Development Corporation Ltd.;
55. Tamil Nadu Urban Finance and Infrastructure Development Corporation Limited;
56. Kerala Power Finance Corporation Limited;
57. Kerala State Power & Infrastructure Finance Corporation Limited.

However, Bidders may check the correctness of above list before submitting the bid.

Annexure -7

Declaration regarding customs/excise duty exemption for materials to be purchased for use in building the sewerage network including pumping stations etc.

(Bidder's Name and Address)

To:

Dear Sir:

Ref: -----[Name of the Project] - Certificate for Import/Procurement of Goods and materials/Construction Equipment.

1. We confirm that we are solely responsible for obtaining customs/excise duty waivers which we have considered in our bid and in case of failure to receive such waivers for reasons whatsoever, the Owner will not compensate us.
2. We are furnishing below the information required by the [Project Executing Agency] for issue of the necessary certificates in terms of the Government of India Central Excise Notification No. 108/95 along with all subsequent amendments including the amendment dt.01-03-2008 and Customs Notification No. 85/99.
3. The goods, equipment and materials for which certificates are required are as under:

Items	Make/ Brand Name /Class	Capacity [where applicable]	Quantity	Value	State whether it will be procured locally or imported [if so from which country]	Remarks regarding justification for the quantity and their usage in setting up Sewerage Network
Goods						
[a]						
[b]						
[c]						
[d]						
[e]						
[f]						
[g]						

4. We agree that no modification to the above list is permitted after bids are opened.
5. We agree that the certificate will be issued only to the extent considered reasonable by the Executing Agency for the work, based on the bid submitted by us, construction programme and methodology furnished along with the bid.

6. We confirm that the above goods will be exclusively used for the construction of the above work. We are aware that exemption will be issued to only goods/material/equipment which form part of the work on permanent basis but not for the goods/material/equipment which are used by the us for execution of project and after completion of the project, the goods remain with the us being owner of such goods for further deployment in other projects.

Date: _____ (Signature) _____

Place: _____ (Printed Name) _____

(Designation) _____

(Common Seal) _____

Model Bid Price Sheet .

Item Rate BoQ

	Input
	Calculated

Tender Inviting Authority: Bihar Urban Infrastructure Development Corporation Ltd (BUIDCO),Bhagalpur

Name of work: Design, Build, Renovate, Finance, Operate and Transfer Sewage Treatment Plant (STP) alongwith Associated Infrastructure with Operation and Maintenance Period of 15 years under Hybrid Annulity Base PPP model In Bhagalpur, State of Bihar, India under Namami Gange Programme

Contract No.:

Bidder Name	
-------------	--

Bhagalpur Price Schedule

(This BOQ template most not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter bidder name and values only)

S.No.	Item Description	Quantity	NET UNIT RATE IN figures to be entered by the bidder (Rs.)	Units	Total Amount (Incl. all Taxes, duties, cess, etc. as applicable) (Rs.)	Total Amount (In words)
1	2	3	4	5	6	7
Bhagalpur Bid project cost						
1.1	Bld Project cost(Including all taxes)					
1.1.1	Bld Project Cost (Including all taxes) for proposed 65.00 MLD STP In Bhagalpur	1		Each	-	INR Zero Only
1.1.2	Bld Project Cost (Including all taxes) for all associated Infrastructure In Bhagalpur (Main pumping station-1no, Pumping station/lifting station-10no,rising main-13.86 km, trunk main-8.98km, Intercept sewer-3.78km and Interception and diversion work-11no.)	1		Each	-	INR Zero Only
Bhagalpur O&M Charges						
1.2	O&M charges for Bhagalpur STP 65.00 MLD for first month after Bhagalpur COD					
1.2.1	Manpower	180		Months	-	INR Zero Only
1.2.2	Maintenance and Repair	180		Months	-	INR Zero Only
1.2.3	Consumables	180		Months	-	INR Zero Only
1.2.4	Bhagalpur STP 65.00 MLD-Guaranteed Energy Consumption for first month after Bhagalpur COD					
1.2.4.1	For flow < 32.50MLD and BOD < 130 mg/L	1		kWh/MLD		

1.2.4.2	For flow < 32.50MLD and BOD > 130 mg/L and upto 160mg/L	1		kWh/MLD			
1.2.4.3	For flow < 32.50MLD and BOD > 160 mg/L and upto 190mg/L	1		kWh/MLD			
1.2.4.4	For flow < 32.50MLD and BOD > 190 mg/L and upto 250mg/L	1		kWh/MLD			
1.2.4.5	For flow < 32.50MLD and BOD > 250mg/L	1		kWh/MLD			
1.2.4.6	For flow < 32.50MLD and upto 49.00 MLD and BOD < 130 mg/L	1		kWh/MLD			
1.2.4.7	For flow > 32.50MLD and upto 49.00 MLD and BOD > 130 mg/L and upto 160mg/L	1		kWh/MLD			
1.2.4.8	For flow > 32.50MLD and upto 49.00 MLD and BOD > 160 mg/L and upto 190mg/L	1		kWh/MLD			
1.2.4.9	For flow > 32.50MLD and upto 49.00 MLD and BOD > 190 mg/L and upto 250mg/L	1		kWh/MLD			
1.2.4.10	For flow > 32.50MLD and upto 49.00 MLD and BOD > 250mg/L	1		kWh/MLD			
1.2.4.11	For flow > 49.00MLD and upto 65.00 MLD and BOD < 130 mg/L	1		kWh/MLD			
1.2.4.12	For flow > 49.00MLD and upto 65.00 MLD and BOD > 130 mg/L and upto 160mg/L	1		kWh/MLD			
1.2.4.13	For flow > 49.00MLD and upto 65.00 MLD and BOD > 160 mg/L and upto 190mg/L	1		kWh/MLD			
1.2.4.14	For flow > 49.00MLD and upto 65.00 MLD and BOD > 190 mg/L and upto 250mg/L	1		kWh/MLD			
1.2.4.15	For flow > 49.00MLD and upto 65.00 MLD and BOD > 250mg/L	1		kWh/MLD			
1.2.4.16	Bhagalpur STP (65.00 MLD) Guaranteed Energy Consumption (Average)			-			
1.2.5	Bhagalpur STP 65.00 MLD Power Charges (₹65.00 X Units Consumed/MLD X 5475 X 6.08)	2,163,720			-	INR Zero Only	
1.2.6	Land requirement (sqm)-Bhagalpur STP 65.00 MLD	2,700		sqm	-	INR Zero Only	
1.3	O&M charges for Associated Infrastructure for first month after Bhagalpur COD(Main pumping station-1no, Pumping station/lifting station-10no, rising main-13.86 km, trunk main-8.98km, Intercept sewer-3.78km and Interception and diversion work-11no.)						
1.3.1	Manpower	180		Months	-	INR Zero Only	
1.3.2	Maintenance and Repair	180		Months	-	INR Zero Only	
1.3.4	Bhagalpur Associated infra Guaranteed Energy Consumption for first month after Bhagalpur COD - (67.00+65.00 MLD capacity X Units Consumed/MLD X 5475 X 6.08) (Main pumping station-1no and Pumping station/lifting station-10no)	4,394,016		kWh/MLD	-	INR Zero Only	
Total For Bhagalpur Facilities(A+B)						-	INR Zero Only



Image Source: https://www.outlookindia.com/outlooktraveller/wp-content/uploads/2017/06/bihar27_bhagalpur_ti.jpg

**CONCESSION AGREEMENT
FOR
DEVELOPMENT OF SEWAGE TREATMENT PLANTS
AT BHAGALPUR, *STATE OF BIHAR*
ON HYBRID ANNUITY PPP BASIS**

TABLE OF CONTENTS

1.	DEFINITIONS AND INTERPRETATION	5
2.	SCOPE OF THE PROJECT AND GRANT OF THE CONCESSION	25
3.	CONDITIONS PRECEDENT, EFFECTIVENESS AND TERM.....	28
4.	SITE AND ASSET OWNERSHIP	33
5.	PERFORMANCE SECURITY, O&M SECURITY AND MOBILIZATION ADVANCE ...	38
6.	PROJECT ENGINEER.....	42
7.	CONSTRUCTION PERIOD	43
8.	OPERATIONS AND MAINTENANCE PERIOD	66
9.	PAYMENT AND INVOICING	83
10.	FINANCING ARRANGEMENTS AND SECURITY	93
11.	INSURANCE AND INDEMNITIES	94
12.	CHANGE IN OWNERSHIP	98
13.	CHANGE IN LAW.....	100
14.	FORCE MAJEURE	102
15.	SUSPENSION	107
16.	EVENTS OF DEFAULT	110
17.	CONSEQUENCES OF TERMINATION	114
18.	TERMINATION COMPENSATION.....	116
19.	TRANSFER ON TERMINATION.....	121
20.	DISPUTE RESOLUTION	125
21.	REPRESENTATIONS AND WARRANTIES.....	127
22.	MISCELLANEOUS	130

CONCESSION AGREEMENT

This Concession Agreement (**Agreement**) is executed on this [●] day of [●] Two Thousand and Eighteen at -----:

AMONGST

- (1) **Bihar Urban Infrastructure Development Corporation Ltd (BUIDCO)**, a flagship company owned by Government of Bihar, incorporated in 2009, with its registered office at Bihar Urban Infrastructure Development Corporation Ltd., Project Director, 2nd Floor, Khadya Bhawan, Road no.2, Daroga Rai Path, R Block, Patna 800001, Bihar (hereinafter referred to as the *Executing Agency*, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (2) **NATIONAL MISSION FOR CLEAN GANGA**, a statutory body constituted under the Environment (Protection) Act, 1986, with its registered office at 1st Floor, Major Dhyanchand National Stadium, India Gate, New Delhi - 110002 (hereinafter referred to as **NMCG**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (3) [_____][*insert name of the Concessionaire*], a company organized, incorporated, registered and existing under the Companies Act, with its registered office at _____ [*insert address*] acting through _____, _____ [*insert name of the authorised signatory and his/her designation*] duly authorized by resolution dated _____ [*insert date of the Board Resolution*] (hereinafter referred to as the **Concessionaire**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns).

The *Executing Agency*, NMCG and the Concessionaire shall collectively be referred to as the **Parties** and individually as a **Party**.

WHEREAS:

- A. The GoI, recognizing that long-term rejuvenation of the river Ganga will have significant social and economic benefits on the lives of the 500 million people living along its basin, has identified cleaning of the river Ganga as one of its priorities. For this purpose, in May 2015, the GoI approved the flagship Namami Gange programme for cleaning, rejuvenation, and protection of the river Ganga. In January 2016, the GoI approved a hybrid annuity model to implement STP projects under the Namami Gange programme on a PPP basis.
- B. Subsequently, the MoWR issued the River Ganga (Rejuvenation, Protection and Management) Authorities Order, 2016 (**Ganga 2016 Order**) to constitute various

authorities to assist the GoI in achieving its aim of effective abatement of pollution in the river Ganga. The Ganga 2016 Order designated NMCG as the nodal agency for the implementation of the Ganga 2016 Order.

- C. The Executing Agency has the power to develop, maintain and regulate water supply and sewerage works in the state of Bihar. With a view to implement the Namami Gange programme and the Ganga 2016 Order, the Executing Agency, in association with NMCG, has decided to undertake the development of one STP, with a proposed capacity of 45 MLD, at *Bhagalpur*, on a PPP basis, through a hybrid annuity model.
- D. For this purpose, the Executing Agency intends to engage a concessionaire who will design, develop, finance, construct, operate and maintain the Facilities on the Site, and after the expiry of the Term, transfer the Facilities to the Executing Agency, in accordance with this Agreement (collectively the **Project**).
- E. On 23 August 2018, the Executing Agency commenced a competitive Bid Process for the Project by issuing a request for proposal (the **RFP**), inviting interested parties to submit their qualification proposals and financial proposals to the Executing Agency for undertaking the Project.
- F. Pursuant to the terms of the RFP, the Executing Agency received proposals from various bidders, including a proposal submitted by the Selected Bidder on ... [insert date].
- G. Following a process of evaluation of qualification proposals and financial proposals submitted by the bidders (including the Selected Bidder), the Executing Agency has on ... [insert date] accepted the proposal submitted by the Selected Bidder for the development of the Project. Subsequently, the Executing Agency has issued the letter of award dated ... [Insert date] to the Selected Bidder (the **LOA**).
- H. The Selected Bidder has accepted the LOA and has agreed to undertake the Project in accordance with the terms of this Agreement.
- I. The Selected Bidder has incorporated a special purpose vehicle to act as the Concessionaire, to implement the Project and perform the obligations and exercise the rights of the Concessionaire, including the obligation to enter into this Agreement.
- J. The Executing Agency and NMCG have agreed to enter into this Agreement with the Concessionaire for implementation of the Project, subject to and on the terms and conditions set out in this Agreement.

IT IS AGREED as follows:

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

Acres	means a unit of land area equal to 43,560 sq.ft.
Additional Performance Security.	means a performance security that must be submitted by the Selected Bidder to the <i>Executing Agency</i> together with the Performance Security and ESHS Performance Security to secure the obligations of the Concessionaire/Bidder in relation to the <i>clause 16.5 of the RFP document</i> .
Adjoining Property	means any land and/or property adjoining or adjacent to the Site, including all conduits, roads, footpaths, walls, fences, buildings and other erections, structures and other apparatus on, under or within such land and/or property.
Adjusted DG Set Units	has the meaning ascribed to it in Clause 9.4(g)(ii)(B)(II).
Affected Party	means the Party affected by a Force Majeure Event.
Applicable Laws	means the Constitution of India and all and any laws, enacted or brought into force and effect by the GoI, any State Government (including the Go-----), any Government Authority or any local government having jurisdiction over the Parties, the Site or the Project, including rules, regulations and notifications made thereunder, and judgments, decrees, injunctions, writs and orders of any court of record, as may be applicable to the execution of this Agreement and the performance of the respective rights and obligations of the Parties, as may be in force and effect during the subsistence of this Agreement. For the avoidance of doubt, and without in any way limiting the generality of the foregoing, Applicable Laws shall include the EPA, the EPA Rules, Ganga 2016 Order, and the State Water Supply and Sewerage related Acts
Applicable Permits	means any permissions, clearances, concessions, authorizations, consents, licenses, permits, rulings, exemptions, no objections, resolutions, filings, orders, notarizations, registrations or approvals of whatsoever nature that are required to be obtained from time to time in connection with the Project, and for generally performing the obligations contemplated by this Agreement in accordance with the Applicable Laws, as set out in Schedule 7.
Appointed Date	means the date of signing of this Agreement.
Arbitration Act	means the Arbitration and Conciliation Act, 1996, as amended from time to time.
Article	means an article of this Agreement.
Associate	means, in relation to the Concessionaire, the Selected Bidder or a Member of the Selected Bidder, a Person who Controls, or is Controlled

	by, or is under the common Control of the same Person who controls the Concessionaire, the Selected Bidder or Member of the Selected Bidder, as the case may be.
Availability	means the availability of the Facilities to convey, accept and treat the Sewage, as determined in accordance with Clause 8.12(a)(i) and the term ' Available ' shall be construed accordingly.
Availability Liquidated Damages	means the liquidated damages payable by the Concessionaire to the Executing Agency for failure to achieve the Guaranteed Availability, in accordance with Clause 8.12(a)(v).
Bank	means [the International Bank for Reconstruction and Development (IBRD)/International Development Association (IDA)].
Basic Engineering Designs	means the following designs and documents to be submitted by the Concessionaire and approved by the Executing Agency as a Condition Precedent: <ul style="list-style-type: none"> (a) process description, process calculations, and hydraulic calculations; (b) list of design codes and standards; (c) master drawing schedule; (d) drainage design; (e) STP Facilities layout; (f) process flow diagram; (g) hydraulic flow diagram; (h) mass balance diagram; (i) process and instrumentation diagram; (j) single line diagram; (k) electrical load list; and (l) general arrangement diagrams of all units of the Facilities.
Bid	means the bid consisting of the Qualification Proposal and the Financial Proposal submitted by a Bidder for qualification and award of the Project.
Bid Due Date	means the last date of submission of the Bids as set out in the RFP.
Bid Process	means the single-stage bidding process, with two sub-stages, undertaken by the Executing Agency to award the Project to the Selected Bidder on the terms and conditions set out in the RFP. The Bid Process commenced with the issuance of the RFP and ends on the Appointed Date.
Bid Project Cost	means INR [] (Rupees []), being the cost of construction of the Facilities, as quoted by the Selected Bidder in its Bid, which includes the interest during construction, Taxes and all other pre-operative expenses in relation to the Facilities.
BOD	means biochemical oxygen demand.
Capex Annuity	means the amount payable to the Concessionaire per quarter during the O&M Period, towards reimbursement of 60% of the Completion Cost.

Capex Annuity	means the amount payable to the Concessionaire per quarter during the O&M Period, towards reimbursement of 60% of the Completion Cost.
Capital	means, in respect of the Concessionaire, the total capital of the Concessionaire that will be raised by the issuance of equity shares, preference shares and convertible instruments.
Change in Law	<p>means the occurrence of any of the following events after the Bid Due Date:</p> <ul style="list-style-type: none"> (a) the modification, amendment, variation, alteration or repeal of any existing Applicable Law; (b) the enactment of any new Applicable Law or the imposition, adoption or issuance of any new Applicable Law by any Government Authority; (c) changes in the interpretation, application or enforcement of any Applicable Law or judgement by any court/Government Authority; (d) the introduction of a requirement for the Concessionaire to obtain any new Applicable Permit or the unlawful revocation of an Applicable Permit; or (e) the introduction of any new Tax (including goods and services tax) or a change in the rate of an existing Tax. <p>It is clarified that Change in Law shall not include any change in the (Indian) Income Tax Act, 1961 with regard to the taxes on the income of the Concessionaire.</p>
Clause	means a clause of this Concession Agreement.
COD Certificate	means the certificate issued by the Executing Agency to the Concessionaire upon issuance or deemed issuance of the Trial Operations Completion Certificates for the Facilities and satisfaction of the conditions set out in Clause 7.15(a).
Commercial Operations Date or COD	means the date on which the COD Certificate is issued or deemed to be issued to the Concessionaire in accordance with Clause 7.15(a).
Companies Act	means the (Indian) Companies Act, 1956 or the (Indian) Companies Act, 2013, as amended from time to time, as the context may require.
Completion Cost	means the cost of completing the construction of the Facilities, as calculated in accordance with Clause 9.4(b).
Concessionaire	has the meaning ascribed to it in the array of Parties.
Concessionaire Applicable Permits	means the Applicable Permits which are required to be obtained and maintained by the Concessionaire to develop, operate and maintain the

	Facilities, as set out in Schedule 7.
Concessionaire Event of Default	has the meaning ascribed to it in Clause 16.1.
Concessionaire Related Parties	means any of the following: (a) the Selected Bidder or Associates of the Selected Bidder; (b) an officer, servant, employee or agent of the Concessionaire acting in that capacity; (c) any Subcontractor engaged by the Concessionaire and their directors, officers, servants, employees or agents acting in that capacity; or (d) any Person acting on behalf of the Concessionaire.
Concessionaire's Representative	means the Person nominated by the Concessionaire, from time to time, to act on its behalf and liaise with the Executing Agency and NMCG for the purposes of this Agreement and notified as such in writing to the Executing Agency and NMCG.
Conditions Precedent	means collectively, the obligations of the Concessionaire that are set out at Clause 3.2, the obligations of the Executing Agency that are set out at Clause 3.3 and the obligations of NMCG that are set out at Clause 3.4, and ' Condition Precedent ' means any one of these.
Confidential Information	means any part of this Agreement, or any information contained therein or any material provided to any Party pursuant to this Agreement, all of which information shall be deemed to be confidential, except to the extent that this Agreement otherwise requires.
Construction Completion Certificate	means the certificate issued by the Executing Agency to the Concessionaire to certify completion of construction of the Facilities and the satisfaction of all other conditions required to be fulfilled by the Concessionaire in accordance with Clause 7.13(c).
Construction Completion Date	means, with respect to the Facilities, the date on which the Facilities Construction Completion Certificate is issued or deemed to be issued to the Concessionaire, in accordance with Clause 7.13(c)(iii)
Construction Payments	means, for each Facility, the payments to be made to the Concessionaire during the Construction Period, upon satisfactory completion of the Payment Milestones, which shall, in aggregate, be equivalent to 40% of the Bid Project Cost, as adjusted from time to time to reflect the variation in the Construction Price Index.
Construction Period	has the meaning ascribed to it in Clause 7.1.
Construction Plan	means the detailed construction plan for the facilities to be prepared by the Concessionaire, which will set out the work to be performed by the Concessionaire to achieve each of the 4 Baghalpur Facilities Payment Milestones, in a manner such that the Facilities are completed on or prior to the Scheduled Construction Completion Date. The Construction Plan shall be approved by the Executing Agency in accordance with Clause 7.3.

Construction Price Index	<p>shall comprise:</p> <p>(a) 70% of WPI; and</p> <p>(b) 30% of CPI(IW),</p> <p>which constituents may be substituted by such alternative index or indices as the Parties may mutually agree.</p>
Control	<p>means, with respect to a Person:</p> <p>(a) the ownership, directly or indirectly, of more than 50% of the voting shares of such Person; or</p> <p>(b) the power, directly or indirectly, to direct or influence the management and policies of such Person by operation of law, contract or otherwise,</p> <p>and the term 'Controlled' shall be construed accordingly.</p>
Cost	<p>means all documented expenditure reasonably incurred by the Concessionaire, whether on or off the Site, including overhead and similar charges, but does not include profit.</p>
CP Long-Stop Date	<p>has the meaning ascribed to it in Clause 3.5(a).</p>
CPI(IW)	<p>means the Consumer Price Index for Industrial Workers published by the Labour Bureau, GoI and shall include any index which substitutes the CPI(IW), and any reference to CPI(IW) shall, unless the context otherwise requires, be construed as a reference to the CPI(IW) published on the last date of the preceding quarter.</p>
Debt Due	<p>means the aggregate of the following sums expressed in Rupees outstanding on the date of issuance of the Notice of Intent to Terminate:</p> <p>(a) the principal amount of the debt provided by the Lenders under the Financing Documents for financing 45% of the Bid Project Cost but excluding any part of the principal that had fallen due for repayment 2 years prior to the date of the Notice of Intent to Terminate, as set out in the Financial Package; and</p> <p>(b) all accrued interest, financing fees and charges payable under the Financing Documents on, or in respect of, the debt referred to in (a) above until the date of the Notice of Intent to Terminate but excluding (i) any interest, fees or charges that had fallen due 1 year prior to the date of the Notice of Intent to Terminate, (ii) any penal interest or charges payable under the Financing Documents to any Lender, and (iii) any pre-payment charges in relation to accelerated repayment of debt except where such charges have arisen due to an Executing Agency Event of Default or an NMCG Event of Default,</p> <p>provided that if all or any part of the Debt Due is convertible into equity</p>

	<p>at the option of Lenders and/or the Concessionaire, it shall for the purposes of this Agreement be deemed to be Debt Due even after such conversion and the principal shall be dealt with as if such conversion had not been undertaken.</p> <p>For the purpose of calculating Debt Due:</p> <p>(A) the aggregate of the principal amounts of the debt provided by the Lenders under the Financing Documents shall, in no event, exceed 45% of the Bid Project Cost; and</p> <p>(B) any amount of Debt Due in foreign currency as on the date of the Notice of Intent to Terminate shall be converted to Rupees at the exchange rate published on the official website of the Reserve Bank of India as at 12 noon on the relevant date.</p>
Delay Event	has the meaning ascribed to it in Clause 7.11(b).
Delay Liquidated Damages	has the meaning ascribed to it in Clause 7.12(a).
Design Capacity	means the average flow of Sewage that the Facilities should be designed to handle and treat in a day, which shall be 45 MLD.
Designs and Drawings	means, collectively, the Phase I Designs and Drawings and the Phase II Designs and Drawings.
DG Sets	means the backup diesel generators set maintained by the Concessionaire at the Site, to ensure continuous supply of power for the operation of the Facilities, when the supply of power from the grid is not available.
Digested Sludge	means the sludge which is obtained after the treatment and digestion of the Sewage at the STP.
Direct Political Force Majeure Events	has the meaning ascribed to it in Clause 14.1(b)(iii).
Discharge Standards	means the minimum standards set out in the Technical Specifications that the Treated Effluent and Digested Sludge must comply with.
Dispute	has the meaning ascribed to it in Clause 21.1.
Dispute Notice	has the meaning ascribed to it in Clause 21.1.
Dispute Meeting	has the meaning ascribed to it in Clause 21.1.
Effective Date	means the date on which all the Conditions Precedent have been satisfied by the Executing Agency, NMCG and the Concessionaire in accordance with this Agreement.
Emergency	means a condition or situation that endangers, or which in the reasonable opinion of the Executing Agency, the Project Engineer or the Concessionaire, may endanger the environment or lives or security of

	people at or around the Site or that poses an imminent threat of material damage to any property (including the Facilities) at or around the Site.
Encumbrance(s)	means mortgage, charge, pledge, lien (statutory or otherwise), assignment by way of security, hypothecation, right of set-off, trust, priority, retention of title or ownership or other security interest and any other agreement or arrangement having substantially the same effect.
EPA	means the Environment (Protection) Act, 1986, as amended from time to time.
EPA Rules	means the Environment (Protection) Rules, 1986, as amended from time to time.
Equity	means the sum expressed in INR representing the paid up equity share capital of the Concessionaire for meeting the equity component of its financial obligations under this Agreement and the Financing Documents, which, for the purpose of this Agreement, shall include convertible instruments that shall compulsorily convert into equity share capital and any loans provided by any shareholder of the Concessionaire.
Escrow Account	means the interest-bearing account opened by NMCG with the Escrow Bank in accordance with the Escrow Agreement, which shall be operational until the expiry of the Term.
Escrow Agreement	means the agreement to be executed among the Executing Agency, NMCG, the Concessionaire, and the Escrow Bank in relation to the opening and operations of the Escrow Account, in the form set out at Schedule 3.
Escrow Bank	means the Scheduled Bank with which NMCG opens the Escrow Account, pursuant to the Escrow Agreement.
ESHS	means environment, social, health and safety.
ESHS Documents	means, collectively, the Safeguard Documents and Safety Documents prepared by the Concessionaire and approved by the Executing Agency in accordance with Clause 7.4.
ESHS Performance Security	has the meaning ascribed to it in Clause 5.1.
ESMF	means the Environment and Social Management Framework agreed with the National Ganga River Basin Authority, available at http://nmcg.nic.in/Disclosure.aspx .
Event of Default	means an Executing Agency Event of Default, NMCG Event of Default or a Concessionaire Event of Default, as the context may require.
Executing Agency	has the meaning ascribed to it in the array of Parties.
Executing Agency Applicable Permits	means the Applicable Permits which are required to be obtained by the Executing Agency to undertake the Project, as set out in Schedule 7.
Executing Agency Event of Default	has the meaning ascribed to it in Clause 16.3.

Executing Agency Related Parties	<p>means any of the following:</p> <p>(a) an officer, servant, employee or agent of the Executing Agency, acting in that capacity;</p> <p>(b) any contractor or subcontractor of the Executing Agency and their directors, officers, servants, employees or agents, acting in that capacity; or</p> <p>(c) any Person acting on behalf of the Executing Agency .</p> <p>For the avoidance a doubt, 'Executing Agency Related Parties' does not include the Concessionaire or NMCG.</p>
Executing Agency's Representative	<p>means any officer nominated by the Executing Agency, from time to time, to act on its behalf and liaise with the Concessionaire and NMCG for the purposes of this Agreement and notified as such in writing to the Concessionaire and NMCG.</p>
Facilities	<p>means collectively, the STP, the Online Monitoring System, the on-site testing laboratory facilities and such other facilities associated with the STP, required to be set up by the Concessionaire, as described in greater detail in the Schedule 10 (<i>Technical Specifications</i>) and Schedule 1 (<i>Scope of Work</i>).</p>
Financial Assistance	<p>means all funded and non-funded financial assistance, including loans, advances and guarantees or any re-financing that the Concessionaire may avail of for the Project from the Lenders.</p>
Financial Capacity	<p>means the financial capacity and strength of the [Selected Bidder/Member(s)]¹ determined in accordance with the RFP.</p>
Financial Close	<p>means, the date on which the Financing Documents become effective, the conditions precedent under the Financing Documents for disbursements are fulfilled and the Concessionaire has access to the Financial Assistance.</p>
Financial Package	<p>means the financing package indicating the means of financing the Facilities, and includes all Financial Assistance specified in the Financing Documents and the Equity.</p>
Financial Proposal	<p>means the financial proposal submitted by the Selected Bidder in accordance with the RFP for undertaking the Project.</p>
Financial Year	<p>means each 12-month period commencing on 1 April of one calendar year and ending on 31 March of the next calendar year; and if different for a company, then the 12-month period for which such company files its statutory audited accounts in the normal course of its business.</p>
Financing Documents	<p>means, collectively, the documents entered into or to be entered into by the Concessionaire with the Lenders, in respect of all funded and non-</p>

¹ Delete Member(s) if the Selected Bidder is a single entity.

	funded financial assistance, including loans, advances and or any re-financing that the Concessionaire may avail of for the Project from the Lenders and includes any document providing Security to the Lenders.
First Breach	has the meaning ascribed to it in Clause 8.12(b)(iii)(A).
First Breach Notice	has the meaning ascribed to it in Clause 8.12(b)(iii)(A).
FM Notice	has the meaning ascribed to it in Clause 14.2(a).
Force Majeure Event	means a Non-Political Force Majeure Event, an Indirect Political Force Majeure Event or a Direct Political Force Majeure Event, as the case may be.
Forced Unavailability	means an interruption of or a reduction in the Availability of any Facility that is the result of: <ul style="list-style-type: none"> (a) a maximum capacity utilization of such Facility, as notified by the Concessionaire to the Executing Agency in accordance with Clause 8.9; (b) a suspension of the performance of the O&M services for such Facility pursuant to Clause 15.1(a)(i) or Clause 15.2(a)(i), to the extent any such event is not attributable to the Concessionaire; or (c) unavailability or breakdown of the Supporting Infrastructure for such Facility.
Fuel Price	means the prevailing price of diesel at Indian Oil Corporation or Hindustan Petroleum Corporation Limited's retail outlets in Bhagalpur, Bihar; as determined on the 15 th day of a month.
Fundamental Change in Law	means any Change in Law that: <ul style="list-style-type: none"> (a) renders unenforceable, illegal, invalid or void any material right or material obligation of the Concessionaire under this Agreement; or (b) renders a material part of this Agreement invalid, illegal or unenforceable; or (c) results in the Concessionaire being deprived of the whole or a substantial part of the benefit of this Agreement.
Ganga 2016 Order	has the meaning ascribed to it in Recital B.
GoB	means the Government of Bihar.
GoI	means the Government of India.
Good Industry Practices	means the exercise of such degree of skill, diligence and prudence, and those practices, methods, specifications and standards of equipment, safety and performance, as may change from time to time and which

	would reasonably and ordinarily be expected to be used by a skilled and experienced developer engaged in construction, management, and maintenance of STPs in India of the type and size similar to the Facilities.
Government Authority	means the GoI, any State Government (including the GoB), any local government or any other ministry, governmental department, commission, board, body, bureau, agency, authority, instrumentality, inspectorate, statutory corporation or body corporate over which the GoI or the GoB exercises control, court, tribunal or other judicial or administrative body or official or person, having jurisdiction over the Concessionaire, the Site, the Project and the performance of obligations and exercise of the rights of the Parties in accordance with the this Agreement.
Grace Period	has the meaning ascribed to it in Clause 7.12(e).
Guaranteed Availability	has the meaning ascribed to it in Clause 8.12(a)(i).
Guaranteed Energy Consumption	means the maximum number of units of power (in kWh) per MLD quoted by the Selected Bidder in the Financial Proposal, which it expects to consume during the O&M Period (other than any units expected to be generated and consumed from the Power Plant), to operate and maintain the Facilities, at varying volumes and BOD of Sewage. The Guaranteed Energy Consumption for any quarter during the O&M Period will be determined on the basis of the number of units of power (in kWh) per MLD quoted by the Selected Bidder in the Financial Proposal for the average volume and BOD of Sewage treated at the STP in such quarter (such average to be calculated in accordance with the KPI Adherence Report).
Hand-back Conditions	mean the condition in which the Site, the Facilities, and the Power Plant, shall be handed back to the Executing Agency or any entity nominated by the Executing Agency on expiry or early termination of this Agreement, which is consistent with the due performance of the Concessionaire's obligations under this Agreement and are described in greater detail in the Technical Specifications.
Hand-back Requirements	means the obligations of the Concessionaire in relation to transfer of the Facilities upon termination of the Project, as set out in Clause 19.3.
Indirect Political Force Majeure Events	has the meaning ascribed to it in Clause 14.1(b)(ii).
Influent Standards	means the permissible standards and characteristics set out in the Technical Specifications for the incoming Sewage.
Inlet Point	means the point mutually agreed to between the Executing Agency and the Concessionaire at the STP where: (a) the Sewage sample shall be drawn to test compliance with the Influent Standards; and (b) meters shall be installed for the purpose of determining the volume and

	concentration of the Sewage delivered at the Facilities.
Intellectual Property Rights	means patents, copyrights, database rights, design rights, trade-marks, service marks, trade names, domain names, rights in reputation, rights in undisclosed or confidential information (such as know-how, trade secrets and inventions, whether patentable or not), and other rights of a like nature (whether registered or unregistered) and all applications for such rights as may exist anywhere in the world.
Invoice	means an invoice for payment of: (a) the Construction Payments during the Construction Period; or (b) the Capex Annuity (along with interest), the O&M Charges and the Power Charges during the O&M Period, submitted by the Concessionaire to the Executing Agency (with a copy to NMCG) in accordance with Article 9.
KPI Adherence Report	has the meaning ascribed to it in Clause 8.12(b)(vi).
KPIs	means the key performance indicators set out in Schedule 9, which the Facilities must achieve during the O&M Period.
Lead Member	[means the Member nominated by the Members of the Selected Bidder to act as the lead member in accordance with the RFP.] ²
Lenders	includes banks, financial institutions, funds and agents or trustees of debenture holders, including their successors and assignees, who have agreed to guarantee or provide Financial Assistance to the Concessionaire under the Financing Documents but does not include any shareholder or Associates of the Concessionaire who have provided any shareholder loans to the Concessionaire.
Liquidated Damages	means the Delay Liquidated Damages, the Availability Liquidated Damages, the Performance Liquidated Damages and the Power Consumption Liquidated Damages.
LOA	has the meaning ascribed to it in Recital G.
Material Adverse Effect	means the effect of any act or event, which materially and adversely affects the ability of any Party to exercise its rights or perform any of its obligations under and in accordance with this Agreement and which act or event causes a material financial burden or loss to any Party.
Member	[means, where the Selected Bidder is a Consortium, a member of the Selected Bidder.] ³
Milestone Completion Certificate	means, in respect of any Payment Milestone, a certificate issued by the Executing Agency in accordance with Clause 7.13(a), to certify that such Payment Milestone has been achieved in accordance with the requirements of this Agreement.
Minimum Escrow	has the meaning ascribed to it in Clause 9.5(b).

² To be deleted if the Selected Bidder is not a Consortium.

³ To be deleted if the Selected Bidder is not a Consortium.

Balance	
Minor Casualty	means any fire or other casualty that results in physical damage to the B Facilities to the extent that the total cost (as estimated by the Project Engineer) of repairing and/or replacing the damaged portion of the Facilities, as the case may be, to the same condition as previously existed would not exceed the amount of INR 25,00,000 (Rupees twenty five lakhs).
MLD	means million litres per day.
Mobilization Advance	means an amount equivalent to 10% of the Bid Project Cost that is to be paid in advance to the Concessionaire for mobilization and execution of the construction works for the Facilities in accordance with Clause 9.3(d).
Mobilization Advance Guarantee	has the meaning ascribed to it in Clause 5.21.
MoWR	means the Ministry of Water Resources, River Development and Ganga Rejuvenation, GoI.
Net Worth	means the net worth of a company, which shall be determined as follows: (a) subscribed and paid up equity share capital; and (b) reserves LESS (c) revaluation reserves; (d) miscellaneous expenditure not written off; (e) reserves not available for distribution to equity shareholders; and (f) aggregate value of accumulated losses.
NMCG	has the meaning ascribed to it in the array of Parties.
NMCG Event of Default	has the meaning ascribed to it in Clause 16.4.
NMCG's Representative	means any officer nominated by NMCG, from time to time, to act on its behalf and liaise with the Concessionaire and the Executing Agency for the purposes of this Agreement and notified as such in writing to the Concessionaire and the Executing Agency .
Non-Political Force Majeure Event	has the meaning ascribed to it in Clause 14.1(b)(i).
Notice of Arbitration	has the meaning ascribed to it in Clause 21.2(a).
Notice of Intent to Terminate	means a notice of intent to terminate issued by the Executing Agency in case of a Concessionaire Event of Default (in accordance with Clause

	16.2) or a notice of intent to terminate issued by the Concessionaire in case of a Executing Agency Event of Default or an NMCG Event of Default (in accordance with Clause 16.5), stating its intention to terminate this Agreement.
O&M	means operation and maintenance.
O&M Charges	means the amount required by the Concessionaire per quarter to operate and maintain the Facilities, excluding the Power Charges, during the O&M Period. The O&M Charges for the first quarter after the COD will be determined on the basis of the O&M Charges quoted by the Selected Bidder (in the Financial Proposal) for the first month from the COD, which amount shall then be adjusted to reflect the variation in the O&M Price Index.
O&M Manual	means the manual required to be prepared by the Concessionaire and approved by the Executing Agency for the operation and maintenance of the Facilities in accordance with Clause 8.2.
O&M Payments	means, for each Facility, collectively the: (a) Capex Annuity; (b) interest on the reducing balance of 60% of the Completion Cost; (c) O&M Charges; and (d) Power Charges (subject to the cap of the Power Charges based on the Guaranteed Energy Consumption), to be paid by NMCG to the Concessionaire during the O&M Period, in accordance with this Agreement.
O&M Period	means the period of 15 years from the COD during which the Concessionaire is required to operate and maintain the Facilities.
O&M Price Index	shall comprise: (a) 70% of CPI(IW); and (b) 30% of WPI, which constituents may be substituted by such alternative index or indices as the Parties may mutually agree.
O&M Security	has the meaning ascribed to it in Clause 5.5.
Online Monitoring System	means the monitoring system(s) to be set up by the Concessionaire as part of the Facilities for continuous monitoring of the volume, specifications and characteristics of the Sewage and the Treated Effluent.
Outlet Point	means the outlet of the STP where the sample of the Treated Effluent shall be drawn periodically to test compliance with the Discharge Standards.
Payment Certificate	has the meaning ascribed to it in Clause 9.3(e)(v) for Construction Payments and Clause 9.4(k) for O&M Payments.
Payment Milestones	means the 4 milestones listed in Clause 9.3(e) for release of the Construction Payments to the Concessionaire, and ' Payment Milestone '

	shall mean any one of them, as the context may require.
Performance Liquidated Damages	means the liquidated damages payable by the Concessionaire to the Executing Agency for a failure to meet the Discharge Standards, in accordance with Clause 8.12(b)(iii).
Performance Security	has the meaning ascribed to it in Clause 5.1.
Person	means any individual, company, corporation, partnership, joint venture, trust, society, sole proprietor, limited liability partnership, co-operative society, government company, unincorporated organization or any other legal entity.
Phase I Designs and Drawings	means: (a) the Basic Engineering Designs; (b) the Screening Report; and (c) the detailed 'good for construction' designs and drawings, technical information, plans, samples, patterns, models and specifications for the works required for achieving the first Payment Milestone.
Phase II Designs and Drawings	means the detailed 'good for construction' designs and drawings, technical information, plans, samples, patterns, models and specifications for the works required for achieving the second, third and fourth Payment Milestones.
Power Charges	means the cost of the power consumed by the Concessionaire to operate and maintain the Facilities during the O&M Period, which will be calculated on the basis of the prevailing Power Unit Rate, the Fuel Price, to the extent applicable and such other applicable charges as per the guidelines of the relevant Government Authorities.
Power Consumption Liquidated Damages	has the meaning ascribed to it in Clause 9.4(g)(ii)(C).
Power Outage	means any interruption in the supply of electricity from the grid or any DG Sets maintained by the Concessionaire at the Site, which disrupts the continuous operation of any Facility.
Power Plant	means a biogas power plant or a rooftop solar plant that the Concessionaire sets up at the relevant Site as part of the Project, for production of clean energy.
Power Unit Rate	means the cost per unit of power drawn from the grid (through the relevant distribution licensee for the Site), which will be the prevailing tariff per unit of power charged by the relevant distribution licensee in the relevant month during the O&M Period.
PPP	means public private partnership.
Price Index	means, for the Construction Payments, the Construction Price Index, and for the O&M Payments, the O&M Price Index.
Price Index Multiple	means, the variation multiple in the Price Index occurring between the Reference Index Date preceding the Bid Due Date and the Reference

	<p>Index Date preceding the date of the Invoice, which is calculated by dividing the Price Index on the Reference Index Date preceding the date of the Invoice by the Price Index on the Reference Index Date preceding the Bid Due Date.</p> <p>For the avoidance of doubt and by way of illustration, if (a) the Price Index on the Reference Index Date preceding the Bid Due Date, say 30 May, 2017, is 200; (b) the Invoice is submitted on 15 April, 2020; and (c) the Price Index as on 31 March, 2020 is 210, then the Price Index Multiple for determination of the amount due in respect of such Invoice shall be 1.05.</p>
Project	has the meaning ascribed to it in Recital D.
Project Engineer	means the engineering firm appointed by NMCG in accordance with Article 6.
Proposed Technology	means the proven technology(ies) proposed to be used by the Concessionaire to develop the Bhagalpur STP, as specified by the Concessionaire in its Designs and Drawings. The proposed technology for the STP must be the same as the technology adopted for at least one of the STP(s) for which the Selected Bidder claimed technical experience in its Bid.
Qualifying Change in Law	<p>means any Change in Law, which:</p> <p>(a) is directly applicable to the Project;</p> <p>(b) impacts the Cost or time for undertaking the Project; and</p> <p>(c) which was not reasonably foreseeable by the Concessionaire as on the Bid Due Date.</p>
Reference Index Date	means, in respect of a specified date, the last date of the preceding month with reference to which the Construction Price Index or the O&M Price Index is revised.
Residual Grit	means the grit which is obtained as residual matter after the treatment of the Sewage at the STP.
RFP	has the meaning ascribed to it in Recital E.
Rupee or Rs. or INR	means Indian National Rupees, the lawful currency of India.
Safeguard Documents	has the meaning ascribed to it in Clause 7.4.
Safety Documents	has the meaning ascribed to it in Clause 7.4.
SBI MCLR	means the prevailing marginal cost of fund based lending rate for a tenor of 1 year, notified by the State Bank of India.
Schedule	means a schedule of this Agreement.
Scheduled Bank	means a bank as defined under section 2(e) of the Reserve Bank of India

	Act, 1934, as amended from time to time.
Scheduled COD	means the date which is 4 months from the Construction Completion Date of the Facilities, whichever is later, by which the Concessionaire is required to achieve the COD.
Scheduled Construction Completion Date	means the date which is 21 months from the Effective Date, by which the Concessionaire is required to complete the construction of the Facilities.
Scheduled Maintenance Programme	means, for each year of the O&M Period, the schedule for undertaking preventive and corrective maintenance of the Facilities, as prepared by the Concessionaire and approved by the Executing Agency in accordance with Clause 8.11(f).
Scheduled Maintenance	means a planned maintenance of any Facility that: <ul style="list-style-type: none"> (a) has been scheduled and allowed by the [Name of the Project Executing Agency]in accordance with the Scheduled Maintenance Programme; and (b) is for inspection, testing, preventive and corrective maintenance, repairs, replacement or improvement of such Facility, as the case may be.
Scheduled Payment Milestone Completion Date	means the scheduled date of completion of the construction work corresponding to the relevant Payment Milestone.
Scope of Work	means the scope of work for construction and O&M of the Facilities as set out in Schedule 1.
Screening Report	means, for each Facility, the environmental and social design safeguards screening report prepared by the Concessionaire and submitted to the Executing Agency for its review as part of the Phase I Designs and Drawings, in the format set out in Part 6 of Schedule 8.
Screenings	means solids such as fibres, plastic and other products or things, which need to be removed from the Sewage, prior to the treatment of Sewage at the STP.
Second Breach	has the meaning ascribed to it in Clause 8.12(b)(iii)(B).
Second Breach Notice	has the meaning ascribed to it in Clause 8.12(b)(iii)(B).
Security	means and includes any Encumbrance, or any other agreement or arrangement having substantially the same economic effect.
Selected Bidder	means the Bidder selected by the Executing Agency for award of the Project.
Sewage	Means 99 % water carrying domestic wastes originating in kitchen, bathing, laundry, urine and night soil, and is brought for treatment to the Facilities.

Site	means the land admeasuring [_____] Acres in Bhagalpur, required by the Concessionaire to develop the Facilities, as quoted by the Selected Bidder as its 'Land Requirement' in the Financial Proposal, as presented in Schedule 11: site layout.
Sq. ft.	means square feet.
State water supply and sewerage related acts	Means any Acts that govern or regulate provision of safe drinking water and scientific sanitation in the state of Bihar
STP	means the STP of 45 MLD to be set up at the Bhagalpur Site, as part of the Project.
STP By-Products	means the by-products of the treatment process after the Sewage has passed through the Facilities comprising the Digested Sludge, the Residual Grit and the Screenings.
Subcontract	means a contract entered into by the Concessionaire to subcontract any part of its scope of work in relation to the Project under this Agreement.
Subcontractor	means the Concessionaire's counterparty under any Subcontract.
Substitution Agreement	means the substitution agreement to be executed by the Executing Agency, NMCG, the Concessionaire and the Lenders, in the format set out in Schedule 2.
Supporting Infrastructure	means the supporting infrastructure facilities required for the operation of the Facilities, which will be provided, operated and maintained by the Executing Agency during the Term.
Taxes	means all taxes, levies, imposts, cesses, duties and other forms of taxation, including (but without limitation) income tax, sales tax, goods and service tax, value added tax, service tax, octroi, entry tax, corporation profits tax, advance corporation tax, capital gains tax, residential and property tax, customs and other import and export duties, excise duties, stamp duty or capital duty, and any interest, surcharge, penalty or fine in connection therewith which may be payable by the Concessionaire or the Subcontractors and the term Tax shall be construed accordingly.
Technical Capacity	means the technical capacity and experience of the [Selected Bidder/Member(s)] ⁴ determined in accordance with the RFP.
Technical Specifications	means the technical specifications for design, construction, operation and maintenance of the Facilities, as set out in Schedule 10.
Term	has the meaning ascribed to it in Clause 3.7.
Termination	means the compensation payable by NMCG upon termination of this

⁴ Delete Member(s) if the Selected Bidder is a single entity.

Compensation	Agreement, in accordance with Article 18.
Third Breach	has the meaning ascribed to it in Clause 8.12(b)(iii)(C).
Third Breach Notice	has the meaning ascribed to it in Clause 8.12(b)(iii)(C).
Threshold Limit	has the meaning ascribed to it in Clause 13.2(e)(i).
Total Casualty	means any fire or other casualty that results in physical damage to the Facilities, to the extent that the total cost of repairing, replacing or restoring the damaged portion of the Facilities, as the case may be (as determined by the Project Engineer) to the same condition as existed previously would be more than 25% or more of the then total replacement cost of the Facilities.
Treated Effluent	means the water which is obtained after the treatment of the Sewage at the Bhagalpur STP.
Trial Operations	means the operation of the Facilities on a trial basis for a period of 3 months from the Construction Completion Date or such longer period as may be determined in accordance with Clause 7.14.
Trial Operations Completion Certificates	means the certificates issued by the Executing Agency to the Concessionaire upon successful completion of the Trial Operations of the Facilities, and the term Trial Operations Completion Certificate shall mean the certificate issued for either of the Facilities.
Trial Operation Procedures	means the procedures for conducting the Trial Operations, as set out in the Technical Specifications.
Unscheduled Outage	means an interruption of or a reduction in the Availability of the STP that is not the result of a Forced Unavailability.
Variation	means any alteration in the Scope of Work, Technical Specifications or the Designs and Drawings, as instructed by the Executing Agency or proposed by the Concessionaire, in accordance with Article 20.
Variation Order	means an order issued by the [Name of the Project Executing Agency] certifying its approval of a proposed Variation and recording the terms and condition on which the proposed Variation is required to be implemented.
Waste Disposal Site	means the site identified by the Executing Agency for disposal of the STP By-Products and other waste material (including silt) from the STP.
Website	means the web portal of the Executing Agency available at the url: http://www.buidco.in/
Wilful Misconduct	means an intentional or reckless breach or disregard by a Party of any of its obligations under this Agreement.
World Bank Group Safeguard Policies and Performance Standards	means the World Bank Group Safeguard Policies and Performance Standards, available at https://policies.worldbank.org/sites/PPF3/Pages/Manuals/Operational%20Manual.aspx , http://www.ifc.org/performancestandards and

	http://pubdocs.worldbank.org/en/497851495202591233/Managing-Risk-of-Adverse-impact-from-project-labor-influx.pdf
WPI	means the Wholesale Price Index for all commodities as published by the Ministry of Commerce and Industry, GOI and shall include any index which substitutes the WPI, and any reference to WPI shall, unless the context otherwise requires, be construed as a reference to the WPI published for the period ending with the preceding month.

1.2 Rules of Interpretation

In this Agreement, unless the context otherwise requires:

- (a) Any reference to a statutory provision shall include such provision as modified or re-enacted or consolidated from time to time.
- (b) The words importing the singular shall mean the plural and vice-versa; and words importing the masculine shall include the feminine and neuter and vice-versa.
- (c) Headings in this Agreement are for convenience of reference only.
- (d) The references to the word 'include' or 'including' or to the phrase 'in particular', shall be construed without limitation.
- (e) References to any date or time of day are to Indian Standard Time; any reference to day shall mean a reference to a calendar day; any reference to a month shall mean a reference to a calendar month, any reference to a year shall mean a reference to a calendar year.
- (f) The references to any agreement, deed or other instrument shall be construed as a reference to such agreement, deed, or other instrument as may be amended, varied, supplemented or novated, from time to time.
- (g) Unless otherwise provided, any late payment charges to be calculated and payable under this Agreement shall accrue *pro rata* on a monthly basis and from the respective due dates as provided for in this Agreement.
- (h) A requirement that a payment be made on a day which is not a business day shall be construed as a requirement that the payment be made on the next business day.
- (i) Whenever provision is made for the giving or issuing of any notice, endorsement, consent, approval, permission, certificate or determination by any Person, such notice, etc., shall be reasonably given, shall not be unreasonably withheld or delayed and shall be in writing and the words 'notify', 'endorse', 'approve', 'permit', 'certify' or 'determine' shall be construed accordingly. Where any notice, consent or approval is to be given by any Party, the notice, consent or approval shall be given on their behalf only by any authorized persons.
- (j) The words written and in writing include a facsimile transmission and any means of reproducing works in a tangible and permanently visible form.

- (k) The terms of the RFP form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement. In the event of any discrepancy between this Agreement and the RFP, the provisions set out in this Agreement shall prevail.
- (l) The provisions of the Articles, Clauses and the Schedules of this Agreement shall be interpreted in such a manner that will ensure that there is no inconsistency in interpretation between the intent expressed in the Articles, Clauses and the Schedules.
- (m) In the event of any ambiguities or discrepancies within this Agreement, the following shall apply:
 - (i) **between two Clauses of this Agreement, the provisions of the specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;**
 - (ii) **between the requirements of two or more Schedules of this Agreement, the provisions of the specific Schedule relevant to the issue under consideration shall prevail over the more general; and**
 - (iii) **between the Clauses and the Schedules, unless specified otherwise, the Clauses shall prevail over the Schedules.**
- (n) In the event of any discrepancy between various documents issued by or provided to the Executing Agency as a part of the Bid Process, the following order of priority shall apply:
 - (i) **this Concession Agreement;**
 - (ii) **the Schedules to the Concession Agreement;**
 - (iii) **the Financial Proposal submitted by the Selected Bidder;**
 - (iv) **the LOA issued to the Selected Bidder;**
 - (v) **the written clarifications, if any, issued to the bidders; and**
 - (vi) **the RFP.**
- (o) Subject to the provisions of this Agreement, the Concessionaire shall be responsible to and indemnify, the Executing Agency and NMCG for the acts and omissions of the Concessionaire Related Parties as if they were the acts and omissions of the Concessionaire and the Executing Agency and NMCG shall be responsible to and indemnify the Concessionaire for the acts and omissions of the Executing Agency Related Parties and the NMCG Related Parties, respectively, as if they were the acts and omissions of the Executing Agency or NMCG, as the case may be.
- (p) Neither the giving of any approval or consent, the review, knowledge or acknowledgement of the terms of any document by or on behalf of the Executing

Agency or NMCG, nor the failure to do so, shall, unless expressly stated in this Agreement, relieve the Concessionaire of any of its obligations under this Agreement or of any duty which it may have under this Agreement to ensure the correctness, accuracy or suitability of the matter or thing which is the subject of the approval, consent, review, knowledge or acknowledgement.

- (q) The rule of construction, if any, that an agreement should be interpreted against the Party responsible for the drafting and preparation thereof shall not apply to this Agreement.
- (r) The Parties acknowledge that damages for specific defaults prescribed under this Agreement (including the Delay Liquidated Damages, the Performance Liquidated Damages, the Availability Liquidated Damages and the Power Consumption Liquidated Damages) are a genuine pre-estimate of and reasonable compensation for the loss and damage that shall be suffered by the non-defaulting Party due to failure of the defaulting Party to perform its obligations in accordance with this Agreement, and are not in the nature of a penalty.

1.3 Units of Measurement

All measurements and calculations shall be in the metric system and calculations done to 4 decimal places, with the 5th digit of 5 or above being rounded up and below being rounded down.

2. SCOPE OF THE PROJECT AND GRANT OF THE CONCESSION

2.1. Scope of the Project

The scope of the Project shall be as set out in Schedule 1 and shall include:

- (a) designing, financing, constructing and completing the **Facilities by the Scheduled Construction Completion Date**, in accordance with Applicable Laws, Applicable Permits, Technical Specifications, Designs and Drawings, the Construction Plan, the ESHS Documents and Good Industry Practices; and
- (b) operating and maintaining the Facilities in accordance with Applicable Laws, Applicable Permits, Technical Specifications, Designs and Drawings, the O&M Manual, the ESHS Documents and Good Industry Practices to ensure compliance with the KPIs; and
- (c) handback of the Facilities upon expiry or early termination of this Agreement in accordance with the Hand-back Conditions and the Hand-back Requirements.

2.2. Grant of Concession

- (a) On and from the Effective Date and subject to the terms of this Agreement, Applicable Laws and Applicable Permits, the Executing Agency grants to the Concessionaire the exclusive right to:
 - i. design, finance, construct and complete the Facilities; and

- ii. upon completion of construction of the Facilities, operate and maintain the Facilities during the O&M Period.
- (b) The grant of the concession set out in Clause 2.2(a) shall oblige or entitle the Concessionaire, as the case may be, to the following:
 - i. access to the Site from the Effective Date, for the sole purpose of implementing the Project;
 - ii. apply for and obtain all the Concessionaire Applicable Permits and utilities required to undertake the Project;
 - iii. raise funds (through both debt and equity financing) to finance 60% of the Bid Project Cost;
 - iv. complete the construction of the Facilities on or before the Scheduled Construction Completion Date;
 - v. upon completion of construction of the Facilities, undertake Trial Operations;
 - vi. upon successful completion of the Trial Operations, operate and maintain the Facilities for 15 years;
 - vii. receive, treat and process Sewage up to the Design Capacity;
 - viii. store, treat, market, sell or dispose of the STP By-Products subject to and in accordance with this Agreement;
 - ix. store, treat or dispose of the Treated Effluent subject to and in accordance with this Agreement;
 - x. transfer the Facilities to the Executing Agency upon the expiry of the Term or termination of this Agreement, after rectification of any defects in the Facilities, in accordance with the Hand-back Conditions and the Hand-back Requirements;
 - xi. receive the Construction Payments during the Construction Period and the O&M Payments during the O&M Period, subject to compliance with the terms and performance of the obligations under this Agreement;
 - xii. appoint Subcontractors, agents, advisors and consultants and enter into Subcontracts to undertake the Project, with the prior approval of the Executing Agency;
 - xiii. construct a biogas Power Plant at the Site; and
 - xiv. construct a solar rooftop Power Plant at the Site, at its sole option and discretion.

2.3. Description of the Facilities

- (a) The Facilities shall include the Bhagalpur STP along with the associated, the Online Monitoring Systems, the on-site testing laboratory facilities, temporary storage facilities for the Digested Sludge and all other such facilities necessary

or associated with the Bhagalpur STP for treatment, processing and disposal of the Sewage, as described in greater detail in Schedule 1 (*Scope of Work*) and Schedule 10 (*Technical Specifications*).

- (b) The Concessionaire shall operate the Facilities and treat the Sewage in a manner such that the KPIs are achieved, and the Treated Effluent and Digested Sludge comply with the Discharge Standards.
- (c) The by-products of the Sewage treated at the Bhagalpur STP (i.e., STP By-Products) will be bifurcated into the Screenings, the Digested Sludge and the Residual Grit. The Concessionaire will be required to dispose the STP By-Products and silt as follows:
 - (i) the Residual Grit, the Screenings and silt will be disposed at the relevant Waste Disposal Site to be identified by the Executing Agency within a radius of 10 km from the relevant Site, in accordance with the Technical Specifications; and
 - (ii) the Concessionaire shall dry the Digested Sludge at a sludge handling facility to be provided by the Concessionaire at the Site, and have the option to sell the Digested Sludge to farmers/other third party buyers or dispose the Digested Sludge at the relevant Waste Disposal Site. Provided that if the Concessionaire sells the Digested Sludge to any third party, the Concessionaire shall be required to share 50% of the revenues from such sale with the Executing Agency.
- (d) From the Outlet Point, the Treated Effluent shall be transferred through the Supporting Infrastructure to any discharge point(s) indicated by the Executing Agency. The Concessionaire is not permitted to divert, transfer or sell the Treated Effluent generated from the Bhagalpur STPs to any third party.

2.4. Use of Proposed Technology

- (a) The Concessionaire shall design and develop the Bhagalpur STP on the basis of the Proposed Technology, approved by the Executing Agency as part of the Designs and Drawings.
- (b) If the Selected Bidder is the owner of the Proposed Technology, then the Concessionaire shall enter into a technology license agreement with the Selected Bidder, under which the Selected Bidder will grant to the Concessionaire an irrevocable, perpetual, assignable, non-exclusive and royalty-free license to use the Proposed Technology to develop and operate the Facilities.
- (c) If the Selected Bidder does not own the Proposed Technology, then the Concessionaire shall, at its own cost, enter into a technology license agreement with the technology provider, under which the technology provider will grant to the Concessionaire an irrevocable, perpetual, assignable and royalty-free license to use the Proposed Technology. At no point will the Agency or NMCG be obliged to make any payments to the Concessionaire towards the licensing and use of the Proposed Technology.

- (d) Upon the expiry or early termination of this Agreement, the Concessionaire shall assign the license and related rights to use the Proposed Technology for the sole purpose of operating and maintaining the Bhagalpur STP to the Executing Agency at no additional cost to the Executing Agency.
- (e) The Concessionaire shall indemnify the Executing Agency and NMCG for any claims, losses, damages and costs suffered by the Executing Agency and/or NMCG as a result of an infringement of any third party's Intellectual Property Rights caused by the operation and use of the Bhagalpur STP.
- (f) If the Bhagalpur STP includes use of different technologies, then, the provisions of this Clause 2.4 shall apply to each such technology adopted for the STP.

3. CONDITIONS PRECEDENT, EFFECTIVENESS AND TERM

3.1. Effectiveness

- (a) The day on which all of the Conditions Precedent have been satisfied in accordance with this Article 3 shall be the Effective Date.
- (b) This Article 3 and Article 2 (*Scope of the Project and Grant of the Concession*), Article 5 (*Performance Security, ESHS Performance Security, O&M Security and Mobilization Advance Guarantees*), Article 6 (*Project Engineer*), Article 10 (*Financing Arrangements and Security*), Clause 11.1 (*Indemnity and Limitation of Liability*), Article 12 (*Change in Ownership*), Article 13 (*Change in Law*), Article 14 (*Force Majeure*), Article 21 (*Dispute Resolution*), Article 22 (*Representations and Warranties*) and Article 23 (*Miscellaneous*) and the related Schedules, shall come into full force and effect and be binding on the Parties on and from the Appointed Date and continue until such time as this Agreement expires or is terminated in accordance with its terms. The other provisions of this Agreement shall come into full force and effect and be binding on the Parties on and from the Effective Date and continue until such time as this Agreement expires or is terminated in accordance with its terms.

3.2. Conditions Precedent to be satisfied by the Concessionaire

The Concessionaire shall satisfy the following Conditions Precedent (if not already fulfilled on the Appointed Date):

- (a) submit the Phase I Designs and Drawings to the Executing Agency for its approval in accordance with Clause 7.2;
- (b) prepare the Construction Plan within 30 days from the Appointed Date and submit the Construction Plan to the Executing Agency for its approval in accordance with Clause 7.3;
- (c) prepare the ESHS Documents within 90 days from the Appointed Date and submit the ESHS Documents to the Executing Agency for its approval in accordance with Clause 7.4;
- (d) obtain all Concessionaire Applicable Permits that are required for achieving Financial

Close and for commencement of construction of the Facilities at its own cost and expense and if such Concessionaire Applicable Permits are subject to any conditions, then, to the extent relevant, comply with all such conditions, such that the Concessionaire Applicable Permits are and shall be kept in full force and effect for the entire Construction Period, or such longer period as may be required under Applicable Laws;

- (e) execute and provide a copy to the Executing Agency of the technology license agreement(s) executed with the Selected Bidder or the third party technology supplier for setting up the Bhagalpur STP;
- (f) submit to the Executing Agency certified true copies of all resolutions adopted by the board of directors of the Concessionaire authorising execution, delivery and performance of this Agreement, Substitution Agreement and the Escrow Agreement by the Concessionaire;
- (g) execute the Substitution Agreement with the Executing Agency , NMCG and the Lenders in the agreed form set out at Schedule 2;
- (h) achieve Financial Close and submit a copy of the Financing Documents and the Financial Package to the Executing Agency , duly certified by a director of the Concessionaire;
- (i) [execute a shareholders' agreement amongst the shareholders of the Concessionaire, and deliver to the Executing Agency a certified true copy of the shareholders' agreement (attested by a director of the Concessionaire);]⁵
- (j) execute the Escrow Agreement with the Executing Agency , NMCG, and the Escrow Bank in the agreed form set out at Schedule 3;
- (k) submit to the Executing Agency certified true copies of the constitutional documents of the Concessionaire;
- (l) submit to the Executing Agency a legal opinion stating that: (i) this Agreement, the Substitution Agreement and the Escrow Agreement have been duly executed and are legally valid, binding and enforceable in accordance with their terms against the Concessionaire; and (ii) all actions, conditions and things required by Applicable Laws to be taken, fulfilled and done (including the obtaining of any necessary Concessionaire Applicable Permits and resolutions of the board of directors) in order for the Concessionaire to enter into and comply with its obligations under this Agreement, the Substitution Agreement and the Escrow Agreement have been taken, fulfilled or done;
- (m) if [a Member/the Selected Bidder]⁶ has submitted unaudited annual accounts along with the Bid, the Concessionaire shall submit to the Executing Agency , within 60 days of the Appointed Date: (i) a certified copy of [such Member's/the Selected Bidder's]⁷ duly audited balance sheet, annual report and profit and loss account for the latest Financial Year occurring prior to the Bid Due Date; and (ii) certificate(s) issued by the statutory auditor(s) stating that the [Selected Bidder/Member]⁸ continues to meet the Financial Capacity specified in the RFP; and

⁵ This Condition Precedent to be deleted if the Selected Bidder is not a Consortium.

⁶ Delete Member if the Selected Bidder is a single entity.

⁷ Delete Member if the Selected Bidder is a single entity.

⁸ Delete Member if the Selected Bidder is a single entity.

- (n) submit to the Executing Agency a certificate, duly attested by a director, certifying the shareholding pattern of the Concessionaire.

3.3. Conditions Precedent to be satisfied by the Executing Agency

The Executing Agency shall satisfy the following Conditions Precedent (if not already fulfilled on the Appointed Date):

- (a) grant access to the Bhagalpur STP Site and all necessary rights of way to the Site to the Concessionaire, free of Encumbrances and encroachments;
- (b) to the extent relevant, obtain any change in land use permission from the relevant Government Authority to enable the Concessionaire to undertake the Project at the Site;
- (c) subject to Clause 3.2(a), review and approve the Phase I Designs and Drawings in accordance with Clause 7.2;
- (d) subject to Clause 3.2(b), review and approve the Construction Plan in accordance with Clause 7.3;
- (e) subject to Clause 3.2(c), review and approve the ESHS Documents in accordance with Clause 7.4;
- (f) obtain all approvals and consents, including the Executing Agency Applicable Permits and any approvals from the National Green Tribunal, required for Executing Agency to enter into this Agreement and undertake the Project;
- (g) provide access road(s) to the Site, which are capable of being used for transportation of equipment and material to the Site for the construction of the Facilities;
- (h) execute the Substitution Agreement with the Concessionaire, NMCG and the Lenders in the agreed form set out at Schedule 2; and
- (i) execute the Escrow Agreement with the Concessionaire, NMCG and the Escrow Bank in the agreed form set out at Schedule 3.

3.4. Conditions Precedent to be satisfied by NMCG

NMCG shall satisfy the following Conditions Precedent (if not already fulfilled on the Appointed Date):

- (a) obtain all approvals and consents that may be required for NMCG to enter into this Agreement and undertake the Project;
- (b) appoint the Project Engineer in accordance with Article 6;
- (c) execute the Substitution Agreement with the Concessionaire, the Executing Agency and the Lenders in the agreed form set out at Schedule 2;
- (d) execute the Escrow Agreement with the Concessionaire, the Executing Agency, and the Escrow Bank in the agreed form set out at Schedule 3 and open the Escrow Account with the Escrow Bank; and

- (e) fund the Escrow Account with an amount equivalent to the first Payment Milestone.

3.5. Satisfaction of Conditions Precedent

- (a) Unless otherwise specified, each Party shall satisfy or procure the satisfaction of the Conditions Precedent that it is responsible for, within 120 days from the Appointed Date (the CP Long-stop Date).
- (b) If any Party fails to satisfy any Condition Precedent that it is required to fulfil by the CP Long-stop Date due to:
 - (i) a Force Majeure Event;
 - (ii) a Qualifying Change in Law;
 - (iii) in case of the Concessionaire, undue delay by the relevant Government Authority in granting any Concessionaire Applicable Permit, despite the Concessionaire having applied for such Concessionaire Applicable Permit within the specified timelines, on payment of the prescribed fees and having complied with the requirements of Applicable Laws in making such application; or
 - (iv) delay by the other Parties in fulfilling any Condition Precedent required to be satisfied by them or in performing any other obligation under this Agreement, which impacts its ability to satisfy its Conditions Precedent,

then the CP Long-stop Date shall be extended on a day-for-day basis for the period of such delay, provided that the CP Long-stop Date shall not be extended beyond the date which is 6 months from the Appointed Date

- (c) Each Party shall cooperate and use its reasonable efforts to assist the other Parties in satisfying the Conditions Precedent.

3.6. Consequences of failure to satisfy Conditions Precedent

- (a) Subject to this Clause 3.6:
 - (i) If the Concessionaire fails to satisfy any of the Conditions Precedent that it is required to fulfil by the CP Long-stop Date, as may be extended in accordance with Clause 3.5(b), any Party may terminate this Agreement forthwith by issuing a notice to the other Parties.
 - (ii) If either the Executing Agency or NMCG fails to satisfy any of the Conditions Precedent that they are required to fulfil by the CP Long-stop Date, as may be extended in accordance with Clause 3.5(b), any Party may terminate this Agreement forthwith by issuing a notice to the other Parties.
 - (iii) No Party shall be permitted to waive any Condition Precedent required to be fulfilled by any other Party.
- (b) If the Concessionaire has failed to satisfy any of the Conditions Precedent required to be satisfied by it other than due to the reasons set out in Clause 3.5(b) and this Agreement is terminated in accordance with this Clause 3.6, then:
 - (i) the Executing Agency shall be entitled to forfeit the Performance Security up to

INR 2,25,00,000 (Rupees two crores and twenty five lakhs) as a genuine pre-estimate of and reasonable compensation for loss and damage caused to the Executing Agency as a result of the Concessionaire's failure to satisfy any of the Conditions Precedent and the consequent termination of this Agreement;

- (ii) the Concessionaire shall not be entitled to receive any payment or compensation from the Executing Agency or NMCG for the costs and expenses incurred by the Concessionaire in performing any of its obligations under this Agreement (including preparing any Phase I Designs and Drawings, the Construction Plan and the ESHS Documents) prior to the termination of this Agreement;
 - (iii) the Concessionaire shall hand over to the Executing Agency all documents, designs, plans, data and any Confidential Information provided by the Executing Agency or NMCG to the Concessionaire prior to termination of this Agreement;
 - (iv) the Executing Agency shall hand over to the Concessionaire the Phase I Designs and Drawings, the Construction Plan, the ESHS Documents and any other document and Confidential Information submitted by the Concessionaire to the Executing Agency or NMCG prior to termination of this Agreement; and
 - (v) if the access to any part of the Site has been granted to the Concessionaire prior to termination of this Agreement, then upon termination of this Agreement, the Concessionaire shall clear the Site and remove all debris, hazardous materials, construction materials, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site, and thereafter, the Site will be deemed to automatically vest with the Executing Agency, free from all Encumbrances.
- (c) If the Executing Agency or NMCG has failed to satisfy any of the Conditions Precedent required to be satisfied by it or the Concessionaire has failed to satisfy any of the Conditions Precedent required to be satisfied by it due to the reasons set out in Clause 3.5(b), and this Agreement is terminated in accordance with this Clause 3.6, then:
- (i) the Executing Agency shall return the Performance Security and the ESHS Performance Security submitted by the Concessionaire;
 - (ii) the Concessionaire shall hand over to the Executing Agency all documents, designs, plans, data and any Confidential Information provided by the Executing Agency or NMCG to the Concessionaire prior to termination of this Agreement;
 - (iii) the Executing Agency shall hand over to the Concessionaire the Phase I Designs and Drawings, the Construction Plan, the ESHS Documents and any other document and Confidential Information submitted by the Concessionaire to the Executing Agency or NMCG prior to termination of this Agreement; and
 - (iv) if the access to any part of the Site has been granted to the Concessionaire prior to termination of this Agreement, then upon termination of this Agreement, the Concessionaire shall clear the Site and remove all debris, hazardous materials, surplus construction materials, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site, and thereafter, the Site will be deemed to automatically vest with the Executing Agency, free from all Encumbrances.
- (d) Upon termination of this Agreement pursuant to this Clause 3.6, other than to the extent specified in this Clause 3.6, no Party shall have any liability to the other Parties in

connection with this Agreement and the Concessionaire shall not be entitled to receive any termination compensation from NMCG or the Executing Agency.

3.7. Term

Subject to early termination in accordance with Article 14 (*Force Majeure*) or Article 16 (*Events of Default*), this Agreement shall come into full force and effect on the Effective Date and remain in full force and effect until the expiry of the O&M Period (i.e., 15 years from the COD) (**Term**).

4. SITE AND ASSET OWNERSHIP

4.1. Grant of License over the Site

- (a) The Executing Agency shall grant the Concessionaire a license over the Site, along with all necessary rights of way, to enter upon, access and occupy the Site, free of all Encumbrances in accordance with this Clause 4.1, Applicable Laws, and Applicable Permits. The license granted to the Concessionaire shall include the exclusive right to:
 - (i) design, construct and commission the Facilities at the Site;
 - (ii) operate and maintain the Facilities during the O&M Period;
 - (iii) install, operate, use, maintain, and remove such equipment, devices or other structures and improvements on, over, or under the Site, as may be necessary or appropriate for the operations and activities required or permitted under this Agreement;
 - (iv) use access roads, gates, fences and utilities at or about the Site;
 - (v) discharge, store, treat and manage the STP By-Products and the Treated Effluent produced by the Facilities; and
 - (vi) construct, use, operate, maintain, replace and repair electric lines, telecommunication lines, water supply networks and other utilities required to undertake the Project at the Site.
- (b) On and from the Effective Date and subject to the provisions of this Agreement, the Executing Agency shall grant the Concessionaire: (i) a license over the Site including the exclusive right to occupy and use the Site to construct the Facilities; and (ii) all necessary rights of way to the Site. Any charges payable for obtaining the right of way will be paid directly by the Executing Agency.
- (c) The Executing Agency shall provide the Site to the Concessionaire free of Encumbrances and encroachments as a Condition Precedent. If the Concessionaire discovers any hazardous substances at the time of handover of the Site by the Executing Agency, the Executing Agency will remove such hazardous substances at its own cost and expense.

- (d) The Concessionaire shall not without the prior written consent or approval of the Executing Agency use the Site for any purpose other than to undertake the Project and purposes incidental thereto, as permitted under this Agreement or as may be otherwise approved by the Executing Agency .
- (e) The full ownership and title over the Site shall vest with the Executing Agency for the entire Term.
- (f) The Executing Agency warrants that the Concessionaire shall, subject to complying with the terms and conditions of this Agreement, occupy the Site, from such time that access is granted to the Concessionaire and until the expiry of the Term. If the Concessionaire is obstructed by any Person claiming any right, title or interest in or over the Site or any part thereof or in the event of any enforcement action including any attachment, distraint, appointment of receiver or liquidator being initiated by any Person claiming to have a charge on the Site or any part thereof, the Executing Agency shall, if called upon by the Concessionaire, defend such claims and proceedings.
- (g) Subject to any substitution rights exercised by the Lenders, the license granted by the Executing Agency shall automatically terminate upon termination of this Agreement or expiry of the Term.

4.2. Right, Title and Interest in the Facilities

- (a) The full ownership, rights and title to the Facilities constructed or installed by the Concessionaire pursuant to this Agreement shall vest with the Executing Agency during the entire Term and thereafter. The Concessionaire shall have the right to enter upon the Site, access and operate the Facilities during the Term, to exercise its rights and fulfil its obligations under this Agreement.
- (b) Except as otherwise provided in this Agreement, the Concessionaire shall not:
 - (i) sell or otherwise dispose or create any Security over the Facilities or any part thereof;
 - (ii) dispose any assets forming part of the Facilities, other than for the purposes of replacement due to normal wear and tear; or
 - (iii) transfer, assign or novate all of its rights and obligations under this Agreement,without the prior written consent of the Executing Agency (such consent not being unreasonably withheld or delayed).

4.3. Site Data and Verification

- (a) The Executing Agency has made available to the Concessionaire, the layout plans, load flow studies and all other relevant data, studies and reports in the Executing Agency's possession in connection with the Site and the Facilities.
- (b) The Concessionaire shall be deemed to have obtained all necessary information

as to risks, contingencies and other circumstances which may influence or affect the implementation of the Project at the Site.

- (c) The Concessionaire shall also be deemed to have inspected and examined the Site and its surroundings, analysed and verified the accuracy and reliability of the studies, reports and data provided by the Executing Agency and any other information available with respect to the Facilities and the Site and to have satisfied itself as to all the relevant matters including:
- (i) the nature of the Site, including the subsurface, hydrological, climatic and general physical conditions of the Site;
 - (ii) the suitability of the Site for undertaking the construction and operation of the Facilities;
 - (iii) the condition of the utilities available till the battery limits of the Site;
 - (iv) the extent, nature and availability of labour, material, transport, accommodation, storage facilities and other facilities and resources necessary to undertake the Project;
 - (v) the nature of design, construction work and O&M services necessary for the performance of its obligations under this Agreement;
 - (vi) Applicable Laws and Applicable Permits required to be obtained and maintained to undertake the Project;
 - (vii) the risk of injury or damage to Adjoining Property and to the occupiers of such property or any other risk;
 - (viii) the suitability and adequacy of any access roads to the Site and other utilities and facilities to be provided by the relevant Government Authority; and
 - (ix) all other matters that may affect the performance of its obligations under this Agreement.

The Concessionaire acknowledges and agrees that if any error or discrepancy is subsequently discovered in the data made available by the Executing Agency, then, such error or discrepancy shall not entitle the Concessionaire to any extension of the Scheduled Payment Milestone Completion Date, the Scheduled Construction Completion Date and/or compensation for additional costs incurred. Further, any misinterpretation of the data, studies and reports provided by the Executing Agency shall not relieve the Concessionaire from the performance of its obligations under this Agreement on the ground that it could not reasonably be expected to have foreseen any of the matters listed in Clause 4.3(c) (i) to (ix) above, which affect or may affect the Project or the performance of any of its obligations under this Agreement.

4.4. Unforeseen Site Conditions

Without prejudice to Clause 4.3 above, if during the execution of the Project, the

Concessionaire encounters any adverse physical conditions, which could not have been reasonably foreseen by acting in accordance with Good Industry Practices, the Concessionaire may seek a Variation in accordance with Clause 20.3. Upon receipt of a request for a Variation due to unforeseen Site conditions, if, in the opinion and sole discretion of the Executing Agency, such conditions could not have been reasonably foreseen by a prudent developer acting in accordance with Good Industry Practices, then the Executing Agency shall issue a Variation Order in accordance with Article 20. Any decision of the Executing Agency regarding the existence of any unforeseen Site conditions shall be final and binding.

4.5. Site Related Covenants

The Concessionaire agrees and undertakes that:

- (a) the Concessionaire shall not transfer, alienate, assign, dispose of, sub-license or create any Security over any part of the Site or its rights and interest in the Site, other than as specifically permitted under this Agreement;
- (b) the Concessionaire shall not allow any encroachment on, or unauthorized occupation of any part of the Site and in the event of any encroachment or unauthorized occupation, the Concessionaire shall immediately cause such encroachment or any unauthorized occupants to be removed from the Site. The Concessionaire shall not be entitled to any extension of time or costs incurred in removal of any encroachment or any unauthorized occupants from the Site;
- (c) the grant of any rights to a Subcontractor or any other third party shall not interfere with or hinder the performance of the Concessionaire's obligations under this Agreement;
- (d) the Concessionaire shall be wholly responsible for safety at and security of the Site and the Facilities;
- (e) the Concessionaire shall take all necessary measures to confine its operations, personnel and equipment to the Site and not encroach on any Adjoining Property;
- (f) all minerals, fossils, articles of value or antiquity, structures and other remains or things of geological or archaeological interest and other objects with historic, antique or monetary value discovered at, on or under the Site shall be dealt with in accordance with Applicable Laws and the Concessionaire shall take all necessary precautions to prevent its or its Subcontractor's personnel from removing or damaging any such article or thing. Further, immediately upon the discovery of any such article or thing of value, the Concessionaire shall inform the Executing Agency of such discovery and carry out the instructions of the Executing Agency in this regard;
- (g) the Concessionaire shall make good any damage to any roads, footpaths, conduits, and other works on any Adjoining Property, which is caused by the Concessionaire or the Concessionaire Related Parties;

- (h) the Concessionaire shall use all reasonable endeavours not to do or permit to be done anything which might:
 - (i) cause destruction, scarring or defacing of natural surroundings in the vicinity of the Site;
 - (ii) be or become a danger or nuisance or give rise to liability in tort to any owners or occupiers of the Adjoining Property or to members of the public; or
 - (iii) cause any contamination or damage to any Adjoining Property,

and the Concessionaire shall, at its own expense, take all reasonable measures and precautions to avoid any such danger, nuisance, tort, damage or interference and shall make good any damage so caused.

If the construction works and/or the O&M services cannot be carried out without interfering with the rights of the owner or occupier of any Adjacent Property, the Concessionaire shall promptly and at its own cost obtain all necessary third party consents and/or the approval of any Government Authority to undertake such construction works and/or the O&M services. The Executing Agency shall provide all assistance to the Concessionaire for procuring such approvals.

4.6. Access to Executing Agency Related Parties, NMCG Related Parties and Government Authorities

The Concessionaire shall ensure that the Executing Agency Related Parties, the NMCG Related Parties, the Bank and the relevant Government Authorities have access to the Site and the license granted to the Concessionaire over the Site shall always be subject to:

- (a) the rights of the Executing Agency , the Executing Agency 's Representative, NMCG's Representative, the Project Engineer, the Bank and other Executing Agency Related Parties and NMCG Related Parties to enter upon and access the Site to inspect and monitor the progress of the Project, and for the exercise of their rights and the performance of their obligations under this Agreement, provided that the Executing Agency and/or NMCG shall ensure that the exercise of the inspection or monitoring rights do not impede or obstruct the construction and/or operation of the Facilities in any manner whatsoever; and
- (b) the rights of the Government Authorities or other utility providers to enter upon and access the Site for laying or installing telegraph lines, electric lines or for any other public purpose.

If any physical damage is caused to the Site or the Facilities as a result of such access and use of the Site by the Executing Agency, the Project Engineer, the Executing Agency Related Parties, the NMCG Related Parties, the Bank or Government Authorities then the Executing Agency shall bear the costs of remedying such damage and restoring the Site and the Facilities.

5. PERFORMANCE SECURITIES, ESHS PERFORMANCE SECURITIES, O&M SECURITIES AND MOBILIZATION ADVANCE GUARANTEES

5.1. The Concessionaire shall have submitted to the Executing Agency, prior to the Appointed Date:

- (a) an unconditional and irrevocable bank guarantee for an amount equal to **INR [] (Rupees []), corresponding to 9% of the Bid Project Cost (the Performance Security);**
- (b) an unconditional and irrevocable bank guarantee for an amount equal to **INR [] (Rupees []), corresponding to 1% of the Bid Project Cost (the ESHS Performance Security);**

5.2. The Performance Security shall remain valid until 25 months from the Effective Date or 1 month from the COD, whichever is later.

5.3. The Performance Security shall be returned within 30 days of the COD.

5.4. The ESHS Performance Security shall be valid until the expiry of the O&M Period.

5.5. Within 60 days of the Construction Completion Date, the Concessionaire shall submit:

an unconditional and irrevocable bank guarantee to the Executing Agency for an amount equal to **INR [] (Rupees []), corresponding to 4% of the Bid Project Cost (the O&M Security); and**

5.6. The Concessionaire shall furnish the O&M Security in the same format as provided for the Performance Security in the RFP, with necessary modifications. The Concessionaire shall maintain the O&M Security in full force and effect until the expiry of the O&M Period. The O&M Security shall have an initial validity period of 1 year, which must be renewed on a year-on-year basis, before the expiry of the 11th month of the relevant year, until the expiry of the O&M Period.

5.7. The ESHS Performance Security shall secure the due performance of the Concessionaire's ESHS obligations during the Construction Period and the O&M Period, as set out in the approved ESHS Documents.

5.8. The Performance Security shall secure the due performance of all the Concessionaire's obligations during the Construction Period and the O&M Security shall secure the due performance of all the Concessionaire's obligations during the O&M Period.

5.9. The cost of procuring the Performance Security, the ESHS Performance Security and the O&M Security shall be borne solely by the Concessionaire.

5.10. If Performance Security is scheduled to expire before the COD, then the Concessionaire shall arrange for an extension of the Performance Security at least 30 days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, the Executing Agency shall be entitled to drawdown the total amount available under the

Performance Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the Performance Security.

- 5.11. If ESHS Performance Security is scheduled to expire before the expiry of the O&M Period, the Concessionaire shall replace or arrange for an extension of the ESHS Performance Security at least 30 days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, the Executing Agency shall be entitled to drawdown the total amount available under the ESHS Performance Security and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the ESHS Performance Security.
- 5.12. If O&M Security is not renewed by the expiry of the 11th month of the relevant year of the O&M Period, then the Executing Agency shall be entitled to drawdown the total amount available under the O&M Security, and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the O&M Security.
- 5.13. The Executing Agency shall be entitled to utilize such retained amount in the same manner as it would utilise the Performance Security, the ESHS Performance Security or the O&M Security, as the case may be.

Upon receipt of a renewed or replacement Performance Security or within 30 days of the COD, the Executing Agency shall return the unutilized cash security amount for the Performance Security to the Concessionaire.

Upon receipt of a renewed or replacement ESHS Performance Security or within 30 days of the expiry of the Term, the Executing Agency shall return the unutilized cash security amount for the ESHS Performance Security to the Concessionaire.

Upon receipt of a renewed or replacement O&M Security or within 30 days of the expiry of the O&M Term, the Executing Agency shall return the unutilized cash security amount for the O&M Security to the Concessionaire.

The interest earned on any retained amounts or cash security shall be the property of the Executing Agency and the Executing Agency shall not be required to account to the Concessionaire for any such interest.

- 5.14. The Executing Agency shall have the right to draw on the Performance Security and claim up to the amount guaranteed upon the Concessionaire's failure to satisfy any Condition Precedent or honour any of its obligations, responsibilities or commitments during the Construction Period, or any amount due and payable by the Concessionaire to the Executing Agency (including any Delay Liquidated Damages and Termination Compensation), in accordance with this Agreement.
- 5.15. The Executing Agency shall have the right to draw on the O&M Security and claim up to the amount guaranteed upon the Concessionaire's failure to honour any of its obligations, responsibilities or commitments during the O&M Period, or any amount due and payable by the Concessionaire to the Executing Agency (including any Availability Liquidated Damages, Performance Liquidated Damages, Termination Compensation and any amounts the Concessionaire is liable to pay under Clause 19.2), in accordance with this Agreement.

- 5.16. Without prejudice to its right to draw on the Performance Security or, as the case may be, the O&M Security, the Executing Agency shall have the right to draw on the ESHS Performance Security and claim up to the amount guaranteed upon the Concessionaire's failure to honour any of its ESHS related obligations, responsibilities or commitments during the Construction Period or the O&M Period, as set out in the approved ESHS Documents, in accordance with this Agreement.
- 5.17. The Executing Agency shall not be required to give any prior notice to the Concessionaire of its intention to make a demand under the Performance Security, the ESHS Performance Security or the O&M Security, as the case may be. However, the Executing Agency shall provide the Concessionaire with a copy of any demand notice issued by the Executing Agency under the Performance Security, the ESHS Performance Security or the O&M Security, simultaneously with the issuance of the demand notice to the Scheduled Bank that has issued the relevant Performance Security, ESHS Performance Security or the O&M Security.
- 5.18. If the Executing Agency makes a demand under any Performance Security, ESHS Performance Security or O&M Security, in part or in full, the Concessionaire shall immediately and in no event later than 15 days of such demand, restore the value of such Performance Security, ESHS Performance Security or O&M Security to the amount stated in Clause 5.1 or Clause 5.5.
- 5.19. Within 30 days from the COD or the termination of this Agreement, whichever is earlier, the Performance Security or, as the case may be, the amount retained by the Executing Agency as cash security under Clause 5.10, shall be released to the Concessionaire after the expiry of 30 days from the COD or termination of this Agreement, subject to the Executing Agency 's right to receive any amounts from the Concessionaire before or upon COD or termination of this Agreement.
- 5.20. Upon the expiry of the O&M Period or the termination of this Agreement, whichever is earlier, the O&M Security, the ESHS Performance Security or, as the case may be, the amount retained by the Executing Agency as cash security under Clause 5.11 or Clause 5.12, shall be released to the Concessionaire after the expiry of 30 days from the date of expiry or termination of this Agreement, subject to the Executing Agency 's right to receive any amounts from the Concessionaire before or upon such expiry or termination of this Agreement.
- 5.21. **Mobilization Advance Guarantee**
- (a) Within 30 days of the Effective Date, the Concessionaire shall submit to the Executing Agency : (i) an unconditional and irrevocable bank guarantee for an amount equal to 110% of the Mobilization Advance for the Facilities in the form set out at Schedule 4 (the **Mobilization Advance Guarantee**). The Mobilization Advance Guarantee shall secure the Mobilization Advance paid to the Concessionaire in accordance with Clause 9.3(d). The cost of procuring the Mobilization Advance Guarantee shall be borne solely by the Concessionaire.
- (b) Each Mobilization Advance Guarantee shall remain valid until the entire Mobilization Advance secured by such Mobilization Advance Guarantee has

been adjusted against the Construction Payments. However, the Concessionaire may, at its discretion, progressively reduce the value of the relevant Mobilization Advance Guarantee by the amount of the Mobilization Advance adjusted against each of the 4 instalments of the Construction Payments, in accordance with Clause 9.3(d). For this purpose, the Concessionaire shall be required to furnish a replacement Mobilization Advance Guarantee of the reduced amount within 15 days of receipt of a Payment Certificate from the Executing Agency on successful completion of the relevant Payment Milestone. The Executing Agency shall return the relevant existing Mobilization Advance Guarantee upon receipt of a replacement Mobilization Advance Guarantee from the Concessionaire.

- (c) If any Mobilization Advance Guarantee is scheduled to expire before the entire Mobilization Advance has been adjusted, then the Concessionaire shall arrange for an extension of the relevant Mobilization Advance Guarantee at least 30 days prior to such expiration. If the Concessionaire fails to procure such extension or replacement, the Executing Agency shall be entitled to drawdown the total amount available under such Mobilization Advance Guarantee and retain such amount as cash security until such time that the Concessionaire submits an extension or replacement of the Mobilization Advance Guarantee.
- (d) The Executing Agency shall be entitled to utilize such retained amount in the same manner as it would utilize the Mobilization Advance Guarantee. Upon receipt of an extension or replacement Mobilization Advance Guarantee or on adjustment of the entire Mobilization Advance, the Executing Agency shall return the unutilized cash security amount to the Concessionaire.

The interest earned on any retained amounts or cash security shall be the property of the Executing Agency and the Executing Agency shall not be required to account to the Concessionaire for any such interest.

- (e) The Executing Agency shall have the right to draw on the Mobilization Advance Guarantees in the event of the inadequate adjustment of the Mobilization Advance in accordance with Clause 9.3(d), prior to the Construction Completion Date.
- (f) The Executing Agency shall not be required to give any prior notice to the Concessionaire of its intention to make a demand under any Mobilization Advance Guarantee. However, the Executing Agency shall provide the Concessionaire with a copy of any demand notice issued by the Executing Agency under a Mobilization Advance Guarantee, simultaneously with the issuance of the demand notice to the Scheduled Bank that has issued the Mobilization Advance Guarantee.

5.22. Additional Performance Security:

- (a) In the event of the Selected Bidder having submitted Additional Performance Security in accordance with the Clause 16.5 of the RFP document, then such Additional Performance Security shall be in force till the end of Construction period if the Bid

Project Cost is found to be unreasonable and till the end of the Concession Period if O & M Charges are found to be unreasonable. Notwithstanding to anything contained herein, the Additional Performance Security shall be liable to be forfeited either fully or partially by the Executing Agency as it deems fit for the reasons mentioned in Clause 16.1 of the Concession agreement. The Additional Performance Security for the unreasonable Bid Project cost shall be returned 30 days after COD and the Additional Performance Security for O & M Charges shall be returned at the end of Concession Period.

(b) Change in Ownership in accordance with Clause 12 of the Concession Agreement shall be subject to the fulfillment of the requirements of Additional Performance Security as per the clause 5.22(a) above, by the incoming Consortium Partner/Single Entity.

6. PROJECT ENGINEER

6.1 NMCG shall appoint a third-party engineering firm with requisite technical expertise, knowledge and experience in the design, engineering and construction of STP as the engineer for the Project (the Project Engineer). The Project Engineer shall assist the Executing Agency in supervising the construction, operation and maintenance of the Facilities and shall support the Executing Agency to monitor compliance with the KPIs. The detailed scope of work of the Project Engineer is set out in Schedule 5.

6.2 All fees, costs, charges and expenses payable to the Project Engineer shall be borne by NMCG.

6.3 The Concessionaire may request NMCG to replace the Project Engineer if the Concessionaire believes that the Project Engineer is not performing its duties in accordance with this Agreement or is otherwise impeding the performance of the Concessionaire's obligations under this Agreement.

NMCG may replace the Project Engineer in any of the following circumstances:

- (a) if it has reason to believe that the Project Engineer has not discharged its duties in accordance with this Article 6 or Schedule 5; or
- (b) has received a formal complaint from the Concessionaire. In such a case NMCG will make necessary investigations and it is established that the Project Engineer has not discharged its duties in accordance with this Article 6 or Schedule 5; or
- (c) if the Project Engineer submits its resignation.

6.4 In appointing any replacement of the Project Engineer, NMCG shall comply with this Article 6 and Schedule 5.

6.5 The Project Engineer shall be required to act independently, reasonably, fairly and expeditiously to ensure: (a) the timely completion of construction of the Facilities on or before the Scheduled Construction Completion Date; and (b) compliance with the KPIs during the O&M Period.

6.6 During the Construction Period, the Project Engineer shall inspect the Facilities at least once a month and prepare an inspection report, setting out the progress of the construction

of the Facilities, defects or deficiencies, if any, and status of compliance with the Construction Plan, Technical Specifications and Designs and Drawings. The Project Engineer shall send the report to the Executing Agency and the Concessionaire within 7 days of such inspection, pursuant to which, the Concessionaire shall be required to rectify the defects or deficiencies, if any, identified by the Project Engineer.

- 6.7 During the O&M Period, the Project Engineer shall inspect the Facilities at least once a month and prepare an inspection report, setting out the defects or deficiencies, if any, and status of compliance with the KPIs (including specifically, the Influent Standards and the Discharge Standards). The Project Engineer shall send the report to the Executing Agency and the Concessionaire within 7 days of such inspection, pursuant to which, the Concessionaire shall be required to rectify the defects or deficiencies, if any, identified by the Project Engineer. The Project Engineer shall also have the right to verify the results of the tests undertaken by the Concessionaire at any time during the O&M Period at the Inlet Point and the Outlet Point to determine the standard of the Sewage, the STP By-Products and the Treated Effluent.
- 6.8 Except as specifically provided in this Agreement, the Project Engineer shall have no authority, whether express or implied, to amend, vary or curtail any of the rights or obligations of the Parties.
- 6.9 The Project Engineer shall at all times during the Term have the right to enter upon and access the Site. The Concessionaire shall have the right to accompany the Project Engineer during its inspection of the Facilities.
- 6.10 The Project Engineer shall, at all times, have the right to attend any meetings held by the Concessionaire to review the progress of the construction or O&M of the Facilities, and to provide its comments/suggestions regarding the progress as well as the manner in which the construction works or O&M services is being undertaken. Neither any comments/suggestions provided by the Project Engineer nor any failure to provide comments/suggestions shall be deemed to be an acceptance of the construction works or the O&M services or a waiver of the Concessionaire's obligations to implement the Project, in accordance with this Agreement, the Technical Specifications, the Designs and Drawings, the ESHS Documents, and all Applicable Laws and Applicable Permits.
- 6.11 The Concessionaire agrees that notwithstanding any review by the Project Engineer of any or all of the construction works or O&M services, the Concessionaire shall bear all risk, responsibility and liability for the quality, adequacy and suitability of the Facilities.

7. CONSTRUCTION PERIOD

7.1. Commencement and Duration

The period for construction of the Facilities shall commence on and from the Effective Date, and shall continue until the Construction Completion Date (the **Construction Period**).

Notwithstanding anything to the contrary in this Agreement, the Concessionaire shall, prior to the Effective Date, be entitled to commence:

- (a) soil or geophysical investigation or testing at the Site; and
- (b) appointment of Subcontractors for the construction works for the Facilities, with the prior approval of the Executing Agency .

7.2. Designs and Drawings

(a) Phase I Designs and Drawings

(i) *Basic Engineering Designs*

- (A) The Concessionaire shall prepare the Basic Engineering Designs in accordance with the Technical Specifications, Applicable Laws and Applicable Permits. To set up the Power Plant, the Concessionaire shall also submit the Basic Engineering Designs for the Power Plant. The Basic Engineering Designs shall be drawn to scale, with accurate dimensions, to minimize construction delays, disputes and cost overruns and to ensure smooth construction of the Facilities. The Facilities should be designed in a manner such that the Concessionaire can obtain a consent to operate from the Bihar Environment Protection and Pollution Control Board for the operation of the Facilities. The Basic Engineering Designs should also specify the Proposed Technology for the STP.
- (B) Within 30 days from the Appointed Date, the Concessionaire shall submit 4 hard copies and 1 soft copy on a compact disc of the draft Basic Engineering Designs to the Executing Agency for its review and approval.
- (C) The Executing Agency shall forward the Basic Engineering Designs to the Project Engineer and the Indian Institute of Technology (IIT) for their review and comments.
- (D) The Executing Agency shall provide comments if any, on the draft Basic Engineering Designs (including any comments from IIT and the Project Engineer) to the Concessionaire or notify the Concessionaire of its approval of the draft Basic Engineering Designs within 20 days from the date of receipt of the draft Basic Engineering Designs. The Executing Agency may require the Concessionaire to amend or modify the draft Basic Engineering Designs if the Executing Agency, IIT or the Project Engineer identifies any deficiencies, inaccuracies or shortcomings in the draft Basic Engineering Designs. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Basic Engineering Designs from the Executing Agency , then the Concessionaire shall modify the draft Basic Engineering Designs to correct any such shortcomings, inaccuracies or deficiencies and/or address, in writing, the Executing Agency's / IIT's / the Project Engineer's comments on the draft Basic Engineering

Designs and submit the revised Basic Engineering Designs to the Executing Agency for its approval within 10 days of receipt of comments. The process set out in this Clause 7.2(a)(iv) shall continue until the Basic Engineering Designs are certified by IIT and are approved by the Executing Agency in accordance with this Clause 7.2(a)(iv).

(ii) *Screening Report*

- (A) The Concessionaire shall prepare the Screening Report in accordance with the World Bank Group Safeguard Policies and Performance Standards, the ESMF and as per the format set out in Schedule 8.
- (B) Within 30 days from the Appointed Date, the Concessionaire shall submit 4 hard copies and 1 soft copy of the draft Screening Report on a compact disc to the Executing Agency for its review and approval.
- (C) The Executing Agency shall forward the draft Screening Report to the Bank for its review and comments.
- (D) The Executing Agency shall provide comments if any, on the draft Screening Report (including any comments from the Bank) to the Concessionaire or notify the Concessionaire of its approval of the draft Screening Report within 20 days from the date of receipt of the draft Screening Report. The Executing Agency may require the Concessionaire to amend or modify the draft Screening Report if the Executing Agency or the Bank identifies any deficiencies, inaccuracies or shortcomings in the draft Screening Report. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Screening Report from the Executing Agency, then the Concessionaire shall modify the draft Screening Report to correct any such shortcomings, inaccuracies or deficiencies and/or address, in writing, the Executing Agency's/Bank's comments on the draft Screening Report and submit the revised Screening Report to the Executing Agency for its approval within 10 days of receipt of comments. The process set out in this Clause 7.2(a)(ii)(D) shall continue until the Screening Report is approved by the Executing Agency in accordance with this Clause 7.2(a)(ii)(D).

- (iii) Within 30 days from the approval of the Basic Engineering Designs, the Concessionaire shall prepare the balance Phase I Designs and Drawings based on the approved Basic Engineering Designs and submit 4 hard copies and 1 soft copy on a compact disc of the balance Phase I Designs and Drawings to the Executing Agency for its review and approval. The process set out in Clause 7.2(a)(i)(C) and Clause 7.2(a)(i)(D) will apply for approval of the balance Phase I Designs and Drawings.

- (b) Phase II Designs and Drawings
- (i) At least 2 months prior to the commencement of work for the second Payment Milestone for the Facilities, the Concessionaire shall submit 4 hard copies and 1 soft copy on a compact disc of the Phase II Designs and Drawings for the works corresponding to the second Payment Milestone for the Facilities. The process set out in Clause 7.2(a)(iii) and Clause 7.2(a)(iv) will apply for approval of the Phase II Designs and Drawings for the works corresponding to the second Payment Milestone.
 - (ii) The process set out in Clause 7.2(a)(iii) above shall apply to the submission and approval of the Phase II Designs and Drawings for the work corresponding to the third Payment Milestone and the fourth Payment Milestone for the Facilities.
- (c) The Concessionaire shall construct the Facilities strictly in accordance with the approved Designs and Drawings. If there are any errors or deficiencies in the Technical Specifications, the Designs and Drawings shall take into account, address or rectify such errors or deficiencies. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved Designs and Drawings without the prior written approval of the Executing Agency. The Concessionaire shall not commence construction of any part of the Facilities prior to approval of the Designs and Drawings in accordance with this Clause 7.2. If the Concessionaire undertakes any construction work for the Facilities prior to the approval of the Designs and Drawings, it shall do so at its own risk and the Executing Agency shall have the right to reject any such construction work that does not comply with the approved Designs and Drawings.
- (d) Notwithstanding any approval of the Designs and Drawings by the Executing Agency, the Concessionaire shall bear all risk, responsibility and liability for the suitability, accuracy, adequacy and practicality of the Designs and Drawings. Subject to Clause 3.5 and Clause 7.11(b), the Concessionaire shall not be entitled to any extension of time and/or costs incurred in the preparation of the Designs and Drawings and complying with the requirements of this Clause 7.2.

7.3. Construction Plan

- (a) Within 30 days from the Appointed Date, the Concessionaire shall prepare and submit to the Executing Agency a detailed Construction Plan. The Construction Plan shall set out:
- (i) the detailed plan for completing the construction of Facilities by the Scheduled Construction Completion Date;
 - (ii) specific activities and extent of construction work to be performed by the Concessionaire to achieve each of the 4 Payment Milestones; and
 - (iii) the order in which the Concessionaire proposes to execute the construction of the Facilities.

- (b) The Executing Agency shall review and provide comments, if any, on the draft Construction Plan to the Concessionaire or notify the Concessionaire of its approval of the draft Construction Plan within 30 days from the date of receipt of the draft Construction Plan from the Concessionaire. The Executing Agency may require the Concessionaire to amend or modify the draft Construction Plan if the Executing Agency identifies any deficiencies or shortcomings in the draft Construction Plan. If the Concessionaire receives any comments, suggestions or instructions to modify the draft Construction Plan from the Executing Agency, then the Concessionaire shall incorporate the suggestions made by the Executing Agency and modify the draft Construction Plan to address any such comments, shortcomings or deficiencies identified by the Executing Agency. Thereafter, the Concessionaire shall submit the revised Construction Plan to the Executing Agency for its approval. The process set out in this Clause 7.3(b) shall continue until the Construction Plan is approved by the Executing Agency in accordance with this Clause 7.3(b).
- (c) The Concessionaire shall construct the Facilities strictly in accordance with the approved Construction Plan. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved Construction Plan without the prior written approval of the Executing Agency. The Concessionaire shall not commence construction of any part of the Facilities prior to approval of the Construction Plan in accordance with this Clause 7.3.
- (d) Notwithstanding any approval of the Construction Plan by the Executing Agency, the Concessionaire shall, subject to Clause 7.11(b), be solely liable for completing the construction of the Facilities by the Scheduled Construction Completion Date.
- (e) The Concessionaire shall submit a consolidated Construction Plan for the Facilities.

7.4. ESHS Documents

- (a) Within 90 days from the Appointed Date, the Concessionaire shall prepare and submit 4 hard copies and 1 soft copy on a compact disc of the ESHS Documents to the Executing Agency.
- (b) The ESHS Documents shall collectively set out the health, safety and environment policies, guidelines and procedures to be followed by the Concessionaire in undertaking the Project, developed in accordance with the World Bank Group Safeguard Policies and Performance Standards, the ESMF, this Agreement (including, specifically, Schedule 8), Applicable Laws, Applicable Permits, and Good Industry Practices.
- (c) The ESHS Documents shall comprise the following:
 - (i) *Safeguard Documents*

As part of the Safeguard Documents, the Concessionaire shall be

required to:

- (A) submit an update of the environment and social impact assessment report (ESIA), which has been prepared by the Executing Agency and shall be provided to the Concessionaire along with the RFP; and
 - (B) prepare the environmental management plan (EMP).
- (ii) *Safety Documents*

As part of the Security Documents, the Concessionaire shall be required to prepare the following:

- (A) environment, social, health and safety management plan (ESHSMP);
 - (B) environmental, social, health and safety management strategies and implementation plan (ESHS-MSIP) – The ESHS-MSIP shall be prepared on the basis of the requirements set out in Schedule 8. The ESHS-MSIP shall include the following, for the purposes of managing the key ESHS risks in relation to the Project:
 - (I) traffic management plan to ensure safety of local communities from construction traffic;
 - (II) water resource protection plan to prevent contamination of drinking water;
 - (III) boundary marking and protection strategy for mobilization and construction to prevent offsite adverse impacts; and
 - (IV) strategy for obtaining Concessionaire Applicable Permits prior to the start of relevant works [such as opening a quarry or borrow pit].
 - (C) Code of conduct – The code of conduct shall be prepared on the basis of the requirements set out in Schedule 8. The Code of Conduct shall apply to the Concessionaire's employees and subcontractors and shall set out the ESHS obligations of the Concessionaire under the Agreement relating to risks associated with labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behaviour and crime, and maintaining a safe environment etc. The Code of Conduct shall also set out the manner in which the Code of Conduct will be implemented, including how it will be introduced into conditions of employment/engagement, what training will be provided, how it will be monitored and how the Concessionaire proposes to deal with any breaches.
- (iii) In the ESHS, the Concessionaire shall also be required to provide details of the core team of 3 people for implementation of the Concessionaire's ESHS obligations, comprising: (A) health expert and safety specialist;

- (B) an environmental specialist; and (C) social specialist, who meet the minimum qualification requirements specified in Schedule 8.
- (iv) Within 30 days from the appointed date, the Concessionaire shall prepare and submit 4 hard copies and 1 soft copy of Labour Influx and Workers Camp Management Plan to Executing Agency that addresses specific activities that will be undertaken to minimize the impact on the local community, including elements such as worker codes of conduct, training programs on HIV/AIDS, etc. A Workers' Camp Management Plan addresses specific aspects of the establishment and operation of workers' camps.

This Labor Influx and Workers' Camp Management Plan will include:

- (i) mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
 - (ii) informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
 - (iii) introducing a Worker Code of Conduct as part of the employment contract, and including sanctions for non-compliance (e.g., termination), manual scavenging, engagement with local residents, child labor, nondiscrimination, harassment of coworkers including women and those belonging to SC and STs and other minority social groups,
 - (iv) contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.
 - (v) training programs on HIV/AIDS and other communicable diseases,
 - (vi) workers' Camp Management Plan addressing specific aspects of the establishment and operation of workers' camps provided the ULB/ Executing Agency is unable to cater to the demand for affordable housing for this additional workforce in terms of rentals, hostels, apartments etc. ; and
 - (vii) compliant handling Mechanism at the project level
-
- (d) The Executing Agency shall forward a copy of the draft ESHS Documents to the Bank for its review and comments.
 - (e) The Executing Agency shall provide comments, if any, on the draft ESHS Documents (including any comments from the Bank) to the Concessionaire or notify the Concessionaire of its approval of the draft ESHS Documents within 30 days from the date of receipt of the draft ESHS Documents from the Concessionaire. The Executing Agency may require the Concessionaire to amend or modify the draft ESHS Documents if the Executing Agency or the Bank identifies any deficiencies or shortcomings in the draft ESHS Documents. If the Concessionaire receives any comments, suggestions or instructions to modify the draft ESHS Documents from the Executing Agency, then the Concessionaire shall modify the draft ESHS Documents to address any such comments, shortcomings or deficiencies identified by the Executing Agency. Thereafter, the Concessionaire shall submit the revised ESHS Documents to the Executing Agency for its approval. The process set out in this Clause 7.4(e) shall continue until the ESHS Documents are approved by the Executing Agency in accordance with this Clause 7.4(e).

- (f) The Concessionaire shall and shall ensure that its Subcontractors comply with and conform in all aspects of the ESHS Documents, approved in accordance with this Clause 7.4, in executing the Project. Any failure of the Concessionaire or the Subcontractors to comply with the ESHS Documents shall constitute a Concessionaire Event of Default. The Concessionaire shall indemnify the Executing Agency and NMCG against all costs, expenses, penalties and liabilities incurred/suffered by the Executing Agency and NMCG due to the Concessionaire's or any Subcontractor's failure to comply with the ESHS Documents in the course of execution of the Project. The Concessionaire shall not deviate from or make any subsequent modification or amendment to the approved ESHS Documents without the prior written approval of the Executing Agency.

- (g) Neither any approval of the ESHS Documents by the Executing Agency, nor any failure to review and provide comments on the ESHS Documents shall excuse any failure by the Concessionaire to adopt proper and recognized safety and environment friendly practices during the execution of the Project. The Concessionaire shall bear all risk, responsibility and liability for the accuracy and adequacy of the final ESHS Documents in ensuring compliance with the World Bank Group Safeguard Policies and Performance Standards, the ESMF, this Agreement (including specifically, Schedule 8), Applicable Laws, Applicable Permits and Good Industry Practices in the execution of the Project. The Concessionaire shall not be entitled to any extension of time and/or costs incurred in preparation of the ESHS Documents and complying with the requirements of this Clause 7.4.

7.5. Subcontracting

- (a) The Concessionaire may enter into Subcontracts to perform any part of its scope of work during the Construction Period, with the prior written consent of the Executing Agency.

- (b) The Concessionaire shall provide a copy of each proposed Subcontract, along with details of the relevant Subcontractor, to the Executing Agency for its approval, which should set out the precise scope of work to be subcontracted to such Subcontractor and should be consistent with the terms of this Agreement.

- (c) Within 15 days of receipt of a draft Subcontract under Clause 7.5(b) above, the Executing Agency shall notify the Concessionaire of its approval or rejection (along with reasons) of the Subcontractor.

- (d) The approval of any Subcontractor and the corresponding Subcontract by the Executing Agency shall be subject to the following conditions:
 - (i) the Subcontractor appointed by the Concessionaire possesses the requisite skill, expertise and capability to perform the relevant obligations of the Concessionaire during the Construction Period;

- (ii) the Subcontract is on terms consistent with this Agreement;
 - (iii) the Subcontract contains provisions that provide, at the Executing Agency 's option, for the subcontract to be novated or assigned to the Executing Agency or its nominee without any further consent or the approval from the Concessionaire or the Subcontractor or entitle the Executing Agency or its nominee to step into such Subcontract, in substitution of the Concessionaire, if this Agreement is terminated due to a Concessionaire Event of Default. However, the step-in rights of the Executing Agency shall always be subject to the substitution rights of the Lenders under this Agreement or the Substitution Agreement; and
 - (iv) the Concessionaire shall be responsible for the supervision and monitoring of the performance of any work or services by the Subcontractor.
- (e) If the Executing Agency does not notify its approval or rejection of any Subcontract to the Concessionaire within 15 days of the receipt of the draft Subcontract, then such Subcontract will be deemed to be approved by the Executing Agency.
 - (f) Within 7 days of the execution of an amendment to any approved Subcontract, the Concessionaire shall submit a copy of such amendment to the Executing Agency for its records.
 - (g) If the Concessionaire proposes to novate an approved Subcontract and/or replace an approved Subcontractor, then such novation or replacement shall be with prior approval of the Executing Agency and the process set out in this Clause 7.5 shall apply in such case.
 - (h) Notwithstanding the approval of any Subcontractor by the Executing Agency, the Concessionaire shall be and remain liable under this Agreement for all work and services subcontracted under this Agreement and for all acts, omissions or defaults of any Subcontractor. No default under any Subcontract shall excuse the Concessionaire from its obligations or liabilities under this Agreement. All references in this Agreement to any act, default, omission, breach or negligence of the Concessionaire shall be construed to include any such act, default, omission, breach or negligence of the Subcontractors.
 - (i) The Bank has right to access of information and audit the sub-contractor files with regards to the Concession Agreement.

7.6. Concessionaire's Construction Obligations

The Concessionaire shall design, finance, construct and complete the Facilities and achieve the COD in accordance with Applicable Laws, Applicable Permits, Good Industry Practice, the Technical Specifications, the ESHS Documents, the Designs and Drawings, the Construction Plan and other provisions of this Agreement.

For this purpose, during the Construction Period, the Concessionaire shall:

- (a) complete the work corresponding to each Payment Milestone by the Scheduled Payment Milestone Completion Date and complete the construction of the Facilities by the Scheduled Construction Completion Date, in a manner that:
 - (i) **is in compliance with the Technical Specifications, the Designs and Drawings, the Construction Plan, the ESHS Documents, Applicable Laws, Applicable Permits and Good Industry Practices. For the avoidance of doubt, if there arises any ambiguity or conflict between the Technical Specifications and any Applicable Laws, then the one setting out the more stringent requirements or specifications shall prevail;**
 - (ii) **the Facilities are fabricated, erected, installed and completed in accordance with the final Designs and Drawings;**
 - (iii) **the Facilities are free from all defects in design, materials, and workmanship;**
 - (iv) **the Facilities are safe, reliable and fit for purpose; and**
 - (v) **the STP shall be capable of treating Sewage up to their respective Design Capacity.**
- (b) maintain and comply with the conditions of all Applicable Permits in undertaking the construction of the Facilities, and make reasonable endeavours to assist the Executing Agency in obtaining the Applicable Permits from the relevant Government Authorities;
- (c) within 30 days of the Effective Date, and in any event, prior to the commencement of any construction of the Facilities, appoint a Person with sufficient skill and expertise to act as the Concessionaire's Representative. The Concessionaire's Representative shall monitor, coordinate and supervise the completion of the Facilities, and liaise with the Executing Agency's Representative, NMCG's Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Term, the Concessionaire may replace the Concessionaire's Representative with prior written notice to the Executing Agency and NMCG;
- (d) provide all necessary assistance to the Project Engineer and the Executing Agency in undertaking inspection of the Facilities, and in performing its other obligations and duties under this Agreement;
- (e) provide all necessary assistance to the Bank to inspect the Site and/or all accounts, records, and other documents relating to the submission of proposals and contract performance of the Concessionaire, as well as its Subcontractors, agents, personnel, consultants, service providers or suppliers relating to the Project and have them audited by auditors appointed by the Bank;
- (f) ensure that none of its employees, consultants, service providers, suppliers, or sub-contractors, who may be engaged in future, shall be engaged in corrupt, fraudulent, collusive, coercive or obstructive practice, as defined in Clause 23.18;

- (g) reasonably consider and act upon the comments/suggestions made by the Project Engineer and the Executing Agency during any meetings with the Concessionaire;
- (h) rectify any defects and/or deficiencies in the Facilities, including any defects and/or deficiencies identified by the Project Engineer or the Executing Agency ;
- (i) take all necessary measures to maintain the safety and security of personnel, material and property at the Site and the Adjoining Properties, in accordance with the approved ESHS Documents and all Applicable Laws;
- (j) ensure that all excavated materials, earthworks, waste materials and hazardous substances are stored and/or disposed in accordance with the ESHS Documents, Applicable Laws and Applicable Permits;
- (k) submit monthly reports to the Project Engineer (with a copy to the Executing Agency), no later than 10 days after the end of each month, which should set out the following:
 - (i) **extent of progress of construction activities performed by the Concessionaire for the Facilities;**
 - (ii) **comparison of actual progress against the planned progress of construction works, reasons for delay, if any and steps taken by the Concessionaire to mitigate the delay;**
 - (iii) **details of any accident or hazardous incident at the Site and the steps taken by the Concessionaire to mitigate the consequences of such accident or hazardous incident; and**
 - (iv) **status of rectification of defects and/or deficiencies discovered by the Project Engineer or the Executing Agency ;**
- (l) ensure that an adequate number of suitably skilled and experienced contractors, architects, workmen and other personnel are engaged to undertake the Project. The Concessionaire shall be solely responsible for the work performed by any staff and labour engaged by it to execute the Project and for payment of all applicable labour charges, fees, cess payable under Applicable Laws (including labour welfare legislations) in connection with the skilled and unskilled manpower employed for the Project, including specifically the Building and Other Construction Workers Welfare Cess Act, 1996. The Concessionaire shall and shall ensure that its Subcontractors provide all necessary amenities and welfare facilities for the staff and labour engaged by them at the Site and comply with all applicable labour laws. The Concessionaire shall indemnify and hold harmless the Executing Agency and NMCG from and against all claims, liabilities, expenses, costs and losses suffered or incurred by the Executing Agency or NMCG due to the Concessionaire's or any Subcontractor's failure to comply with any Applicable Laws (including labour welfare legislations);
- (m) arrange for all equipment, machinery, tools and other resources required to undertake the Project and be solely responsible for such equipment, machinery,

tools and resources;

- (n) take all reasonable measures to ensure that the transportation of any of the Concessionaire's or the Subcontractors' personnel or equipment, to or from the Site, does not interfere with local traffic in the vicinity of the Site;
- (o) maintain accurate and systematic accounts and records of goods and material utilized and other costs and expenses incurred in connection with the construction works for the Facilities, including all invoices, receipts, challans, vouchers, quotations and other records and documents with respect to the Facilities in accordance with Applicable Laws;
- (p) obtain and maintain adequate insurances as per this Agreement; and
- (q) prepare and keep up-to-date, "as-built" records of the execution of the construction work for the Facilities, showing the exact as-built locations, sizes and details of the works executed. The "as-built" records shall be kept on the Site and be made available to the Project Engineer and the Executing Agency for review and verification. The Concessionaire shall provide 4 hard copies and 1 soft copy on a compact disc, of the complete set of "as-built" drawings for the Facilities to the Executing Agency as a condition precedent to the issuance of the Construction Completion Certificate.
- (r) The concessionaire shall not be ordinarily entitled to additional Land beyond the quoted Land in the Financial Proposal for the Construction of the Project. However under unavoidable circumstances and in the interest of the Project, the Executing Agency based on availability, may consider to allocate additional land for the construction of the Project upon the request of the Concessionaire and such allocation shall be subject to the payment of one hundred and fifty percentage of the Land Rate, for each additional acres of Land and part thereof. If the additional land requirement changes position of the Selected Bidder vis a vis the Second Preferred Bidder, then the Concessionaire shall pay to the Executing Agency, a sum of equivalent to (a) one hundred and fifty percentage of the Land Rate for each additional acres of Land and part thereof; OR (b) the difference between Bid Price of Second Preferred Bidder and the revised Bid Price of the Selected Bidder/Concessionaire; whichever is higher.

7.7. Power Plant

- (a) The Concessionaire shall construct a biogas Power Plant at the Site to utilise the bio gas generated from the treatment of the Sewage at the STP to produce clean energy. The Concessionaire may, at its sole option and discretion, also construct a rooftop solar Power Plant at the Facilities to produce clean energy. The Concessionaire shall utilise the energy produced by the Power Plant to operate the relevant Facility and sell any excess energy to third party consumers during the Term, in accordance with all Applicable Laws.
- (b) the Concessionaire shall undertake such construction of a Power Plant in accordance with all Applicable Laws and after obtaining all necessary approvals and consents to construct the Power Plant at the Site.

- (c) The Concessionaire shall not be entitled to any additional land, Construction Payments, or an extension of the Scheduled Construction Completion Date for construction of the Power Plant.
- (d) The Concessionaire shall not be entitled to any additional O&M Payments for operating the Power Plant.
- (e) the Executing Agency and NMCG shall not be liable to the Concessionaire in any manner whatsoever if the quality or quantity of Sewage delivered to the STP is not adequate or appropriate to produce sufficient biogas to operate the Power Plant at the Site.
- (f) The ownership, rights and title to the Power Plant constructed by the Concessionaire shall vest with the Executing Agency during the entire Term and thereafter.

7.8. Executing Agency's rights and obligations

During the Construction Period, the Executing Agency shall:

- (a) comply with all its obligations under Applicable Laws (including, specifically the State Water Supply and Sewerage Related Acts and the Executing Agency Applicable Permits;
- (b) make reasonable endeavours to assist the Concessionaire in obtaining the Applicable Permits from the relevant Government Authorities, provided that the Concessionaire has complied with all the requirements as per Applicable Laws for applying for such Applicable Permits;
- (c) maintain the Supporting Infrastructure to enable the delivery of Sewage at the Bhagalpur STP and disposal of the Treated Effluent from the STP during the Trial Operations;
- (d) within 30 days of the Effective Date, and in any event, prior to the commencement of any construction for the Facilities, appoint a Person with sufficient skill and expertise to act as the Executing Agency 's Representative. The Executing Agency's Representative shall liaise with the Concessionaire's Representative, NMCG's Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Term, the Executing Agency may replace the Executing Agency 's Representative with prior written notice to the Concessionaire and NMCG;
- (e) cause the Project Engineer to carry out timely inspection of the Facilities, and perform its other obligations and duties under this Agreement;
- (f) upon progressive completion of construction works for the Facilities in accordance with the Technical Specifications, Designs and Drawings, Construction Plan and other provisions of this Agreement, as certified by the Project Engineer, issue the Milestone Completion Certificates and the

Construction Completion Certificate to the Concessionaire; and

- (g) ensure that the Concessionaire enjoys peaceful access to the Site and shall not assign, transfer, or otherwise dispose its rights, title, and interest in the Site or create any Encumbrance over any part of the Site, which may adversely impact the exercise of the Concessionaire's rights and duties under this Agreement.

7.9. NMCG's rights and obligations

During the Construction Period, NMCG shall:

- (a) comply with all its obligations under the Applicable Laws (including specifically, the Ganga 2016 Order);
- (b) make the Construction Payments, on satisfactory completion of the relevant Payment Milestone, in accordance with Clause 9.3;
- (c) within 30 days of the Effective Date, and in any event, prior to the commencement of any construction for the Facilities, appoint a Person with sufficient skill and expertise to act as the NMCG's Representative. NMCG's Representative shall liaise with the Concessionaire's Representative, the Executing Agency's Representative and the Project Engineer during the Construction Period and the O&M Period. At any time during the Term, NMCG may replace the NMCG Representative with prior written notice to the Executing Agency and the Concessionaire; and
- (d) ensure that the Escrow Account is funded with the Minimum Escrow Balance.

7.10. Utilities

- (a) The Concessionaire shall obtain install and maintain at its cost, all utilities necessary for undertaking the construction of the Facilities, including all temporary power and water connections, lighting facilities, telephone connections, internet connections, etc. at the Site.
- (b) The Concessionaire shall not be entitled to any extension of time or costs to comply with its obligations in Clause 7.10(a) above.
- (c) The Executing Agency shall provide any reasonable assistance required by the Concessionaire to obtain the utilities for the construction of the Facilities.

7.11. Construction Timelines

- (a) The Concessionaire shall comply with the Construction Plan, the Designs and Drawings and the Technical Specifications and complete the construction of the Facilities on or before the Scheduled Construction Completion Date.
- (b) Subject to Clause 7.11(c) below, the Concessionaire shall be entitled to a day-for-day extension of the relevant Scheduled Payment Milestone Completion Date or as the case may be, the Scheduled Construction Completion Date, if the

completion of construction of the Facilities is delayed due to any of the following reasons (each such event, a **Delay Event**):

- (i) occurrence of a Force Majeure Event, provided that the requirements of Article 14 have been complied with;
- (ii) a Qualifying Change in Law;
- (iii) undue delay by the relevant Government Authority in granting or renewing any Applicable Permit, despite the Concessionaire having applied for such grant or renewal expeditiously and having complied with the requirements of Applicable Laws in making such application;
- (iv) undue delay by the relevant Government Authority in providing any utility connection, despite the Concessionaire having applied for such utility connection expeditiously and having complied with the requirements of Applicable Laws in making such application;
- (v) any delay attributable to unforeseen site conditions in accordance with Clause 4.4;
- (vi) delay by the Executing Agency in approval of the Phase II Designs and Drawings in accordance with Clause 7.2;
- (vii) delay by the Executing Agency in approval of the O&M Manual in accordance with Clause 8.2;
- (viii) delay by the Executing Agency in issuance of a Milestone Completion Certificate in accordance with Clause 7.13(a);
- (ix) any variation proposed by the Executing Agency in the Technical Specifications or the Designs and Drawings in accordance with Article 20; or
- (x) delay caused in complying with any instructions of the Executing Agency or the Project Engineer, which instructions are not attributable to any default of the Concessionaire.

The Concessionaire shall promptly provide the Executing Agency (with a copy to the Project Engineer and NMCG) with a notice upon becoming aware of any Delay Event listed at Clause 7.11(b) above. The notice should specify the nature of the Delay Event, the extent of delay suffered or likely to be suffered by the Concessionaire and mitigation measures being taken by the Concessionaire.

The issuance of the notice under this Clause 7.11(b), within 7 days from the date the Concessionaire became aware of the Delay Event, shall be a condition precedent to the Concessionaire's entitlement to an extension under Clause 7.11(b).

- (c) Without prejudice to the Concessionaire's obligations to notify the Executing Agency regarding the occurrence of a Delay Event above, the Concessionaire shall: (i) keep and maintain records as reasonably necessary to substantiate and establish claims for extensions under Clause 7.11(b); and (ii) give the Executing Agency and the Project Engineer access to such records and documents or provide the Executing Agency and the Project Engineer with copies, if so requested.
- (d) If the Concessionaire claims an extension of time in accordance with Clause 7.11(b) and

the Executing Agency is of the opinion that such delay was caused or materially contributed to by any concurrent or interacting cause or causes of delay not listed in Clause 7.11(b), then the Concessionaire shall not be entitled to any extension of time for the concurrent period of delay.

- (e) If two or more of the Delay Events listed in Clause 7.11(b) occur concurrently, then such concurrent period shall not be counted twice in determining an extension under Clause 7.11(b).
- (f) Except as provided in Clause 7.11(b), the Concessionaire shall not be entitled to any extension of time for any reason whatsoever, including due to:
 - (i) delay caused in complying with any instructions of the Executing Agency or the Project Engineer which are attributable to any act or omission of the Concessionaire;
 - (ii) failure of any Subcontractor to commence or carry out any work within the prescribed timelines;
 - (iii) unavailability or shortage of equipment, materials, or any other resources;
 - (iv) any delay in approving the drafts of the Designs and Drawings, the Construction Plan, the ESHS Documents or any other document submitted by the Concessionaire due to any deficiencies or shortcomings in such drafts of the Designs and Drawings, the Construction Plan, the ESHS Documents or other documents, as the case may be; or
 - (v) the construction of the Power Plant at the Site.
- (g) If any Delay Event affects the construction of the Facilities, but not both the Facilities, then the Concessionaire shall only be entitled to an extension of time to complete the Facility affected by such Delay Event.
- (h) Any Dispute between the Parties with respect to the occurrence, length of subsistence or consequence of any of the Delay Event shall be settled in a final and binding manner in accordance with Article 21 (*Dispute Resolution*).

7.12. Delay Liquidated Damages and Bonus

- (a) Subject to Clause 7.11(b), if the Concessionaire fails to complete the work corresponding to any Payment Milestone by the relevant Scheduled Payment Milestone Completion Date or fails to complete the construction of the Facilities by the Scheduled Construction Completion Date, then the Executing Agency shall be entitled to liquidated damages for each day of delay beyond the Scheduled Payment Milestone Completion Date, or, as the case may be, the Scheduled Construction Completion Date, at the rate of 0.1% of the Performance Security (in case of a delay in achieving a Payment Milestone or completing the Facilities by the Scheduled Construction Completion Date) for each day of delay up to 6 months from the relevant Scheduled Payment Milestone Completion Date, or, as the case may be, the Scheduled Construction Completion Date (collectively, the **Delay Liquidated Damages**).

The Delay Liquidated Damages will be payable until the work for the relevant Payment Milestone is completed or, as the case may be, the construction of the Facilities is completed, as certified by the Executing Agency in accordance with Clause 7.13.

If the Concessionaire completes the construction of the Facilities by the Scheduled Construction Completion Date, the aggregate Delay Liquidated Damages recovered by the Executing Agency under this Clause 7.12(a) for a delay in achieving any Payment Milestone shall be refunded by the Executing Agency to the Concessionaire, without any interest. Provided that, if the Concessionaire completes the construction of only one Facility (and not both the Facilities) by the Scheduled Construction Completion Date, then the Executing Agency shall only refund the Delay Liquidated Damages recovered by the Executing Agency under this Clause 7.12(a) for the Facility that is completed by the Scheduled Construction Completion Date.

- (b) The Executing Agency shall be entitled to deduct the Delay Liquidated Damages from the amount payable to the Concessionaire for any Payment Milestone, and if such amounts are insufficient, the Executing Agency shall have a right to invoke the Performance Security to the extent of the Delay Liquidated Damages.
- (c) The Parties acknowledge that the Delay Liquidated Damages are a genuine pre-estimation of and reasonable compensation for the loss that shall be suffered by the Executing Agency as a result of the delay in the completion of the Facilities, and not as penalty.
- (d) If, for any reason, the above paragraphs relating to the payment of Delay Liquidated Damages are void, invalid or otherwise inoperative so as to disentitle the Executing Agency from claiming any Delay Liquidated Damages, then the Executing Agency will be entitled to claim against the Concessionaire for general damages for delay in completing the works for the relevant Payment Milestone by the Scheduled Payment Milestone Completion Date, or for the delay in completing the construction of the Facilities by the Scheduled Construction Completion Date.
- (e) If the Concessionaire fails to complete the works for a Payment Milestone within 6 months of the Scheduled Payment Milestone Completion Date or if the Concessionaire fails to complete the construction of the Facilities within 6 months from the Scheduled Construction Completion Date, other than on account of any Delay Event (**Grace Period**), then such failure shall be deemed to be a Concessionaire Event of Default in accordance with Clause 16.1.
- (f) The payment or deduction of Delay Liquidated Damages shall not relieve the Concessionaire from its obligations to complete the construction of the Facilities, or from any of its other duties, obligations or responsibilities under the Agreement. The Concessionaire shall use and continue to use its best endeavours to avoid or reduce further delay in completing the Facilities.
- (g) Bonus on early completion

If the Construction Completion Date for a Facility occurs prior to the Scheduled Construction Completion Date, the Concessionaire shall be entitled to a bonus

equal to 0.05% of the relevant Performance Security for each day by which the Construction Completion Date precedes the Scheduled Construction Completion Date.

7.13. Completion of Construction

(a) Completion of Payment Milestones

- (i) Upon completion of the works corresponding to each Payment Milestone, as specified in the Construction Plan, the Concessionaire shall issue a notice to the Executing Agency, with a copy to the Project Engineer and NMCG, requiring the Executing Agency to inspect (or cause the Project Engineer to inspect) the completed works covered by the relevant Payment Milestone. The purpose of such inspection shall be to determine whether the works corresponding to the relevant Payment Milestone have been completed in accordance with the requirements of Clause 7.6.
- (ii) If the Executing Agency is satisfied that the works for the relevant Payment Milestone have been completed in accordance with the requirements of Clause 7.6, the Executing Agency shall issue a Milestone Completion Certificate to the Concessionaire for such completed Payment Milestone, with a copy to NMCG, within 7 days from the date of inspection of the works covered by such Payment Milestone.
- (iii) If the Executing Agency is of the view that the works for the relevant Payment Milestone do not satisfy the requirements of Clause 7.6, then the Executing Agency shall have the right to provide any comments, suggestions and/or instruct the Concessionaire to carry out necessary modifications, to ensure that the works comply with the requirements of Clause 7.6. Upon receipt of such comments, suggestions or instructions from the Executing Agency, the Concessionaire shall make necessary modifications to the works to remedy any defects or deficiencies and re-issue a notice to the Executing Agency. The Concessionaire shall bear all costs of remedying the defects and deficiencies in the works and shall not be entitled to any extension of time for remedying such defects or deficiencies. This process shall be repeated until the Executing Agency is satisfied that the works for the relevant Payment Milestone have been completed in accordance with the requirements of Clause 7.6 and issues a Milestone Completion Certificate in accordance with this Clause 7.13(a).
- (iv) If the Executing Agency fails to:
 - (A) inspect the completed portion of the works covered by the relevant Payment Milestone, within 7 days from the date of receipt of a notice from the Concessionaire under Clause 7.13(a)(i) above;

- (B) provide any comments or suggestions or notify the Concessionaire of any defects or deficiencies in the completed portion of the works covered by the relevant Payment Milestone, within 7 days from the date of inspection of such completed portion of the works; or
- (C) issue the Milestone Completion Certificate, within 7 days from the date of inspection of the completed portion of the works covered by the relevant Payment Milestone,

then, such delay shall be treated as a Delay Event, which will entitle the Concessionaire to a day for day extension in the Scheduled Payment Milestone Completion Date or the Scheduled Construction Completion Date, as the case may be, beyond the 7-day period.

- (v) The Executing Agency may exercise its rights to review and certify the completion of works for any Payment Milestone either itself or through the Project Engineer. If the Executing Agency instructs the Project Engineer to undertake a review of the works, then the Concessionaire shall co-operate with the Project Engineer to facilitate such review and rectify any defects or deficiencies identified by the Project Engineer in the works. Provided that, in all instances, the Executing Agency shall finally approve the works and issue the Milestone Completion Certificates.

(b) Testing and Commissioning

- (i) Upon completion of construction of each Facility, in accordance with the requirements set out in this Agreement, the Concessionaire shall issue a notice to the Executing Agency , with a copy to NMCG, requiring it to be present at the Site on the date specified in such notice to undertake a final inspection of the completed Facility and conduct any tests required to ensure that the Facility complies with the Technical Specifications, the Designs and Drawings, Applicable Laws and Applicable Permits.
- (ii) Within 5 days from the date of receipt of a notice under Clause 7.13(b)(i) above, the Executing Agency may request the Concessionaire to vary the date of the final inspection and tests and the Concessionaire shall accommodate such request, provided that, such date shall be no later than 7 days from the date specified in the notice received from the Concessionaire under Clause 7.13(b)(i) above.
- (iii) The Concessionaire shall, on the date specified in the notice issued under Clause 7.13(b)(i) or on such other date as may be agreed with the Executing Agency , carry out the tests in accordance with the instructions and under the supervision of the Executing Agency , to demonstrate that the Facility complies with the requirements of Clause 7.6.

- (iv) If the Executing Agency is not satisfied with the results of the tests or inspection, then the Concessionaire shall remedy any defects or deficiencies in the Facility, identified by the Executing Agency or revealed through the tests and the Facility shall be tested again upon rectification of such defects or deficiencies. This process shall be repeated until such time that the Executing Agency is satisfied that the Facility has been completed in accordance with Clause 7.6 and is safe and fit for purpose. The Concessionaire shall bear all costs of remedying the defects and deficiencies and retesting the Facility and shall not be entitled to any extension of time for remedying such defects or deficiencies or for retesting the Facility.
- (v) If the Executing Agency is satisfied with the results of the tests and inspection of the Facility, the Executing Agency shall issue the Milestone Completion Certificate in respect of the last Payment Milestone to the Concessionaire, with a copy to NMCG, within 7 days from the date of inspection and testing of the completed Facility. The issue of the Milestone Completion Certificate for the last Payment Milestone shall certify that the Facility has been completed in accordance with this Agreement, the Technical Specifications, the Designs and Drawings, Applicable Laws and Applicable Permits and the Facility is safe and fit for purpose.
- (vi) If the Executing Agency fails to:
 - (A) inspect or witness the testing of the Facility on the date specified in the notice issued under Clause 7.13(b)(i) or such other date as may be agreed with the Concessionaire;
 - (B) notify the Concessionaire of any defects or deficiencies in the Facility within 7 days from the date of inspection and testing of the Facility; or
 - (C) issue the Milestone Completion Certificate for the last Payment Milestone within 7 days from the date of inspection and testing of the Facility,

then, such delay shall be treated as a Delay Event, which will entitle the Concessionaire to a day for day extension in the Scheduled Payment Milestone Completion Date and the Scheduled Construction Completion Date.

(c) Issue of Construction Completion Certificate

- (i) Within 7 days from the date of issuance of the Milestone Completion Certificate for the last Payment Milestone, the Executing Agency shall issue the Construction Completion Certificate for the relevant Facility to the Concessionaire, with a copy to NMCG, subject to the following conditions having been fulfilled by the Concessionaire:

- (A) the submission of 4 hard copies and 1 soft copy on a compact disc of complete sets of the "as-built" drawings of the Facility;
 - (B) the Concessionaire having obtained all Applicable Permits necessary for commencement of the O&M services (including specifically, the consent to operate from the Bihar Environment Protection and Pollution Control Board for the operation of the Facilities);
 - (C) the Concessionaire having obtained adequate insurance for the O&M Period in accordance with Clause 11.2;
 - (D) the Concessionaire having engaged sufficient number of adequately skilled O&M personnel to perform the services during the O&M Period; and
 - (E) the O&M Manual having been approved by the Executing Agency ; and
 - (F) the Concessionaire having cleared the Site and removed all debris, hazardous materials, surplus construction materials, equipment, temporary works, work sheds, labour camps and all other temporary installations on the Site.
- (ii) If the Executing Agency fails to issue the Construction Completion Certificate for the relevant Facility to the Concessionaire within 7 days from the date of satisfaction of the conditions set out in Clause 7.13(c)(i)(A) to (F) above and fails to notify the Concessionaire of any reasons for the failure to issue the Construction Completion Certificate for the relevant Facility, then, the Construction Completion Certificate for the relevant Facility shall be deemed to have been issued to the Concessionaire upon the expiry of the 7 days period.
 - (iii) The date of the issuance or deemed issuance of the Construction Completion Certificate shall be the Construction Completion Date for the relevant Facility.

7.14. Trial Operations

- (a) Subject to Clause 7.14(c) below, within 1 day of the issuance or deemed issuance of the Construction Completion Certificate for the relevant Facility to the Concessionaire, the Concessionaire shall commence the Trial Operations of the relevant Facility in accordance with the Trial Operation Procedures to determine whether the Facility meets the KPIs on a continuous basis and is fit and ready to be placed into commercial operations for treatment and disposal of Sewage in accordance with this Agreement.
- (b) The Executing Agency shall ensure that adequate quantity of Sewage is delivered to the Facilities during the Trial Operations to enable the Concessionaire to demonstrate that the Facility meets the Technical Specifications and the KPIs.
- (c) If the Concessionaire fails to commence or continue the Trial Operations, due to the inadequate quantity or inferior quality of the Sewage delivered to the relevant Facility, then the Concessionaire shall promptly notify the Executing Agency. If

in the opinion of the Executing Agency, the quantity or quality of Sewage is not adequate to undertake Trial Operations, then the Executing Agency shall extend the time period for the Trial Operations. In such case, the Scheduled COD will also be extended on a day-for-day basis, provided that the Scheduled COD shall not be extended beyond the date which is 6 months from the Construction Completion Date.

- (d) During the Trial Operations, the Executing Agency shall or shall cause the Project Engineer to monitor the performance of the Facility on a regular basis and shall have the right to test the compliance of the incoming Sewage with the Influent Standards and test the compliance of the STP By-Products and the Treated Effluent with the Discharge Standards every 7 days to ensure that the Facility meets the KPIs. If the Executing Agency, or, as the case may be, the Project Engineer is of the view that: (i) the Trial Operations are not being conducted in accordance with the Trial Operations Procedure; or (ii) there are any defects or deficiencies in the Facility, the Executing Agency shall instruct the Concessionaire to follow the Trial Operation Procedures and/or rectify the defects and deficiencies to ensure compliance with the KPIs.

It is clarified that no Availability Liquidated Damages or Performance Liquidated Damages are payable by the Concessionaire during the Trial Operations period for a failure to achieve the KPIs. However, for the Trial Operations to be successfully concluded, the Concessionaire must demonstrate that the relevant Facility consistently and continuously meets the KPIs during the last 20 days of the 3 months Trial Operations period, as may be extended in accordance with Clause 7.14(c) above. If the relevant Facility fails to achieve the KPIs on a continuous basis during the last 20 days of the initial 3 months Trial Operations period (as extended in accordance with Clause 7.14(c)), then the Trial Operations period shall be extended by another 20 days. Subject to Clause 7.14(i), the Trial Operations shall continue until the Concessionaire can demonstrate that the relevant Facility consistently achieves the KPIs for 20 consecutive days.

- (e) If the Concessionaire has been able to consistently achieve the KPIs for 20 consecutive days (as supported by daily reports), the Concessionaire shall issue a notice to the Executing Agency requiring the Executing Agency to undertake a final inspection of the Facility. The Executing Agency shall have the right to undertake such final inspection within 5 days of a notice being issued by the Concessionaire.
- (f) If, upon final inspection, the Executing Agency is satisfied that the Facility meets the KPIs and the Technical Specifications, and are capable of safe and reliable operations, then, the Executing Agency shall issue the Trial Operations Completion Certificate for the relevant Facility to the Concessionaire within 7 days of the Executing Agency undertaking a final inspection of the Facility pursuant to Clause 7.14(e) above.
- (g) If, upon final inspection, the Executing Agency believes that the relevant Facility does not comply with the KPIs and/or Technical Specifications, other than due to: (i) volume of Sewage being inadequate to conduct the Trial Operations; or

- (ii) the quality or characteristics of the Sewage being beyond the Influent Standards, then the Executing Agency shall reject the Facility and terminate this Agreement. Upon termination of this Agreement, in accordance with this Clause 7.14(g), the consequences set out in Article 16 shall follow.
- (h) If the Executing Agency : (i) does not undertake a final inspection of the relevant Facility within 5 days of receipt of a notice from the Concessionaire under Clause 7.14(e); or (ii) fails to notify the Concessionaire of any defects in the relevant Facility within 7 days of undertaking a final inspection; or (iii) fails to issue a Trial Operations Completion Certificate within 7 days from the date of the final inspection, then the Trial Operations shall be deemed to have been successfully completed for such Facility and the Trial Operations Completion Certificate will be deemed to have been issued to the Concessionaire upon the expiry of the 5 days period (in case of (i)) and upon the expiry of the 7 day period (in case of (ii) and (iii)).
- (i) If the Trial Operations are not successfully completed and/or the Concessionaire fails to issue a notice to the Executing Agency under Clause 7.14(e) above on or prior to the Scheduled COD, as may be extended in accordance with Clause 7.14(c), for any Facility, then such failure shall be treated as a Concessionaire Event of Default and the consequences set out at Article 16 shall follow.
- (j) Notwithstanding anything contained in Clause 7.14(h), if the Concessionaire fails to successfully complete the Trial Operations for the relevant Facility on or prior to the Scheduled COD, as may be extended in accordance with Clause 7.14(c), due to the: (i) volume of Sewage being inadequate to conduct the Trial Operations; or (ii) quality or characteristics of the Sewage being beyond the Influent Standards, for any Facility, then such failure will be treated as a Executing Agency Event of Default, and the consequences set out at Article 16 shall follow.
- (k) The Concessionaire will not be entitled to any O&M Payments or any other payment for conducting the Trial Operations, which shall be carried out solely at the cost and risk of the Concessionaire.

7.15. Commercial Operations Date

- (a) Within 7 days from the date of issuance or deemed issuance of the Trial Operations Completion Certificates for the Facilities, the Executing Agency shall issue the COD Certificate, with a copy to NMCG, subject to the following conditions having been fulfilled by the Concessionaire:
- (i) the Concessionaire having submitted to the Executing Agency the Scheduled Maintenance Programme for the first year post COD; and
 - (ii) the Concessionaire having submitted the O&M Security to the Executing Agency .
- (b) If the Executing Agency fails to issue the COD Certificate to the Concessionaire within 7 days from the date of satisfaction of the conditions set out in Clause 7.15

(a) above and fails to notify the Concessionaire of any reasons for the failure to issue the COD Certificate, then, the COD Certificate shall be deemed to have been issued to the Concessionaire upon the expiry of the 7 day period.

- (c) The date on which the COD Certificate is issued or deemed to have been issued to the Concessionaire shall be the Commercial Operations Date of the Facilities.

8. OPERATIONS AND MAINTENANCE PERIOD

8.1. Commencement and Duration

The period for the operation and maintenance of the Facilities shall commence on and from the COD, and shall continue until the expiry of 15 years from the COD (the **O&M Period**), unless terminated earlier in accordance with Article 16.

8.2. O&M Manual

- (a) The Concessionaire shall prepare a detailed O&M Manual for the Facilities based on the Proposed Technology and in accordance with the Technical Specifications, the ESHS Documents, Applicable Laws and Applicable Permits. The O&M Manual shall specify the operation procedures (separately for each component of the Facilities) and maintenance procedures. If there any errors or deficiencies in the Technical Specifications, the O&M Manual shall take in account, address or rectify such errors or deficiencies. The Language for O &M Manual shall be English.
- (b) At least 30 days prior to the Scheduled Construction Completion Date, the Concessionaire shall submit 4 hard copies and 1 soft copy on a compact disc of the draft O&M Manual to the Executing Agency for its review and approval.
- (c) The Executing Agency shall review and provide comments, if any, on the draft O&M Manual to the Concessionaire or notify the Concessionaire of its approval of the draft O&M Manual within 20 days from the date of receipt of the draft O&M Manual from the Concessionaire. The Executing Agency may require the Concessionaire to amend or modify the draft O&M Manual if the Executing Agency identifies any deficiencies, inaccuracies or shortcomings in the draft O&M Manual. If the Concessionaire receives any comments, suggestions or instructions to modify the draft O&M Manual from the Executing Agency , then the Concessionaire shall modify the draft O&M Manual to correct any shortcomings, inaccuracies or deficiencies identified by the Executing Agency and/or address, in writing, the Executing Agency 's comments on the draft O&M Manual and submit the revised O&M Manual to the Executing Agency for its approval. The process set out in this Clause 8.2(c) shall continue until the O&M Manual is approved by the Executing Agency in accordance with this Clause 8.2(c).
- (d) The Concessionaire shall revise the O&M Manual as and when the Concessionaire thinks it necessary to do so and in such case the provisions of Clause 8.2(c) will apply as is to the approval of the revised manual.

- (e) The Concessionaire shall undertake the O&M of the Facilities strictly in accordance with the approved O&M Manual. The Concessionaire shall not deviate from or make any amendment to the approved O&M Manual without the prior written approval of the Executing Agency. The Concessionaire shall not commence operation of the Facilities prior to approval of the O&M Manual in accordance with this Clause 8.2.
- (f) Notwithstanding any approval of the O&M Manual by the Executing Agency, the Concessionaire shall bear all risk, responsibility and liability for the suitability, accuracy, adequacy and practicality of the O&M Manual. The Concessionaire shall not be entitled to any extension of time and/or costs incurred in the preparation of or updating the O&M Manual and complying with the requirements of this Clause 8.2.
- (g) The Concessionaire shall submit a consolidated O&M Manual for the Facilities.

8.3. Subcontracting

- (a) The Concessionaire may enter into Subcontracts to perform any part of its scope of work during the O&M Period, with the prior written consent of the Executing Agency.
- (b) The Concessionaire shall provide a copy of each proposed Subcontract, along with details of the relevant Subcontractor, to the Executing Agency for its approval, which should set out the precise scope of work to be subcontracted to such Subcontractor and should be consistent with the terms of this Agreement.
- (c) Within 15 days of receipt of a draft Subcontract under Clause 8.3(b) above, the Executing Agency shall notify the Concessionaire of its approval or rejection (along with reasons) of the Subcontractor.
- (d) The approval of any Subcontractor and the corresponding Subcontract by the Executing Agency shall be subject to the following conditions:
 - 8.3.d.1. the Subcontractor appointed by the Concessionaire possesses the requisite skill, expertise and capability to perform the relevant obligations of the Concessionaire during the O&M Period;
 - 8.3.d.2. the Subcontract is on terms consistent with this Agreement;
 - 8.3.d.3. the Subcontract contains provisions that provide, at the Executing Agency 's option, for the Subcontract to be novated or assigned to the Executing Agency or its nominee without any further consent or the approval from the Concessionaire or the Subcontractor or entitle the Executing Agency or its nominee to step into such Subcontract, in substitution of the Concessionaire, if this Agreement is terminated due to a Concessionaire Event of Default. However, the step-in rights of the Executing Agency shall always be subject to the substitution rights of the Lenders under this Agreement or the Substitution Agreement; and
 - 8.3.d.4. the Concessionaire shall be responsible for the supervision and monitoring of the performance of any work or services by the Subcontractors.

- (e) If the Executing Agency does not notify its approval or rejection of any Subcontract to the Concessionaire within 15 days of the receipt of the draft Subcontract, then such Subcontract will be deemed to be approved by the Executing Agency.
- (f) Within 7 days of the execution of an amendment to any approved Subcontract, the Concessionaire shall submit a copy of such amendment to the Executing Agency for its records.
- (g) If the Concessionaire proposes to novate an approved Subcontract and/or replace an approved Subcontractor, then such novation or replacement shall be with prior approval of the Executing Agency and the process set out in this Clause 8.3 shall apply in such case.
- (h) Notwithstanding the approval of any Subcontractor by the Executing Agency, the Concessionaire shall be and remain liable under this Agreement for all work and services subcontracted under this Agreement and for all acts, omissions or defaults of any Subcontractor. No default under any Subcontract shall excuse the Concessionaire from its obligations or liabilities under this Agreement. All references in this Agreement to any act, default, omission, breach or negligence of the Concessionaire shall be construed to include any such act, default, omission, breach or negligence of the Subcontractors.

8.4. Concessionaire's rights and obligations

- (a) The Concessionaire shall operate and maintain the Facilities in a manner that:
 - (i) is in compliance with the Technical Specifications, Applicable Laws, Applicable Permits and Good Industry Practice;
 - (ii) results in the Facilities achieving the KPIs;
 - (iii) ensures that the Bhagalpur STP is capable of treating Sewage up to its Design Capacity on a daily basis;
 - (iv) ensures efficient treatment of Sewage and handling and disposal of STP By-Products and the Treated Effluent;
 - (v) is safe and reliable, subject to normal wear and tear of the Facilities;
 - (vi) is in compliance with the technology license agreement(s) executed by the Concessionaire for the technology, processes, know-how and systems used or incorporated into the Facilities;
 - (vii) maintains the safety and security of personnel, material and property at the Site, in accordance with the approved ESHS Documents, Applicable Laws and Applicable Permits; and
 - (viii) ensures that all waste materials and hazardous substances are stored

and/or disposed in accordance with the ESHS Documents, Applicable Laws and Applicable Permits.

- (b) The Concessionaire shall provide adequate power backup at the Site (including through installation of DG Sets) to ensure continuous supply of power (even during any interruption(s) in the supply of power from the grid) for the uninterrupted operations of the Facilities during the O&M Period.
- (c) The Concessionaire shall provide all necessary assistance to the Project Engineer and the Executing Agency in undertaking inspection and monitoring of the operation and maintenance of the Facilities.
- (d) The Concessionaire shall reasonably consider and act upon the comments/suggestions made by the Project Engineer and the Executing Agency during any meetings of the Concessionaire with its Subcontractors.
- (e) The Concessionaire shall provide the Executing Agency and the Project Engineer with reasonable access to the Site during office hours to monitor and inspect the Facilities.
- (f) The Concessionaire shall arrange for all equipment, machinery, tools and other resources required to undertake the O&M of the Facilities and shall take all reasonable measures to ensure that the transportation of any of the Concessionaire's or the Subcontractors' personnel or equipment, to or from the Site, does not interfere with local traffic in the vicinity of the Site.
- (g) The Concessionaire shall develop and implement a safety and surveillance programme for the Facilities and for handling and disposal of the STP By-Products and the Treated Effluent, and adopt appropriate measures and safeguards for security of the environment, life, and property at the Site.
- (h) The Concessionaire shall ensure that none of its employees, consultants, service providers, suppliers, or Subcontractors, including any O&M contractor appointed by the Concessionaire, shall engage in any corrupt, fraudulent, collusive, coercive or obstructive practice, as defined in Clause 23.18.

8.5. Executing Agency's rights and obligations

During the O&M Period, the Executing Agency shall:

- (a) comply with all its obligations under Applicable Laws (including, specifically the State Water Supply and Sewerage Related Acts and the Executing Agency Applicable Permits;
- (b) monitor and review the operations and performance of the Facilities, including disposal of the STP By-Products and the Treated Effluent. This includes the right to access the Facilities, and review the records and reports that the Concessionaire is required to maintain, during normal working hours;
- (c) review the Scheduled Maintenance Programme and all other plans and

documents submitted by the Concessionaire in an expeditious manner, in accordance with this Agreement; and

- (d) ensure that the Concessionaire continues to enjoy peaceful access to the Site and shall not assign, transfer, or otherwise dispose of its rights, title, and interest in the Site or create any Encumbrance over any part of the Site, which may adversely impact the exercise of the Concessionaire's rights and duties under this Agreement.

8.6. NMCG's rights and obligations

During the O&M Period, NMCG shall:

- (a) comply with all its obligations under the Applicable Laws (including specifically, the Ganga 2016 Order);
- (b) make the O&M Payments in accordance with Clause 9.4; and
- (c) ensure that the Escrow Account is funded with the Minimum Escrow Balance.

8.7. Utilities

- (a) The Executing Agency shall apply for and obtain the power connection (at the battery limit of the relevant Site) for the operation of the Facilities, in its name, at least 30 days prior to the Scheduled Construction Completion Date. The Concessionaire shall provide all necessary assistance to the Executing Agency in procuring the power connection, including by providing all documents and information necessary to complete the application process.
- (b) The Concessionaire shall install and maintain at its cost, all utilities (other than power) necessary for the O&M of the Facilities, including water, telephone connections, internet connections, etc. at the Site. Specifically, to procure water for the O&M of the Facilities, the Concessionaire may dig borewells at the Site after obtaining all Applicable Permits (including any no-objection certificates from the Central Ground Water Authority or the relevant state authority).
- (c) The Concessionaire shall not be entitled to any additional costs to comply with its obligations in this Clause 8.7.
- (d) The Executing Agency shall provide any reasonable assistance required by the Concessionaire to obtain the utilities for the O&M of the Facilities.

8.8. Monitoring and Reporting

- (a) Online Monitoring and Meters
 - (i) At the Bhagalpur STP, the Concessionaire shall install and maintain an online monitoring system, in accordance with the Technical Specifications and Applicable Laws (including specifically, the EPA) to monitor the volume, specifications and characteristics of the incoming

Sewage and the Treated Effluent.

The online monitoring devices should be capable of measuring and analysing the flow rate and characteristics of the Sewage at the Inlet Point and of the Treated Effluent at the Outlet Point. Such monitoring shall be conducted in accordance with Applicable Laws and Good Industry Practices.

- (ii) As part of the online monitoring system, the Concessionaire shall also install flow measurement meters in accordance with Applicable Laws and Technical Specifications, at the Inlet Point, the Outlet Point and at any other point set out in the Technical Specifications or required as per Applicable Laws, to measure the flow of sewage over the weir and the volume and concentration of Sewage delivered to the Facilities, and the Treated Effluent discharged from the Facilities.
 - (iii) The Concessionaire shall record and transmit all data collected from the online monitoring systems and the meter reading of the grade, volume and characteristics of the incoming Sewage and the Treated Effluent. The Concessionaire shall furnish a summary report for the Bhagalpur STP to the Executing Agency (with a copy to the Project Engineer) on a daily basis, which shall indicate the periods during which: (A) the volume of the Sewage received at the STP and the volume of the Treated Effluent discharged from the STP during each hour of the relevant day; (B) the periods during which the volume of Sewage received at the STP exceeded its Design Capacity; (C) the quality of the incoming Sewage was beyond the Influent Standards; and (D) the quality of the Treated Effluent was beyond the Discharge Standards.
 - (iv) The Concessionaire shall also be required to upload the periodic reports from the online monitoring on the Central Pollution Control Board's website.
 - (v) The Concessionaire shall maintain the online monitoring systems and meters at its own cost and expense for the entire O&M Period.
 - (vi) At the STP, the Concessionaire shall also install meters and gauges at the DG Sets to measure the total number of energy units (in kWh) consumed from the DG Sets in each month of the O&M Period.
 - (vii) the Concessionaire shall install meters at the Power Plant to measure the total number of energy units (in kWh) generated from the Power Plant in each month of the O&M Period.
 - (viii) The meters shall be calibrated once every year during the O&M Period in accordance with Good Industry Practices and the meters shall be jointly tested by the Executing Agency and the Concessionaire to ensure the accuracy of the meters installed by the Concessionaire.
- (b) Records and Reporting Requirements

- (i) The Concessionaire shall maintain:
 - (A) records of the volume and characteristics of the Sewage received at, and the STP By-Products and the Treated Effluent discharged from the Bhagapur STP; and
 - (B) books of accounts recording all payments received from NMCG and other revenues derived/collected by it from the Facilities or resulting from its use,
- (ii) The Concessionaire shall provide to the Executing Agency 2 copies of its audited financial statements along with a report from its statutory auditors, within 90 days of the close of each Financial Year.
- (iii) For the Bhagalpur STP, the Concessionaire shall deliver to the Executing Agency , with a copy to the Project Engineer, the following during the O&M Period within the specified timelines:
 - (A) reports relating to any activity, problem, incident or circumstance that threatens or may threaten public health, safety, the environment or the safety and security of the Facilities, and any action taken to mitigate the effect of such incident or problem, as soon as reasonably practicable but no later than 12 hours after the occurrence of such event or circumstance;
 - (B) reports on any critical breakdowns or failures in the Facilities, within 12 hours of such occurrence;
 - (C) reports on accidents or other incidents in relation to the O&M personnel or any third party, along with statements on actions taken to minimise recurrence, within 2 days of such occurrence;
 - (D) daily reports with the data collected from the monitoring and metering system, the online monitoring system and the tests conducted by the Concessionaire in accordance with Clause 8.10 on the characteristics and volume of Sewage treated at the Facilities, the STP By-Products and the Treated Effluent discharged from the Facilities, at the end of each day (i.e., on or before 1500 hours every day);
 - (E) monthly progress reports relating to the performance of O&M services (including on compliance with the KPIs, details of disposal or sale, as the case may be, of the STP By-Products and the Treated Effluent, and details of any Emergency during the relevant month), on or before the 7th day of the following month. The monthly progress report must be certified by the Project Engineer before it is submitted to the Executing Agency ;

- (F) copies of any reports, notices or responses submitted for compliance/non-compliance with Applicable Laws or Applicable Permits, within 2 days of making such submissions to the relevant Government Authority; and
 - (G) reports on any material litigation, including any winding-up proceedings or notice to commence winding-up proceedings or material disputes to which the Concessionaire is a party, appointment of a receiver or administrator in relation to the business or assets of the Concessionaire and any adverse orders or judgments passed by any Government Authorities that affects or is likely to affect the performance of the O&M services, as soon as reasonably possible after the occurrence of any such event.
- (c) It is clarified that the reports set out in this Clause 8.8 will be separately prepared and furnished for the Bhagalpur STP.
 - (d) It is expressly agreed between the Parties that the Bank shall be permitted to inspect the Site and/or all accounts, records, and other documents relating to contract performance of the Concessionaire, as well as its Subcontractors, agents, personnel, consultants, service providers or suppliers, including O&M contractors for the Project and have them audited by auditors appointed by the Bank.

8.9. Design Capacity Utilization

- (a) During each day of the O&M Period, the Concessionaire shall ensure that the STP can accept, treat, and process Sewage up to its Design Capacity.
- (b) The Concessionaire shall notify the Executing Agency (with a copy to the Project Engineer) as soon as it becomes aware that the volume of Sewage received at the STP is more than its Design Capacity.
- (c) In such circumstances, if the Concessionaire is unable to accept and treat the excess Sewage (i.e., over and above the Design Capacity) at the STP, then such failure shall be treated as a Forced Unavailability for which the Concessionaire shall not be liable, subject to the Concessionaire having notified the Executing Agency in accordance with Clause 8.9(b) above. The Executing Agency reserves the right to require the Project Engineer to verify the capacity utilization at the STP, at any time during the O&M Period.

8.10. Testing

- (a) The Sewage and the Treated Effluent will be tested at the Inlet Point and the Outlet Point, respectively in accordance with this Clause 8.10 and the Technical Specifications.
- (b) The Concessionaire shall test the characteristics of the incoming Sewage at the Inlet Point to determine if the incoming Sewage meets the Influent Standards.

The Concessionaire will be required to carry out such tests at the Inlet Point at the intervals specified in the Technical Specifications or at such other time interval as may be instructed by the Executing Agency.

- (c) The Concessionaire shall test the characteristic of the Treated Effluent at the Outlet Point to determine if the Treated Effluent meets the Discharge Standards. The Concessionaire will be required to carry out such tests at the Outlet Point at the intervals specified in the Technical Specifications or such other time interval as may be instructed by the Executing Agency.
- (d) The Concessionaire shall test the characteristics of the Digested Sludge after digestion of the raw Sewage at the STP to assess the volatile suspended solids (VSS) value of the Digested Sludge, in accordance with the Technical Specifications.
- (e) The Concessionaire shall maintain proper records of the tests conducted at the Inlet Point, the Outlet Point or at any other point at the STP (for the Digested Sludge) and the test results shall be verified by the Project Engineer. Separately, the Project Engineer shall also have the right to take random samples of the incoming Sewage, the Digested Sludge and the Treated Effluent at any time during the O&M Period to test compliance with the Influent Standards and the Discharge Standards.
- (f) For the STP, the Concessionaire shall prepare separate daily reports compiling the test reports for each day, which shall be submitted to the Executing Agency, after being duly certified by the Project Engineer.

8.11. Maintenance and Repair of the Facilities

- (a) During the O&M Period, the Concessionaire shall undertake the maintenance of the Facilities and repair any damage to the Facilities either by itself, or through an approved Subcontractor, such that the Facilities shall be:
 - (i) in good working condition (subject only to wear and tear and Force Majeure) and achieve their full useful economic life in accordance with the Designs and Drawings;
 - (ii) maintained in compliance with the Technical Specifications, O&M Manual, Scheduled Maintenance Programme, Applicable Laws, Applicable Permits, Good Industry Practice and the recommendations of the technology providers; and
 - (iii) capable of meeting the KPIs.
- (b) For the first year of the O&M Period, the Concessionaire shall submit its scheduled maintenance programme for the Bhagalpur STP, specifying the Scheduled Maintenance periods for the STP and the impact of such Scheduled Maintenance periods on the Availability of the STP (**Scheduled Maintenance Programme**) to the Executing Agency at least 1 month before the Scheduled COD and for every subsequent year of the O&M Period, the Concessionaire

shall submit the Scheduled Maintenance Programme, at least 1 month prior to the beginning of the relevant year. The Scheduled Maintenance Programme for the first year will cover the period from the COD until the end of the calendar year in which the COD occurs. It is clarified that the Concessionaire shall submit a consolidated Scheduled Maintenance Programme for both the Facilities.

- (c) Within 15 days of receipt of the Scheduled Maintenance Programme, the Executing Agency shall notify the Concessionaire of its approval of such schedule.

If the Executing Agency does not accept any one or more of the requested Scheduled Maintenance periods or its impact on the Availability of a Facility, the Executing Agency shall advise the Concessionaire within 15 days of the receipt of the Scheduled Maintenance Programme on when any Scheduled Maintenance can be rescheduled or how its impact on the Availability of a Facility may be minimised. The rescheduled time shall be as close as reasonably practicable to the requested time, and shall be of equal duration as the requested period. If the Executing Agency fails to object to any Scheduled Maintenance within the specified time period or fails to advise the Concessionaire of a substitute time, the Concessionaire may schedule the Scheduled Maintenance for such duration and at such time as initially requested.

- (d) Notwithstanding the finalization of the Scheduled Maintenance Programme pursuant to this Clause 8.11, the Executing Agency may require the Concessionaire to reschedule a Scheduled Maintenance in the Scheduled Maintenance Programme, provided that:
 - (i) the Executing Agency has given the Concessionaire at least 30 days' prior written notice of such re-scheduling;
 - (ii) the Executing Agency shall not require such Scheduled Maintenance to be rescheduled for a period of shorter or longer duration;
 - (iii) the Executing Agency shall not require that a single Scheduled Maintenance period be split into two or more periods; and
 - (iv) the Executing Agency shall not require that a Scheduled Maintenance be brought forward any earlier than 15 days from the date of such notice without the consent of the Concessionaire.
- (e) Notwithstanding the finalization of the Scheduled Maintenance Programme pursuant to this Clause 8.11, the Concessionaire may request a rescheduling of any Scheduled Maintenance upon 60 days' prior written notice to the Executing Agency. The Executing Agency shall respond to such request within 10 days and shall not unreasonably withhold its permission for such re-scheduling.
- (f) Within 5 days of any re-scheduling of a Scheduled Maintenance in accordance with Clause 8.11(d) or Clause 8.11(e) above, the Concessionaire shall provide to the Executing Agency, the amended Scheduled Maintenance Programme, which shall then be the "**Scheduled Maintenance Programme**".

- (g) During the O&M Period, the Concessionaire shall, at its own cost, replace any component or part of the Facilities that is damaged or worn out or in the Concessionaire's judgement becomes no longer practicable to repair as a result of normal wear and tear.
- (h) If at any time during the O&M Period, a Facility is damaged by a Minor Casualty, the Concessionaire shall, with reasonable diligence, proceed to process the claim with insurance providers and repair, replace, and restore the damaged portion of the Facility to the same condition that it was in before the occurrence of such Minor Casualty. To the extent available, insurance proceeds shall be applied to such repair, replacement or restoration.
- (i) If at any time during the O&M Period, a Facility is damaged by a Total Casualty, then this Agreement shall be terminable at the option of the Concessionaire. If a Total Casualty affects only 1 Facility but not both the Facilities, then, it is clarified that a partial termination of this Agreement to exclude the Facility affected by a Total Casualty shall not be permitted and any termination of this Agreement will be for both the Facilities. If the Concessionaire elects to terminate the Agreement, then the consequences set out at Clause 14.7 will follow. If, however, the Concessionaire elects not to terminate the Agreement, then the Concessionaire shall repair, replace and restore the damaged Facility to the same condition that it was in before the occurrence of such Total Casualty. To the extent available, insurance proceeds shall be applied to such repair, replacement or restoration.

8.12. Key Performance Indicators

(a) Availability

- (i) The Concessionaire shall ensure that the Availability of each Facility on every day during the O&M Period shall be 100% (the **Guaranteed Availability**). Provided that during the period of a Scheduled Maintenance that is undertaken as per the approved Scheduled Maintenance Programme or as notified and approved in accordance with Clause 8.11 for the relevant Facility, the Concessionaire shall ensure that the Guaranteed Availability of such Facility is at least 95%.

The '**Availability**' of each Facility will be determined as a ratio of the number of hours in a day during which such Facility was available to convey, accept and treat the Sewage up to its Design Capacity, to the total number of hours in a day, and the term 'Available' shall be construed accordingly.

- (ii) In computing the Availability of each Facility, the Concessionaire agrees that the Facility will be deemed to be Available at all times, other than during the period of:

- (A) an Unscheduled Outage affecting such Facility;

- (B) a Power Outage affecting such Facility;
- (C) suspension of the O&M services for such Facility, for reasons attributable to the Concessionaire (in accordance with Clause 15.1 and 15.2); or
- (D) an Emergency affecting such Facility, attributable to the Concessionaire,

during which the Facility will be deemed to be not Available.

- (iii) Notwithstanding anything to the contrary contained in this Agreement, during the period of a Forced Unavailability or a Force Majeure, the Facility affected by such Forced Unavailability or a Force Majeure will be deemed to be Available.
- (iv) If the Availability for a Facility on any given day is less than the Guaranteed Availability, the Executing Agency shall issue a notice to the Concessionaire requiring the Concessionaire to cure the default causing the reduction in Availability in 3 days. Any failure to cure the default and achieve the Guaranteed Availability within 3 days of receipt of the notice from the Executing Agency shall constitute a Concessionaire Event of Default.
- (v) ***Availability Liquidated Damages***

Without prejudice to Clause 8.12(a)(iv), if the Availability on any given day is less than the Guaranteed Availability, if the Availability of any Facility on any given day is less than the Guaranteed Availability, then the Concessionaire shall pay the liquidated damages set out in Schedule 6 (the **Availability Liquidated Damages**).

The aggregate Availability Liquidated Damages payable by the Concessionaire in any quarter of the O&M Period will be deducted from the O&M Payments due to the Concessionaire for such quarter. If the Availability Liquidated Damages for a quarter exceed the O&M Payments for such quarter, then the excess amounts shall, at the discretion of the Executing Agency, either be adjusted against the O&M Payments for the subsequent quarter or recovered from the O&M Security.

(b) **Influent Standards and Discharge Standards**

- (i) The Concessionaire is required to receive, treat, and dispose all Sewage delivered to the STP. If, however the Sewage is beyond the Influent Standards as set out in Schedule 9 (*KPIs*), then the Concessionaire shall be required to treat such Sewage but will not be liable for any Performance Liquidated Damages (*defined below*) if the Treated Effluent and/or the Digested Sludge fails to meet the Discharge

Standards

- (ii) Subject to Clause 8.12(b)(i) above, the Concessionaire shall ensure that the Treated Effluent and Digested Sludge comply with the Discharge Standards set out in the Technical Specifications.
- (iii) Subject to Clause 8.12(b)(iv) below, for each Facility, if the Treated Effluent or the Digested Sludge does not comply with the Discharge Standards, then the process set out below shall follow:
 - (A) In the first instance of non-compliance of the Treated Effluent or the Digested Sludge with the Discharge Standards (**First Breach**), the Executing Agency shall issue a notice to the Concessionaire on the first day of such non-compliance (**First Breach Notice**) requiring the Concessionaire to cure the First Breach within 20 days from the date of the First Breach Notice. If the First Breach is cured within 2 days of the First Breach Notice, then the Concessionaire shall not be liable to pay any Performance Liquidated Damages. If, however, the First Breach continues beyond 2 days of the First Breach Notice, then, the Concessionaire shall be liable to pay the Performance Liquidated Damages specified in Schedule 6, from the 3rd day of the First Breach.
 - (B) If: (I) the First Breach continues for 20 days from the date of the First Breach Notice; or (II) another instance of non-compliance with the Discharge Standards occurs within 6 months of the First Breach, then such breach shall constitute the **Second Breach**. Upon occurrence of the Second Breach, the Executing Agency shall issue a notice to the Concessionaire on the first day of the Second Breach (**Second Breach Notice**) requiring the Concessionaire to cure the Second Breach within 20 days from the date of the Second Breach Notice. If the Second Breach continues beyond 2 days of the Second Breach Notice, then, the Concessionaire shall be liable to pay twice the amount of the Performance Liquidated Damages specified in Schedule 6, from the 1st day of the Second Breach. In case of (I) above, it is clarified that the Concessionaire will be liable to pay Performance Liquidated Damages at the rate specified in Schedule 6, for the first 2 days of a continuing breach from the date of the Second Breach Notice and twice the specified Performance Liquidated Damages from the 3rd day of a continuing Second Breach.
 - (C) If: (I) the Second Breach continues for 20 days from the date of the Second Breach Notice; or (II) another instance of non-compliance with the Discharge Standards occurs within 6 months of the Second Breach, then such breach shall constitute the **Third Breach**. Upon occurrence of the Third Breach, the Executing Agency shall issue a notice to the Concessionaire on

the first day of the Third Breach (**Third Breach Notice**) requiring the Concessionaire to cure the Third Breach within 20 days from the date of the Third Breach Notice. If the Third Breach continues beyond 2 days of the Third Breach Notice, then: (X) the Concessionaire shall be liable to pay thrice the amount of the Performance Liquidated Damages specified in Schedule 6, from the 1st day of the Third Breach; and (Y) the Capex Annuity for the relevant quarter(s) will be reduced by an amount equal to the Capex Annuity for the relevant quarter/90 for each day that the Third Breach continues beyond the 1st day of the Third Breach. In case of (I) above, it is clarified that the Concessionaire will be liable to pay twice the Performance Liquidated Damages specified in Schedule 6, for the first 2 days of a continuing breach from the date of the Third Breach Notice and thrice the specified Performance Liquidated Damages from the 3rd day of the Third Breach, in addition to the reduction in the Capex Annuity.

- (D) If: (I) the Third Breach is not cured within 20 days from the Third Breach Notice; or (II) a failure to comply with the Discharge Standards results in occurrence of a Third Breach more than 3 times in a continuous 12 month period, it will be treated as a Concessionaire Event of Default and the consequences set out at Article 16 shall apply.
- (E) The Parties acknowledge that the Performance Liquidated Damages (including any escalation contemplated in this Clause 8.12(b)(iii)) are a genuine pre-estimation of and reasonable compensation for the environmental damage that may be caused by the Concessionaire's continuing failure to comply with the Discharge Standards, and not as penalty. The payment of Performance Liquidated Damages will not absolve the Concessionaire from any other liability under Applicable Law, for causing any environmental pollution or health hazard due to its failure to comply with the Discharge Standards and/or Applicable Law.
- (iv) If the Treated Effluent and/or the Digested Sludge does not meet the Discharge Standards on account of: (A) the characteristics of the Sewage being beyond the permissible Influent Standards; or (B) the volume of the Sewage being more than the Design Capacity of the STP, then, the Concessionaire shall not be liable to pay any Performance Liquidated Damages for a failure to meet the Discharge Standards.
- (v) The Performance Liquidated Damages payable by the Concessionaire in any quarter of the O&M Period will be deducted from the O&M Payments due to the Concessionaire for such quarter. If the Performance Liquidated Damages for a quarter exceed the O&M Payments for such quarter, then the excess amounts shall, at the discretion of the Executing Agency, either be adjusted against the O&M

Payments for the subsequent quarter or recovered from the O&M Security.

- (c) Within 7 days from the end of each month, the Concessionaire shall be required to provide the monthly progress report for each Facility (prepared in accordance with Clause 8.8(c)(iii)(E) above) on compliance of such Facility with the KPIs, which should indicate the periods during which such Facility did not meet the Guaranteed Availability or the Treated Effluent and/or the Digested Sludge did not meet the Discharge Standards and the reasons for such failure. The Project Engineer shall be required to certify each such monthly report before it is provided to the Executing Agency. Such certified report on compliance with KPIs shall be referred to as the **KPI Adherence Report**, and shall form the basis for O&M Payments being made to the Concessionaire during the O&M Period.

8.13. Disposal of STP By-Products and the Treated Effluent

The Concessionaire shall be required to store, handle and dispose the STP By-Products and the Treated Effluent in the manner set out in this Clause 8.13 during the O&M Period:

- (a) Waste Disposal Site
 - (i) Within 30 days from the Effective Date, the Executing Agency shall inform the Concessionaire of each Waste Disposal Site at which the Concessionaire shall be required to dispose the STP By-Products, resulting from the treatment of the Sewage at the STP, and any other waste materials resulting from the construction of the relevant Facility during the Construction Period (including silt).
 - (ii) The Executing Agency may shift any Waste Disposal Site from time to time during the O&M Period provided that, the Waste Disposal Sites will always be within a radius of 10 km from the boundary of the relevant Site and any shifting of a Waste Disposal Site will be with at least 30 days' prior written notice to the Concessionaire.
 - (iii) If, at any time during the O&M Period, the Executing Agency shifts a Waste Disposal Site to a location beyond a radius of 10 km from the boundary of the relevant Site, then, the Executing Agency shall compensate the Concessionaire for any additional transportation costs incurred by the Concessionaire in transporting the STP By-Products, to such Waste Disposal Site.
 - (iv) Any approval for disposal of the STP By-Products at the Waste Disposal Sites will be obtained by the Executing Agency at its cost. Further, all costs and charges in connection with the setting up and maintaining the Waste Disposal Sites (including any tipping fee for the disposal of the STP By-Products) will be borne by the Executing Agency. The Concessionaire shall only be responsible for transporting the STP By-Products to the Waste Disposal Sites and bearing the costs for

transportation and unloading of the STP By-Products at the Waste Disposal Sites.

(b) Disposal of Residual Grit and Screenings

- (i) The Concessionaire shall, at its cost and expense, be required to transfer the Residual Grit and the Screenings to the relevant Waste Disposal Site and shall make adequate transportation arrangements for this purpose.
- (ii) The Concessionaire shall ensure that the Residual Grit and the Screenings are neither disposed at any place on or about the Site, other than the Waste Disposal Sites, nor discharged into the river Ganga. The disposal of the Residual Grit and the Screenings at the Waste Disposal Sites must be strictly in accordance with all Applicable Laws. The Concessionaire shall indemnify the Executing Agency against any costs or liabilities that may arise due to the Concessionaire's failure to comply with this Clause 8.13(b) and all Applicable Laws in disposal of the Residual Grit and the Screenings.

(c) Disposal of Digested Sludge

- (i) As part of each Facility, the Concessionaire shall be required to set up a sludge handling facility at the relevant Site, where the Concessionaire can dry the Digested Sludge during the O&M Period.
- (ii) The Concessionaire shall, at its cost and expense, provide for a storage facility within the Site to temporarily store the dried Digested Sludge until such Digested Sludge is sold or disposed in accordance with this Agreement. For the STP, the Executing Agency shall provide access to a temporary storage facility for the Digested Sludge at no additional cost to the Concessionaire.
- (iii) The Concessionaire shall, subject to compliance with Applicable Laws and Applicable Permits, be free to sell the Digested Sludge, at such price and to such Persons as it may deem fit or dispose the Digested Sludge at the Waste Disposal Sites. Provided that if the Concessionaire sells the Digested Sludge to any third party, the Concessionaire shall be required to share 50% of the revenues from such sale with the Executing Agency .
- (iv) The Concessionaire shall maintain proper records of sale of any Digested Sludge generated from the Facilities (including the revenues earned by the Concessionaire from such sale) and make them available to the Executing Agency for its review.
- (v) The Concessionaire shall ensure that the Digested Sludge is neither disposed at any place on or about the Site, except the Waste Disposal Sites, nor discharged into the river Ganga. The Concessionaire shall indemnify the Executing Agency against any costs or liabilities that may arise due to the Concessionaire's failure to comply with this Clause

8.13(c) and all Applicable Laws in disposal of the Digested Sludge.

- (d) Disposal of Treated Effluent
 - (i) The Concessionaire is required to transfer the Treated Effluent through the Supporting Infrastructure to any discharge point(s) indicated by the Executing Agency.
 - (ii) The Concessionaire is not permitted to divert, transfer or sell the Treated Effluent generated from the STP to any third party.
- (e) Rights and interest in the STP By-Products and the Treated Effluent
 - (i) All rights and interest in the STP By-Products discharged from the STP shall vest with the Concessionaire at all times during the O&M Period, unless transferred by the Concessionaire to a third party buyer/offtaker in accordance with this Agreement.
 - (ii) All rights and interest in the Treated Effluent discharged from the STP shall vest with the Concessionaire at all times during the O&M Period, unless transferred by the Concessionaire to the Executing Agency in accordance with this Agreement.

8.14. Remedial Measures

If after the COD, the Concessionaire ceases to operate any Facility for a period of 48 consecutive hours other than due to a Forced Unavailability, Scheduled Maintenance, or a suspension pursuant to Clause 15.1 or Clause 15.2, which is not attributable to the Concessionaire, or a Force Majeure Event, without the prior written consent of the Executing Agency, then the Executing Agency shall be entitled to step-in and undertake O&M of such Facility until the Concessionaire demonstrates to the satisfaction of the Executing Agency that it can and will resume normal operation and maintenance of the relevant Facility. The exercise of the Executing Agency's rights under this Clause 8.14 shall be at the cost, risk and expense of the Concessionaire. The Concessionaire shall not be entitled to receive any O&M Charges for the duration that the Executing Agency steps-in to operate and maintain the relevant Facility.

8.15. O&M Personnel

- (a) The Concessionaire shall engage (either directly or through an approved Subcontractor) adequate number of suitably skilled and qualified personnel to undertake the O&M of the Facilities in accordance with the requirements set out in this Article 8.
- (b) The Concessionaire shall be solely responsible for discharging all obligations in connection with the employment of the O&M personnel, including the payment of wages, salaries, Taxes, and retrenchment compensation and providing all amenities and benefits required under applicable labour laws.
- (c) Subject to compliance with the Applicable Laws, the Concessionaire shall have full freedom to determine its internal human resources (HR) policies, including, the wages, benefits and salary structure of its employees, the conditions of service, the shifts of work,

its hire and fire policy (whether for misconduct or other cause), and payment of severance or retrenchment compensation.

- (d) The Executing Agency is not and shall not be treated as the "principal employer" of or be deemed to have any contractual or other relationship with the O&M personnel. The Concessionaire shall hold harmless and indemnify the Executing Agency against all losses, claims, costs and damages that the Executing Agency may suffer due to the Concessionaire's or any of its Subcontractor's failure to comply with applicable labour laws.

9. PAYMENT AND INVOICING

9.1. In consideration of the works and services required to be performed by the Concessionaire for designing, financing, constructing, operating and maintaining the Facilities in accordance with this Agreement, the Concessionaire shall be entitled to receive the Construction Payments and the O&M Payments from NMCG in accordance with this Article 9.

9.2. The Concessionaire shall be deemed to have satisfied itself regarding the adequacy, accuracy and sufficiency of the Construction Payments and the O&M Payments. Except for any adjustment in accordance with Clause 8.13(a) and Clause 13.2, or any permitted Variation, the Construction Payments and the O&M Payments are the total consideration payable to the Concessionaire for undertaking the Project.

9.3. Construction Payments

- (a) NMCG shall deposit an amount equivalent to the first 2 Payment Milestones in the Escrow Account in accordance with Clause 9.5 and the Escrow Agreement, prior to the Effective Date. From the Effective Date and during the Construction Period, NMCG shall ensure that the Escrow Account is funded with an amount equivalent to the next 2 Payment Milestones for the Facilities.
- (b) 10% of the Bid Project Cost for the relevant Facility shall be given to the Concessionaire as a Mobilization Advance in accordance with Clause 9.3(d), which will be adjusted against the Construction Payments to be paid by NMCG to the Concessionaire in 4 instalments, in accordance with Clause 9.3(e). The Construction Payments will be paid to the Concessionaire upon completion of the work corresponding to the Payment Milestones and certification of completion of such Payment Milestones by the Executing Agency in accordance with Clause 7.13.
- (c) Adjustment in Construction Payments
 - (i) The Construction Payments shall be adjusted during the Construction Period to reflect the variation in the Construction Price Index occurring after the Reference Index Date immediately preceding the Bid Due Date.
 - (ii) All Invoices to be submitted by the Concessionaire to the Executing Agency for any instalment of the Construction Payments shall be the product of the relevant percentage of the Bid Project Cost and the Price Index Multiple applicable on the date of the Invoice.

(d) Mobilization Advance

- (i) 10 % of the Bid Project Cost shall be payable to the Concessionaire as the Mobilization Advance, within 30 days from the Effective Date, subject to the Concessionaire having submitted a Mobilization Advance Guarantee in accordance with Clause 5.21.
- (ii) The Mobilization Advance shall be deducted in equal instalments from the 4 instalments of the Construction Payments to be made to the Concessionaire upon progressive completion of the Payment Milestones.
- (iii) However the Concessionaire is liable to pay a simple interest at the rate of 8% on the Mobilization Advance, if the Payment Milestones are not achieved by the Concessionaire in accordance with the agreed Construction Plan and for the reasons attributed to the Concessionaire. The interest shall be payable for the period between the actual Payment Milestone and agreed Payment Milestone. The interest amount shall be deducted along with the Mobilization Advance from the Construction Payments.

(e) Milestone Construction Payments

- (i) Subject to this Clause 9.3(e), for each Facility, the Construction Payments will be paid by NMCG to the Concessionaire in the following 4 equal instalments (**Payment Milestones**) (after adjusting the Mobilization Advance (and the interest payable if any as per clause 9.3(d)(iii) on the Mobilization Advance):
 - (A) 1st instalment of 10% of the relevant Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, upon the expiry of 5 months from the Effective Date or issuance of the first Milestone Completion Certificate, whichever is earlier;
 - (B) 2nd instalment of 10% of the relevant Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, upon the expiry of 10 months from the Effective Date or issuance of the second Milestone Completion Certificate, whichever is earlier;
 - (C) 3rd instalment of 10% of the relevant Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date of the relevant Invoice, upon the expiry of 15 months from the Effective Date or issuance of the third Milestone Completion Certificate, whichever is earlier; and
 - (D) 4th instalment of 10% of the relevant Bid Project Cost, as adjusted for the Price Index Multiple applicable on the date

of the relevant Invoice, upon the expiry of 21 months from the Effective Date or issuance of the Construction Completion Certificate, whichever is earlier.

- (ii) For each Facility, within 7 days of issuance of the Milestone Completion Certificate for a Payment Milestone, the Concessionaire shall submit an Invoice to the Executing Agency for the amount of the Construction Payment linked to such Payment Milestone. Any Invoice raised by the Concessionaire for the Construction Payments shall be accompanied by a copy of the relevant Milestone Completion Certificate issued by the Executing Agency.
- (iii) Within 10 days of receipt of an Invoice from the Concessionaire pursuant to Clause 9.3(e)(ii) above, the Executing Agency shall verify and certify the amounts due and payable to the Concessionaire, and either:
 - (A) approve the Invoice and issue a certificate to the Escrow Bank (with a copy to NMCG and the Concessionaire), conveying its approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with this Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws); or
 - (B) issue a notice to the Concessionaire disputing the Invoice and directing the Concessionaire to issue a revised Invoice, after rectifying the errors or discrepancies identified by the Executing Agency .

The Concessionaire shall submit a revised Invoice to the Executing Agency after rectifying the errors or discrepancies identified by the Executing Agency and this process will be repeated until the Executing Agency approves the Invoice and issues a certificate to the Escrow Bank (with a copy to NMCG and the Concessionaire), conveying its approval for release of the amount specified in the Invoice.
- (iv) Any dispute between the Parties in relation to a disputed Invoice will be settled in accordance with Article 21 (*Dispute Resolution*).
- (v) A certificate issued by the Executing Agency in accordance with Clause 9.3(e)(iii) shall be referred to as a **Payment Certificate**.
- (vi) If, within 10 days from the date of receipt of an Invoice, the Executing Agency does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the Executing Agency , and the Concessionaire shall have the right to issue instructions to the Escrow Bank (with a copy to the Executing Agency and NMCG) to release the amounts specified in the Invoice, upon the expiry of the 10-day period.
- (vii) Immediately upon receipt of a Payment Certificate from the Executing Agency in accordance with Clause 9.3(e)(iii) or upon receipt of instructions from the Concessionaire in accordance with Clause

9.3(e)(vi), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice, in accordance with the Escrow Agreement.

(viii) Notwithstanding anything to the contrary in this Agreement, the Executing Agency shall have no obligation to issue a Payment Certificate unless:

(A) the Performance Security remain valid and in effect;

(B) the insurances to be obtained by the Concessionaire in accordance with Clause 11.2 are valid and in effect;

(C) the Concessionaire Applicable Permits for construction of the Facilities are in full force and effect, unless the withdrawal or cancellation of any Applicable Permit is not attributable to the Concessionaire's failure to comply with Applicable Laws;

(D) the Concessionaire has complied with the ESHS Documents in undertaking the construction of the Facilities; and

(E) there is no subsisting Concessionaire Event of Default.

(f) The Concessionaire shall be paid the Construction Payments in Rupees. However, if, in the Financial Proposal, the Selected Bidder specified any percentage of the Bid Project Cost which it would want to receive in a foreign currency during the Construction Period, then the Construction Payments corresponding to such percentage of the Bid Project Cost shall be paid to the Concessionaire in the relevant foreign currency. For the purpose of payment in a foreign currency, the exchange rate shall be []. It is clarified that the aggregate Construction Payments due to the Concessionaire shall not exceed 40% of the Bid Project Cost, as quoted by the Selected Bidder in Rupees and adjusted for inflation as per Clause 9.3(c), on account of a percentage of the Bid Project Cost being paid to the Concessionaire in foreign currencies.

9.4. O&M Payments

(a) During the O&M Period, NMCG shall be required to make the O&M Payments in Rupees to the Concessionaire for each Facility comprising the Capex Annuity, the interest on the reducing balance of 60% of the Completion Cost, the O&M Charges and the Power Charges, in accordance with this Clause 9.4.

(b) Calculation of Completion Cost

(i) The Completion Cost for the Facilities will be the aggregate of (A) – (D) below, for the relevant Facility:

(A) 25% of the Bid Project Cost for the relevant Facility adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the first Payment

Milestone;

- (B) 25% of the Bid Project Cost for the relevant Facility adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the second Payment Milestone;
 - (C) 25% of the Bid Project Cost for the relevant Facility adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the third Payment Milestone; and
 - (D) 25% of the Bid Project Cost for the relevant Facility adjusted for the Price Index Multiple as applicable on the Reference Index Date preceding the date of the Invoice for the fourth Payment Milestone.
- (ii) 60% of the Completion Cost will be paid in quarterly instalments during the O&M Period as Capex Annuity.
- (c) On and from the COD and during the O&M Period, NMCG shall deposit the O&M Payments for each Facility in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuity (along with interest), the O&M Charges and the estimated Power Charges for the next 2 years for each Facility.
- (d) Adjustment in O&M Charges
- (i) The O&M Charges shall be adjusted during the O&M Period to reflect the variation in the O&M Price Index occurring after the Reference Index Date immediately preceding the Bid Due Date.
 - (ii) All Invoices to be submitted by the Concessionaire to the Executing Agency for the quarterly O&M Charges shall be the product of the applicable O&M Charges for the relevant quarter and the Price Index Multiple applicable on the date of the Invoice.
- (e) Capex Annuity
- (i) The Capex Annuity shall be payable in 60 equal quarterly instalments during the O&M Period.
 - (ii) Interest shall be payable on the reducing balance of 60% of the Completion Cost for the relevant Facility, at the rate of the SBI MCLR plus 3% per annum. Such interest shall be due and payable quarterly along with each instalment of the Capex Annuity. The Parties agree that such interest shall be calculated on the basis of the number of days for which the relevant rate of the SBI MCLR was applicable during the

period of calculation.

By way of illustration, assuming that the balance Completion Cost to be paid to the Concessionaire on the date of payment of the 1st Capex Annuity instalment is INR 50,00,00,000 (Rupees fifty crores), the applicable SBI MCLR for the first 50 days is 8% and thereafter it is revised to 7.5% and remains unchanged till the date of payment of the 2nd Capex Annuity, the interest would be calculated as $((50 \times 11\% \times 50) / 365) + ((50 \times 10.5\% \times 40) / 365)$. For the avoidance of doubt, the interest shall be calculated on simple interest basis and the interest shall not be compounded for the purpose of payment.

(f) O&M Charges

- (i) The O&M Charges for the first quarter after COD will be calculated on the basis of the O&M Charges quoted by the Selected Bidder in the Financial Proposal for the first month from the COD, which amount shall be adjusted for the Price Index Multiple applicable on the Reference Index Date preceding the date of the first Invoice for the O&M Payments.
- (ii) For each subsequent quarter of the O&M Period, the O&M Charges will be adjusted for the Price Index Multiple applicable on the Reference Index Date preceding the date of the relevant Invoice for the O&M Payments.

(g) Power Charges

- (i) The Power Charges for the Facilities shall initially be borne by the Concessionaire, which shall be reimbursed by NMCG to the Concessionaire, subject to a cap of: (A) the Power Charges based on the Guaranteed Energy Consumption.
- (ii) The Power Charges for any given quarter of the O&M Period will be calculated as follows:
 - (A) For the units of energy consumed from the grid (as evidenced by a copy of the bill issued by the distribution licensee), the Power Charges will be calculated by multiplying the number of units consumed in such quarter (subject to the Guaranteed Energy Consumption for the energy consumed by the relevant Facility) with the Power Unit Rate.

If the Concessionaire procures power from outside Bihar, then, the Power Unit Rate will be the prevalent power unit rate in Bihar or the tariff at which the Concessionaire procures power from outside Bihar, whichever is lower.

- (B) If there is any interruption in the supply of power from the grid, and the Concessionaire uses backup power supply from the DG

Sets, then,

- (I) the Concessionaire's Representative and the Executing Agency shall jointly take readings from the meters installed at the DG Sets to determine the number of units of energy consumed from the DG Sets for O&M of the relevant Facility;
 - (II) the number of units of energy consumed from the DG Sets (determined as per (I) above) shall be adjusted such that the aggregate of the total number of units consumed from the grid and the total number of units consumed from the DG Sets shall not exceed the Guaranteed Energy Consumption for the relevant Facility (**Adjusted DG Set Units**);
 - (III) the quantity of diesel consumed to generate the Adjusted DG Set Units in the relevant quarter shall be calculated by the Executing Agency based on the rated specific fuel consumption of the DG Sets specified by the manufacturers of the DG Sets; and
 - (IV) the Power Charges for the Adjusted DG Set Units will be calculated by multiplying the quantity of diesel consumed (determined as per (III) above) with the Fuel Price.
- (C) For each Facility, the Concessionaire shall be liable to pay liquidated damages to the Executing Agency for any units of energy consumed beyond the Guaranteed Energy Consumption (whether from the grid or from the DG Sets) for such Facility (**Power Consumption Liquidated Damages**), which will be calculated as follows:
- (I) For excess power consumption up to 5% of the Guaranteed Energy Consumption of the relevant Facility:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant quarter – Guaranteed Energy Consumption for such quarter) * [Power Unit Rate] * 0.25
 - (II) For excess power consumption between 5% and 10% of the Guaranteed Energy Consumption of the relevant Facility:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant quarter – Guaranteed Energy Consumption for such quarter) *

[Power Unit Rate] * 0.5

- (III) For excess power consumption above 10% of the Guaranteed Energy Consumption of the relevant Facility:

Power Consumption Liquidated Damages: (Number of power units consumed in the relevant quarter – Guaranteed Energy Consumption for such quarter) * [Power Unit Rate]

- (D) The Power Consumption Liquidated Damages payable by the Concessionaire in any quarter of the O&M Period will be deducted from the O&M Charges for the relevant Facility payable to the Concessionaire for such quarter. If the Power Consumption Liquidated Damages for a quarter exceed the O&M Charges for the relevant Facility for such quarter, then the excess amounts shall, at the discretion of the Executing Agency, either be adjusted against the O&M Charges for the relevant Facility for the subsequent quarter or recovered from the relevant O&M Security.
- (h) The O&M Payments shall be paid by NMCG to the Concessionaire on a quarterly basis. For each Facility, the Concessionaire shall submit an Invoice to the Executing Agency for each quarter on or before the 7th day of the first month of the following quarter, which should set out: (i) the Capex Annuity due to the Concessionaire in such quarter, along with interest in accordance with Clause 9.4(d)(ii) above; (ii) the O&M Charges due to the Concessionaire in such quarter; and (iii) the Power Charges incurred by the Concessionaire during such quarter for power drawn from the grid or the DG Sets, subject to the cap of the Power Charges based on the Guaranteed Energy Consumption for the relevant Facility. Any Invoice raised by the Concessionaire for O&M Payments shall be accompanied with a copy of the: (A) KPI Adherence Report for each month of the relevant quarter, duly certified by the Project Engineer; and (B) copy of the bill(s) issued by the state distribution utility for the Power Charges, and if relevant, copy of the joint meter reading for consumption of power from the DG Sets.

If the Invoice is not accompanied with the supporting documents specified at (A) and (B) above, the Executing Agency shall not be required to process such Invoice.

- (i) Within 10 days of receipt of an Invoice from the Concessionaire pursuant to Clause 9.4(h) above, the Executing Agency shall verify and certify the amounts due and payable to the Concessionaire, and either:
- (i) **approve the Invoice and issue a certificate to the Escrow Bank (with a copy to NMCG and the Concessionaire), conveying its approval for the release of the amount specified in the Invoice, less any necessary deductions or adjustments in accordance with this Agreement and/or Applicable Laws (including any**

statutory dues); or

- (ii) issue a notice to the Concessionaire disputing the Invoice and directing the Concessionaire to issue a revised Invoice, after rectifying the errors or discrepancies identified by the Executing Agency .

The Concessionaire shall submit a revised Invoice to the Executing Agency after rectifying the errors or discrepancies identified by the Executing Agency and this process will be repeated until the Executing Agency approves the Invoice and issues a certificate to the Escrow Bank (with a copy to NMCG and the Concessionaire), conveying its approval for release of the amount specified in the Invoice.

- (j) Any dispute between the Parties in relation to a disputed Invoice will be settled in accordance with Article 21 (*Dispute Resolution*).
- (k) A certificate issued by the Executing Agency in accordance with Clause 9.4(i) shall be referred to as a **Payment Certificate**.
- (l) If, within 10 days from the date of receipt of an Invoice, the Executing Agency does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the Executing Agency , and the Concessionaire shall have the right to issue instructions to the Escrow Bank (with a copy to the Executing Agency and NMCG) to release the amounts specified in the Invoice, upon the expiry of the 10-day period.
- (m) Immediately upon receipt of a Payment Certificate in accordance with Clause 9.4(i)(A) or upon receipt of instructions from the Concessionaire in accordance with Clause 9.4(l), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice, in accordance with the Escrow Agreement.
- (n) Notwithstanding anything to the contrary in this Agreement, the Executing Agency shall have no obligation to issue a Payment Certificate unless:
 - (i) the O&M Security remain valid and in effect;
 - (ii) the insurances to be obtained by the Concessionaire in accordance with Clause 11.2 are valid and in effect;
 - (iii) the Concessionaire Applicable Permits for O&M of the Facilities are in full force and effect, unless the withdrawal or cancellation of any Applicable Permit is not attributable to the Concessionaire's failure to comply with Applicable Laws;
 - (iv) the Concessionaire has complied with the **ESHS Documents** in undertaking the O&M of the Facilities; and
 - (v) there is no subsisting Concessionaire Event of Default.

9.5. Escrow Account

(a) Prior to the Effective Date, the Concessionaire, NMCG, the Executing Agency and the Escrow Bank shall enter into the Escrow Agreement and NMCG shall open the Escrow Account with the Escrow Bank in accordance with the Escrow Agreement, which shall be operational until the expiry of the Term. The Escrow Agreement shall set out the terms of appointment of the Escrow Bank, NMCG's obligation to deposit the Construction Payments and the O&M Payments in accordance with this agreement with the Escrow Bank and terms of withdrawal of amounts from the Escrow Account.

(b) Minimum Escrow Balance

(i) NMCG shall deposit an amount equivalent to the first 2 Payment Milestones prior to the Effective Date. From the Effective Date and during the Construction Period, NMCG shall ensure that the Escrow Account is funded with an amount equivalent to the next 2 Payment Milestones for the Facilities; and

(ii) on and from the COD and during the O&M Period, NMCG shall deposit the O&M Payments in the Escrow Account such that the Escrow Account is funded at all times with the Capex Annuity (along with interest), the O&M Charges and the estimated Power Charges for the next 2 years for the Facilities,

(the **Minimum Escrow Balance**).

If at any time during the Construction Period or the O&M Period, the balance in the Escrow Account falls below the Minimum Escrow Balance, NMCG shall promptly, and in any event, no later than 90 days, fund the Escrow Account such that the Minimum Escrow Balance is maintained. A failure to maintain the Minimum Escrow Balance for 90 days would be treated as a NMCG Event of Default and the consequences set out in Article 16 would follow.

It is clarified that any interest earned on the amounts deposited by NMCG in the Escrow Account will be counted towards the Minimum Escrow Balance.

(c) The Concessionaire shall be entitled to withdraw amounts from the Escrow Account in accordance with the provisions of this Agreement and the Escrow Agreement.

9.6. Taxes and Royalties

(a) The Construction Payments and the O&M Payments are inclusive of all Taxes other than service tax, which will be paid separately, at actuals.

(b) The Executing Agency may deduct from the Construction Payments, the O&M Payments and any other amounts due to the Concessionaire, any income tax or withholding tax that is required to be deducted at source.

(c) The Concessionaire shall be responsible for payment of all applicable Taxes,

including all procedural compliances related to the payment of Taxes pursuant to this Agreement, and shall be solely responsible for any proceedings initiated by any Government Authority, in respect of any non-payment or short-payment of Taxes.

- (d) The Concessionaire shall be responsible for payment of all applicable royalties on any fine and coarse aggregate, core sand, fine sand, grit and any other minerals extracted and/or used by the Concessionaire or any Subcontractor during the Construction Period, and furnish proof of payment of such royalties to the Executing Agency along with the Invoices for the Construction Payments.
- (e) Upon a request from the Concessionaire, NMCG/Executing Agency will provide all relevant certificates and information to enable the Concessionaire to obtain any Tax exemptions available in relation to the Project. It is clarified that the Executing Agency shall not be responsible in any manner for ensuring that any applicable Tax exemptions are available to the Concessionaire.
- (f) The Concessionaire shall indemnify NMCG and the Executing Agency from and against any cost or liability that may arise due to the Concessionaire's failure to pay all applicable Taxes, in connection with the Project.
- (g) Any Taxes payable in relation to the Site shall be borne by the Executing Agency.

9.7. Default Interest

Upon any Party's failure to make a payment due and payable by it on the due date for such payment, the defaulting Party shall be liable to pay default interest on all such outstanding amounts at the prevailing SBI MCLR + 3% per annum or part thereof. This is without prejudice to any Party's right to terminate this Agreement in accordance with Article 16 or any other right or remedy available to it under this Agreement or Applicable Laws.

9.8. Right of Set-Off

The Concessionaire shall not be entitled to retain or set off any amount due to NMCG or the Executing Agency by it, but NMCG or the Executing Agency may retain or set off any amount owed to it by the Concessionaire under this Agreement, which has fallen due and payable against any amount due to the Concessionaire under this Agreement. NMCG shall notify the Concessionaire at the time it exercises its right to set-off and shall provide the Concessionaire its reasons for exercising such right to set-off.

10. FINANCING ARRANGEMENTS AND SECURITY

10.1. Financing and Bankability Support

- (a) The Parties acknowledge that for the purposes of implementing the Project, the Concessionaire may require Financial Assistance from the Lenders. To this end, the Executing Agency shall co-operate with the Concessionaire to achieve Financial Close, including by signing any relevant documents and providing

such consents and waivers as may be reasonably required by the Lenders.

- (b) In case of a Concessionaire Event of Default, the Executing Agency and NMCG acknowledge that the Lenders will have a right to substitute the Concessionaire in accordance with Clause 16.2 and the Substitution Agreement. The Executing Agency will suspend its right to step-in or terminate this Agreement until the expiry of the period available to the Lenders to exercise their substitution rights under Clause 16.2.

10.2. **Security Creation**

- (a) The Concessionaire shall be entitled to create Security over all of its rights, title and interests in and to the Concession Agreement and the Escrow Agreement in favour of the Lenders for the purpose of obtaining Financial Assistance for the Project, provided that the creation of such Security will not result in any financial liability to the Executing Agency or NMCG.
- (b) The Concessionaire shall be entitled to include the Lenders as co-insured and/or additional loss payees in any of the insurances taken by the Concessionaire in accordance with Clause 11.2 and/or grant Security over the proceeds of such insurance.
- (c) Except for any Security created by operation of law and any Security created pursuant to this Clause 10.2, the Concessionaire shall not be entitled to create any other Security over the Concession Agreement, the Escrow Agreement or insurance policies taken by it in favour of any third Persons, without the prior written consent of the Executing Agency, which consent the Executing Agency may deny in its sole discretion.
- (d) The Concessionaire shall not be entitled to create any Security over the Site or any part thereof, or any of the Facilities or the Power Plant, whether in favour of the Lenders or any third Persons.

11. **INSURANCE AND INDEMNITIES**

11.1 **Indemnity and Limitation of Liability**

- (a) Subject to Clause 11.1(b) below, the Concessionaire shall be responsible for, release, hold harmless and indemnify the Executing Agency, NMCG, the Executing Agency Related Parties and the NMCG Related Parties on demand from and against, all suits, actions, claims, demands, losses, damages, fines, penalties, costs or expenses (including costs of legal fees) or liability for:
 - (i) death or personal injury of any person;
 - (ii) loss of or damage to property;
 - (iii) non-compliance with Applicable Laws or Applicable Permits (including specifically, environmental laws and environmental consents);

(iv) any damage caused to the environment by the Concessionaire (including specifically, due to the Concessionaire's failure to meet the Discharge Standards); and

(v) any third party losses or claims;

which may arise out of, or in consequence of the performance or non-performance of the Concessionaire's obligations under this Agreement.

(b) The Concessionaire shall not be responsible or be obliged to indemnify the Executing Agency or NMCG for any injury, loss, damage, cost and expense caused by the negligence or Wilful Misconduct of the Executing Agency , NMCG, the Executing Agency Related Parties or the NMCG Related Parties or by a breach by the Executing Agency or NMCG of their respective obligations under this Agreement.

(c) The Executing Agency and NMCG shall have the right, but not the obligation, to contest, defend, and litigate any claim, action, suit or proceeding by any third party alleged or asserted against them in respect of, resulting from, related to or arising out of any matter for which they are entitled to be indemnified under this Agreement, and the reasonable costs and expenses (including legal fees) thereof, shall be subject to the indemnification obligations of the Concessionaire.

If, however, the Concessionaire acknowledges in writing its obligations to indemnify the Executing Agency and/or NMCG in respect of loss to the full extent provided by this Agreement, the Concessionaire shall be entitled, at its option, to assume and control the defence of such claim, action, suit or proceeding at its expense and through a counsel of its choice if it gives prompt notice of its intention to do so to the Executing Agency and NMCG and reimburses the Executing Agency and/or NMCG for the costs and expenses incurred by the Executing Agency and/or NMCG prior to the assumption by the Concessionaire of such defence. A Party shall not settle or compromise any such claim, action, suit or proceeding without the prior written consent of the other Parties, which consent shall not be unreasonably withheld or delayed. Notwithstanding the foregoing, the Executing Agency and/or NMCG shall have the right to employ its own counsel and such counsel may participate in such action, but the fees and expenses of such counsel, as and when incurred, shall be at the expense of the Executing Agency or NMCG, as the case may be.

(d) The Executing Agency shall be responsible for, release, hold harmless and indemnify the Concessionaire and the Concessionaire Related Parties on demand from and against, all suits, actions, claims, demands, losses, damages, fines, penalties, costs or any other liability incurred or suffered by the Concessionaire under Applicable Laws, or pursuant to the law of torts, principles of absolute liability or strict liability or polluter pays principle, as a result of any environmental pollution or health hazard caused by the quality of raw Sewage which is delivered at the Facilities.

- (e) Limitation of liability
- (i) Notwithstanding anything to the contrary contained in this Contract, the maximum overall liability of any Party under this Agreement shall not exceed INR 125,00,00,000 (Rupees one hundred and twenty five crores).
 - (ii) Provided that the limitation of liability set out in Clause 11.1(e) above shall not apply to the following:
 - (A) breach of Applicable Law and Applicable Permits;
 - (B) breach of any third party Intellectual Property Rights;
 - (C) fraud and Wilful Misconduct;
 - (D) gross negligence;
 - (E) damages to or loss of third party property;
 - (F) damage caused to the environment;
 - (G) misrepresentation by the Concessionaire; and
 - (H) health hazard, bodily injury or loss of life.
 - (iii) The Parties agree and acknowledge that the provisions of this Clause 11.1(e) in respect of limitation and exclusion of liabilities is an agreed allocation of risk between the Parties, the sufficiency of which the Parties hereby agree and acknowledge.
- (f) The provisions of this Clause 11.1 shall survive the termination of this Agreement.

11.2 Insurance

- (a) The Concessionaire shall, obtain and maintain the policies of insurance set out below in the minimum coverage amounts and during the specified periods separately for each Facility. In addition, the Concessionaire shall obtain any additional coverage required by Applicable Laws and/or deemed necessary by the Concessionaire, the Lenders or the Executing Agency in accordance with this Clause 11.2.

Insurances during the Construction Period

During the Construction Period, the Concessionaire shall obtain and maintain such insurances for such maximum sums as may be required under the Financing Documents and Applicable Laws, and such insurances as may be necessary or prudent in accordance with Good Industry Practices.

Insurances during the O&M Period

During the O&M Period, the Concessionaire shall obtain and maintain insurance policies including but not limited to the following:

- (i) loss, damage or destruction of the Facilities, at replacement value;
 - (ii) comprehensive third party liability insurance including injury to or death of personnel of the Executing Agency or NMCG or others caused by the Project;
 - (iii) the Concessionaire's general liability arising out of the Project;
 - (iv) liability to third parties for goods or property damage;
 - (v) workmen's compensation insurance; and
 - (vi) any other insurance that may be necessary to protect the Facilities, the Concessionaire and its employees, including for all Force Majeure Events that are insurable at commercially reasonable premiums and not otherwise covered in items (i) to (v) above.
- (b) The level of insurance to be maintained by the Concessionaire after repayment of the Lenders' dues in full shall be determined on the same principles as applicable for determining the level of insurance prior to such repayment of the Lenders' dues, in accordance with the Financing Documents.
- (c) The Concessionaire shall, within 30 days of the Effective Date, provide a notice to the Executing Agency, setting out information in respect of the insurances that it proposes to effect and maintain. Within 15 days of receipt of such notice, the Executing Agency may require the Concessionaire to effect and maintain such other insurances as it may deem necessary, and in the event of any difference or disagreement relating to any such insurance, the provisions of Article 21 (*Dispute Resolution*) shall apply.
- (d) The Concessionaire shall purchase insurance from reputable Indian and/or international companies licensed to operate in India, at competitive terms, and shall maintain the insurances on terms consistent with Good Industry Practices. Within 15 days of obtaining any insurance cover, the Concessionaire shall furnish to the Executing Agency, notarised true copies of the certificate(s) of insurance, copies of insurance policies and premia payment receipts in respect of such insurance.
- (e) Each insurance policy shall contain the following endorsements:
- (i) **the Executing Agency shall be additional insured under all policies maintained by the Concessionaire in relation to the Site and the Project, against loss or damage;**
 - (ii) **the insurers shall waive all rights of subrogation against the Executing Agency**

and NMCG;

- (iii) **the insurance policy may not be cancelled or materially changed by the insurer without giving 45 days' prior written notice, except in the case of non-payment, in which case it will be 10 days' prior written notice, to the Executing Agency ; and**
- (iv) **the Executing Agency shall not be responsible for payment of any insurance premium.**
- (f) Any changes in the insurances which impact the Site or the Project will need the prior written consent of the Executing Agency, which consent shall not be unreasonably withheld.
- (g) The Concessionaire shall apply proceeds from all insurance claims, except life and injury, for any necessary repair, reconstruction, reinstatement, replacement, improvement, delivery or installation of the Facilities, and the balance remaining, if any, shall be applied in accordance with the provisions contained in this behalf in the Financing Documents.
- (h) If the Concessionaire fails to procure or maintain any insurance required pursuant to this Clause 11.2 which is required to be obtained for the Site or the Project, the Executing Agency shall have the right to procure and maintain such insurance in accordance with the requirements of this Clause 11.2 and charge the full cost thereof to the Concessionaire.

12. CHANGE IN OWNERSHIP

12.1. Ownership Information

The Selected Bidder shall inform the Executing Agency that it has caused the Concessionaire to be incorporated as a special purpose company to implement the Project and undertake other obligations of the Concessionaire under and in accordance with this Agreement. The shareholding pattern of the [Selected Bidder/Members]⁹ in the Concessionaire is as follows:

S. No.	Name of the shareholder	No. of shares held	Nature of the shares [Equity/Preference]	Value of the shares held [in Rs.]	Shareholding [in %]

The Concessionaire represents and warrants to the Executing Agency and NMCG that no arrangements are in place that have resulted or may result in a breach of the change in ownership restrictions set out in Clause 12.2 below.

⁹ Delete Member if the Selected Bidder is a single entity.

12.2. **Change in Ownership Restrictions**

- (a) [The Concessionaire shall ensure that the Selected Bidder holds at least 51% of the total Capital and voting rights of the Concessionaire until the COD, and at least 26% of the total Capital and voting rights of the Concessionaire until 3 years after the COD.

After the expiry of 3 years from the COD, the Selected Bidder can exit the Concessionaire, subject to: (i) the entity acquiring the shareholding of the Selected Bidder in the Concessionaire meeting the O&M qualification criteria set out in the RFP; or (ii) the Concessionaire appointing an O&M contractor who complies with the technical qualification criteria set out in the RFP.]¹⁰

OR

- (a) [The Concessionaire shall ensure that Members of the Selected Bidder, being the shareholders of the Concessionaire, comply with the following ownership restrictions:

- (i) the Lead Member shall hold at least 26% of the total Capital and voting rights of the Concessionaire until 3 years after the COD; and
- (ii) any Member of the Consortium, other than the Lead Member, whose Technical Capacity or Financial Capacity is being assessed, shall hold at least 26% of the total Capital and voting rights of the Concessionaire until 3 years after the COD.

After the expiry of 3 years from the COD, the Lead Member and other Members can exit the Concessionaire, subject to: (A) the Member who demonstrated the O&M experience for the purposes of qualification continuing to be part of the Concessionaire; or (B) the entity acquiring the shareholding of the Lead Member/any other Member in the Concessionaire meeting the O&M qualification criteria set out in the RFP; or (C) the Concessionaire appointing an O&M contractor who complies with the O&M qualification criteria set out in the RFP.]¹¹

- (b) The Concessionaire shall ensure that the change in ownership restrictions set out in Clause 12.2(a) are incorporated in the articles of association of the Concessionaire.
- (c) If, any Associate, whose credentials were taken into consideration for determining Technical Capacity, ceases or will cease to be an Associate of the [Selected Bidder/Member]¹², then, the Concessionaire shall seek the approval of the Executing Agency for such occurrence along with all relevant details. While the Executing Agency shall not unreasonably withhold or delay such approval, the decision of the Executing Agency will be final in this regard. If Executing Agency is of the view that such occurrence is likely to affect the Technical

¹⁰ This paragraph may be deleted if the Selected Bidder is a Consortium.

¹¹ This paragraph may be deleted if the Selected Bidder is a single entity.

¹² Delete Member if the Selected Bidder is a single entity.

Capacity of the Concessionaire to undertake the Project, then the Executing Agency may treat such occurrence as a Concessionaire Event of Default, in which case the consequences set out in Article 16 shall follow.

- (c) If, at any time after the expiry of 3 years from the COD, the [Selected Bidder/any Member]¹³ is proposed to be replaced by an entity that meets the O&M qualification criteria set out in the RFP or the Concessionaire proposes to appoint an O&M contractor to meet the change in ownership condition set out in Clause 12.2(a), then the Concessionaire shall submit a proposal to the Executing Agency with details of the proposed shareholder/O&M contractor, for its approval. The proposal should demonstrate to the satisfaction of the Executing Agency that the Concessionaire or the proposed O&M contractor meets the O&M qualification criteria specified in the RFP.

Within 15 days of receipt of a proposal from the Concessionaire, the Executing Agency shall notify the Concessionaire of its approval or rejection (along with reasons) of the proposed shareholder/O&M contractor.

The approval of the proposed shareholder/O&M contractor by the Executing Agency shall be at Executing Agency's sole discretion.

If the Executing Agency does not notify its approval or rejection of the proposed shareholder/O&M contractor within 60 days of the receipt of the proposal from the Concessionaire, then such proposed shareholder/O&M contractor will be deemed to be approved by the Executing Agency.

13. CHANGE IN LAW

13.1. Change in Law

The Concessionaire may claim the benefit of and/or relief for a Change in Law event subject to and in accordance with this Article 13.

13.2. Consequences of Change in Law

- (a) The Concessionaire shall not be allowed any relief and/or compensation for any Change in Law which is not a: (i) Qualifying Change in Law; or (ii) Fundamental Change in Law.
- (b) If a Qualifying Change in Law occurs, then the Concessionaire shall notify the Executing Agency and NMCG of such Qualifying Change in Law along with details of:
 - (i) any necessary change in the Construction Plan, the O&M Manual or the Technical Specifications on the basis of which construction works and O&M services are required to be undertaken for the Facilities;
 - (ii) any changes that are required to the terms of this Agreement to deal with such

¹³ Delete Member if the Selected Bidder is a single entity.

Qualifying Change in Law;

- (iii) any extension of the Scheduled Payment Milestone Completion Date or the Scheduled Construction Completion Date, to account for the delay, if any, resulting from the Qualifying Change in Law; and/or
 - (iv) any increase in Costs that will result from the Qualifying Change in Law.
- (c) As soon as practicable and in any event, within 30 days from the receipt of any notice from the Concessionaire under Clause 13.2(b) above, the Parties shall agree on the consequences of the Qualifying Change in Law, as specified in the notice, and any way in which the Concessionaire can mitigate the effect of the Qualifying Change in Law, including:
- (i) providing evidence that the Concessionaire has used reasonable endeavours (including, where practicable, the use of competitive quotes) to minimise any increase in Costs or oblige the Subcontractors to minimise any increase in Costs;
 - (ii) providing evidence as to how the Qualifying Change in Law has affected prices of materials used for construction or O&M of STPs which are similar to the Facilities; and
 - (iii) demonstrating to the Executing Agency and NMCG that the Qualifying Change in Law is the direct cause of the increase in Costs or delay and the estimated increase in Costs, or extension of time could not reasonably be expected to be mitigated or recovered by the Concessionaire.
- (d) If the Parties fail to agree on the consequences of the Qualifying Change in Law within 30 days from the receipt of any notice from the Concessionaire under Clause 13.2(b) above, the dispute will be finally settled in accordance with the dispute resolution procedure set out in Article 21.
- (e) If the Concessionaire has complied with Clause 13.2 (c) above and the Parties mutually agree or it is determined in accordance with Article 21 that the Concessionaire is required to incur additional Costs due to a Qualifying Change in Law, then:
- (i) the Concessionaire shall be required to bear all Costs resulting from any one or more Qualifying Change in Law events, up to an aggregate amount equivalent to 0.5% of the total Bid Project Cost (Threshold Limit); and
 - (ii) for any additional Costs resulting from the Qualifying Change in Law, which is in excess of the Threshold Limit, the Concessionaire shall be entitled to be compensated for such additional Costs, in excess of the Threshold Limit, by way of,
 - (A) a lump-sum payment of an amount equivalent to the additional Costs incurred by the Concessionaire, over and above the Threshold Limit; or
 - (B) an appropriate adjustment in the O&M Charges.
- (f) If the Concessionaire has complied with Clause 13.2(c) above and the Parties

mutually agree or it is determined in accordance with Article 21 that the Concessionaire will suffer any delay as a result of the occurrence of a Qualifying Change in Law, then the Concessionaire shall be entitled to an extension of time in accordance with Clause 7.11(b).

- (g) The quantum of relief (whether extension of time or compensation) that the Concessionaire shall be entitled to under this Clause 13.2 shall be as agreed by the Parties or as determined in accordance with Article 21, provided always that:
 - (i) the Concessionaire shall bear any increased Cost to the extent of the Threshold Limit; and
 - (ii) the Concessionaire shall only be entitled to relief that is reasonable for such Qualifying Change in Law.
- (h) Notwithstanding anything to the contrary in this Agreement, the Concessionaire shall not be entitled to any schedule relief and/or compensation or adjustment in the Bid Project Cost or the O&M Charges due to a Qualifying Change in Law, if such Qualifying Change in Law becomes applicable as a result of a delay in the execution of the Project, which is not attributable to a Delay Event.
- (i) If a Fundamental Change in Law occurs, then,
 - (i) the affected Party may notify the other Parties of the effects of such Fundamental Change in Law on the validity and enforceability of this Agreement or on the rights of the Concessionaire under this Agreement; and
 - (ii) any Party may propose amendments to the Concession Agreement, which would make the Concession Agreement compliant with Applicable Laws, while enabling the Parties to achieve their commercial objectives.

If the Parties are unable to agree on necessary amendments to the terms of this Agreement within 30 days of receipt of a notice from the affected Party or the Fundamental Change in Law event is such that it cannot be mitigated with amendments to the terms of this Agreement, the Fundamental Change in Law event shall be treated as a Direct Political Force Majeure Event in accordance with Article 14.

14. FORCE MAJEURE

14.1. Force Majeure Events

- (a) A **Force Majeure Event** means any act, event or circumstance or a combination of acts, events or circumstances or the consequence(s) thereof occurring after the date of this Agreement, which is/are:
 - (i) beyond the reasonable control of the Affected Party;
 - (ii) such that the Affected Party is unable to overcome or prevent despite exercise of due care and diligence;

- (iii) which does/do not result from the negligence of such Affected Party or the failure of such Affected Party to perform its obligations hereunder; and
 - (iv) such that it/they has/have a Material Adverse Effect.
- (b) A Force Majeure Event means the following events and circumstances to the extent that they satisfy the conditions set out in Clause 14.1(a):
- (i) **Non-Political Force Majeure Events**
 - (A) acts of God including storm, tempest, cyclone, hurricane, tsunami, flood, whirlwind, lightning, earthquake, washout, landslide, soil erosion, volcanic eruption, or extreme adverse weather or environmental conditions or actions of the elements;
 - (B) fire or explosion caused by reasons not attributable to the Concessionaire or any Concessionaire Related Parties;
 - (C) chemical or radioactive contamination or ionising radiation;
 - (D) epidemic, plague or quarantine;
 - (E) the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through a site inspection; and
 - (F) accidents of navigation, air crash, shipwreck, train wreck or other similar failures of transportation of equipment and/or material necessary for construction or O&M of the Facilities.

Non-Political Force Majeure Event shall not include the following conditions, except to the extent resulting from a Non-Political Force Majeure Event:

- (A) heavy rainfall;
- (B) quantum of the Sewage being more than the Design Capacity;
- (C) characteristics of the Sewage being beyond the Influent Standards;
- (D) unavailability, late delivery or changes in cost of plant, machinery, equipment, materials or spare parts required for undertaking the Project;
- (E) a delay in the performance of any Subcontractor;
- (F) non-performance resulting from normal wear and tear; or
- (G) non-performance caused by the non-performing Party's (I) negligent or intentional acts, errors or omissions, (II) failure to comply with the

Applicable Laws or Applicable Permits, or (III) breach of, or default under, this Agreement, as the case may be.

(ii) Indirect Political Force Majeure Events

- (A) hostilities (whether declared as war or not), riot, civil disturbance, revolution, rebellion, insurrection, act of terrorism, in each case involving the GoI or the GoB or occurring in Bihar;
- (B) invasion, armed conflict, coup d'etat, act of foreign enemy, blockade, embargo, revolution, insurgency, nuclear blast/explosion, politically motivated sabotage, religious strife or civil commotion, in each case involving the GoI or the GoB or occurring in Bihar;
- (C) strikes, lockout, boycotts or other industrial disputes which are not directly attributable to the actions of the Affected Party;
- (D) any orders issued by the relevant Government Authority, which require the Concessionaire to suspend the construction or O&M of the Facilities provided that, such orders are not attributable to the Concessionaire's breach or violation of any Applicable Laws or Applicable Permits; and
- (E) delay or failure by relevant Government Authorities in renewing or granting any Applicable Permit, despite the Concessionaire having applied for such Applicable Permit expeditiously and complied with the requirements of Applicable Laws in making such application or the unlawful revocation of any Applicable Permit.

(iii) Direct Political Force Majeure Events

- (A) occurrence of a Fundamental Change in Law in accordance with Clause 13.2(i);
- (B) compulsory acquisition in national interest or expropriation of the Site; and
- (C) any order, notification or judgement issued or passed by any Government Authority which restricts the Concessionaire from constructing or operating the Facilities as contemplated in this Agreement on the Site, unless such restriction is, in any manner, attributable to the Concessionaire.

(c) Without prejudice to the provisions of Clauses 14.1(a) or 14.1(b) above,

- (i) any act, event or circumstance which primarily affects any of the Concessionaire Related Parties associated with the Project shall constitute a Force Majeure Event if and to the extent that it is of a kind or character that, if it had directly affected the Concessionaire, it would have come within the definition of Force Majeure Event under this Clause 14.1; and

(ii) any act, event or circumstance which primarily affects any of the Executing Agency Related Parties or the NMCG Related Parties shall constitute a Force Majeure Event if and to the extent that it is of a kind or character that, if it had directly affected the Executing Agency or NMCG, it would have come within the definition of Force Majeure Event under this Clause 14.1.

(d) If the Parties are unable to agree in good faith on the occurrence or existence of a Force Majeure Event, such dispute shall be finally settled in accordance with the dispute resolution procedure set out in Article 21, provided however that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Affected Party.

14.2. **Notice of Force Majeure Events**

(a) The Affected Party shall give notice to the other Party in writing of the occurrence of any Force Majeure Event (the **FM Notice**), as soon as the same arises or as soon as reasonably practicable and in any event within 3 days after the Affected Party knew of its occurrence, the adverse effect it has or is likely to have on the performance of its obligations under this Agreement, the actions being taken and an estimate of the time period required to overcome the Force Majeure Event and/or its nature and effects (if it is possible to estimate the same).

(b) If, following the issue of the FM Notice, the Affected Party receives or becomes aware of any further information relating to the Force Majeure Event, it shall submit such further information to the other Party as soon as reasonably practicable.

(c) Any party claiming to have been affected by a Force Majeure Event shall not be entitled to any relief unless it has complied with all the provisions of this Clause .

14.3. **Excuse of Performance**

The Affected Party, to the extent rendered unable to perform its obligations or part of the obligation thereof under this Agreement as a consequence of the Force Majeure Event, shall be excused from performance of the affected obligations.

The Parties may mutually agree to extend the period of excuse from performance due to a Force Majeure Event.

If a Force Majeure Event affects only one Facility, and not the other Facility, then the Affected Party shall only be excused from the performance of its obligations in relation to the affected Facility.

Provided that the excuse from performance shall be of no greater scope and of no longer duration than is reasonably warranted by the Force Majeure Event.

14.4. **No Liability for Other Losses**

Save and except as expressly provided in this Agreement, no Party shall be liable in any manner whatsoever to the other Parties in respect of any loss relating to or arising out of the occurrence or existence of any Force Majeure Event or the exercise by it of any right pursuant to this Article 14.

14.5. Resumption of Performance

The Affected Party shall in consultation with the other Parties, make all reasonable efforts to limit or mitigate the effects of a Force Majeure Event on the performance of its obligations under this Agreement. The Affected Party shall also make efforts to resume performance of its obligations under this Agreement as soon as possible and upon resumption, shall notify the other Parties of the same in writing. The other Parties shall afford all reasonable assistance to the Affected Party in this regard.

14.6. Allocation of costs during a Force Majeure Event

- (a) **Upon occurrence of a Force Majeure Event prior to the COD, the Parties shall bear their respective Costs and no Party shall be required to pay any Costs to the other Parties.**
- (b) **Upon occurrence of a Force Majeure Event post the COD, the Concessionaire shall be entitled to continue receiving the Capex Annuity (along with interest) and the O&M Charges during the subsistence of the Force Majeure Event.**

14.7. Termination due to Force Majeure Event

(a) **Termination due to a Non-Political Force Majeure Event**

If a Non-Political Force Majeure Event continues for a period of period of 120 days after the notification of a Non-Political Force Majeure Event or any extended period agreed in pursuance of Clause 14.3, any Party shall, after the expiry of the period of 120-day period or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

Notwithstanding anything contained in this Clause 14.7:

- (i) if a Facility is affected by a Total Casualty, then the Concessionaire may terminate this Agreement without having to wait for the expiry of the 120 days' period stipulated for a Non-Political Force Majeure Event;
- (ii) if a Facility is affected by a Minor Casualty, then the Concessionaire shall be required to repair and restore the Facility to the same condition as previously existed and the Concessionaire shall not be entitled to terminate this Agreement on the grounds of a continuing Non-Political Force Majeure Event.

(b) **Termination due to an Indirect Political Force Majeure Event**

If an Indirect Political Force Majeure Event continues for a period of period of 90 days after the notification of an Indirect Political Force Majeure Event or any extended period agreed in pursuance of Clause 14.3, any Party shall, after the expiry of the period of 90

days' period or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

(c) **Termination due to a Direct Political Force Majeure Event**

If a Direct Political Force Majeure Event continues for a period of period of 60 days after the notification of a Direct Political Force Majeure Event or any extended period agreed in pursuance of Clause 14.3, any Party shall, after the expiry of the period of 60 days' period or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect to the other Parties.

If a Force Majeure affects only 1 Facility but not both the Facilities, then, it is clarified that a partial termination of this Agreement to exclude the Facility affected by the Force Majeure Event shall not be permitted and any termination of this Agreement will be for both the Facilities.

All the other consequences of termination that are set out at Article 17 shall apply in case of termination of this Agreement due to a Force Majeure Event.

15. SUSPENSION

15.1. Suspension by the Concessionaire

(a) Suspension of construction or O&M of the Facilities

- (i) At any time during the Term, the Concessionaire may suspend, whether partially or wholly, the construction or O&M of any Facility, in case of an Emergency.
- (ii) The Concessionaire acknowledges that suspension of the construction of any Facility during the Construction Period pursuant to Clause 15.1(a)(i) shall not entitle the Concessionaire to an extension of time, if such event is attributable to the Concessionaire.
- (iii) In case of suspension of the performance of the O&M services of any Facility pursuant to Clause 15.1(a)(i) for reasons attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, but not the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Clause 15.1(a)(i).
- (iv) In case of suspension of the performance of the O&M services pursuant to Clause 15.1(a)(i) for reasons not attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, and the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Clause 15.1(a)(i).
- (v) Upon the occurrence of an Emergency, the Concessionaire shall as soon as reasonably possible, and in no event later than 3 days after such occurrence, notify the Executing Agency of such occurrence.
- (vi) If, upon notification, the Executing Agency does not concur with the Concessionaire on the nature of such occurrence, then the Concessionaire shall be required to immediately re-commence the construction or O&M of the Facility, as the case may be. Upon re-commencement of the construction or O&M services, the

Concessionaire may initiate a Dispute regarding its claim for the occurrence of such an event or circumstance, and such Dispute shall be finally settled in accordance with the dispute resolution procedure set out in Article 21, provided however that the burden of proof as to the occurrence or existence of such an event shall be upon the Concessionaire.

(b) Mitigation, Resumption and Termination

(i) **The Concessionaire shall make best endeavours to:**

- (A) mitigate the effects (including incremental costs and delays) of the events or circumstances resulting in suspension pursuant to Clause 15.1(a)(i) above. Notwithstanding anything to the contrary contained in this Agreement, if the Executing Agency, in its sole assessment, is not satisfied with the steps being taken by the Concessionaire to mitigate the effects of the Emergency, the Executing Agency shall have the right to step-in to this Agreement and undertake necessary measures to mitigate the effect of the Emergency at the cost and risk of the Concessionaire; and
- (B) resume the construction or O&M services of the Facility within 24 hours of the ceasing of any of the events or circumstances resulting in suspension pursuant to Clause 15.1(a)(i) or such longer period as may be approved by the Executing Agency, and notify the Executing Agency of the resumption of the works or services.

(ii) **Without prejudice to Clause 15.1(b)(i):**

- (A) if suspension of the construction or O&M of a Facility pursuant to Clause 15.1(a)(i) continues for a period of 60 days, and such event is attributable to the Concessionaire, then such suspension shall amount to a Concessionaire Event of Default in accordance with Clause 16.1; and
- (B) if suspension of the construction or O&M of a Facility pursuant to Clause 15.1(a)(i) continues for a period of 60 days, and such event is not attributable to the Concessionaire, then such event will be treated as a Force Majeure Event and the consequences set out in Article 14 shall apply.

15.2. **Suspension by the Executing Agency**

(a) Suspension of construction and/or O&M of the Facilities

- (i) At any time during the Term, the Executing Agency may suspend, whether partially or wholly, the construction or O&M of a Facility, in any of the following events or circumstances:

(A) upon the occurrence of an Emergency; or

(B) if the Concessionaire fails to comply with Applicable Laws, Applicable Permits, the ESHS Documents, the O&M Manual or otherwise fails to perform its obligations in accordance with this Agreement (including the Technical Specifications).

- (ii) The Concessionaire acknowledges that suspension of the construction of the Facilities during the Construction Period pursuant to Clause 15.2(a)(i) shall not entitle the Concessionaire to an extension of time if such event is attributable to the Concessionaire.
- (iii) In case of suspension of the performance of the O&M services pursuant to Clause 15.2(a)(i) for reasons attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, less the Liquidated Damages payable by the Concessionaire for failure to operate the relevant Facility pursuant to Clause 15.2(a)(i). The Concessionaire shall not be entitled to the O&M Charges for the period during which it suspends the performance of the O&M services pursuant to Clause 15.2(a)(i).
- (iv) In case of suspension of the performance of the O&M services pursuant to Clause 15.2(a)(i) for reasons not attributable to the Concessionaire, the Concessionaire shall be entitled to continue to receive the Capex Annuity along with interest, and the O&M Charges, for the period during which it suspends the performance of the O&M services pursuant to Clause 15.2(a)(i).

(b) Mitigation, Resumption and Termination

(i) **The Concessionaire shall make best endeavours to:**

- (A) mitigate the effects (including incremental costs and delays) of the events or circumstances resulting in suspension pursuant to Clause 15.2(a) above. Notwithstanding anything to the contrary contained in this Agreement, if the Executing Agency, in its sole assessment, is not satisfied with the steps being taken by the Concessionaire to mitigate the effects of the Emergency, the Executing Agency shall have the right to step-in to this Agreement and undertake necessary measures to mitigate the effect of the Emergency at the cost and risk of the Concessionaire; and
- (B) resume the construction or O&M services of the relevant Facility within 24 hours of the ceasing of any of the events or circumstances resulting in suspension pursuant to Clause 15.2(a) or such longer period as may be agreed between the Parties, and notify the Executing Agency of the resumption of the works or services.

(ii) **Without prejudice to Clause 15.2(b)(i):**

- (A) if suspension of the construction or O&M of the relevant Facility pursuant to Clause 15.2(a)(i)(A) and the Emergency is attributable to the Concessionaire, or a suspension pursuant to Clause 15.2(a)(i)(B), continues for a period of 60 days then such suspension shall amount to a Concessionaire Event of Default in accordance with Clause 16.1; and
- (B) if suspension of the construction or O&M of the relevant Facility pursuant to Clause 15.2(a)(i)(A) continues for a period of 60 days, and the Emergency is not attributable to the Concessionaire, then such event will be treated as a Force Majeure Event and the consequences set out in Article 14 shall apply.

16. EVENTS OF DEFAULT

16.1. Concessionaire Events of Default

A **Concessionaire Event of Default** means any of the following events arising out of any acts or omissions of the Concessionaire and which have not occurred solely as a consequence of a Executing Agency Event of Default, an NMCG Event of Default, a Qualifying Change in Law, a Fundamental Change in Law or any other Force Majeure Event, and where the Concessionaire has failed to remedy the defects within any specified time period (to the extent any time period is provided):

- (a) failure of the Concessionaire to complete the construction of a Facility by the expiry of the Grace Period;
- (b) failure of the Concessionaire to pay the Delay Liquidated Damages within the timelines specified in this Agreement;
- (c) failure of the Concessionaire to achieve successful completion of Trial Operations of a Facility in accordance with Clause 7.14;
- (d) failure of the Concessionaire to remedy any reduction in Availability within 3 days of receipt of a notice from the Executing Agency in accordance with Clause 8.12(a)(iv);
- (e) for any Facility, failure of the Concessionaire to cure a Third Breach within 20 days from the Third Breach Notice or a failure to comply with the Discharge Standards results in occurrence of a Third Breach more than 3 times in a continuous 12 month period, in accordance with Clause 8.12(b)(iii)(D);
- (f) for any Facility, failure of the Concessionaire to achieve the KPIs for 2 consecutive days, 32 times in a continuous 12 month period;
- (g) for any Facility, failure of the Concessionaire to achieve the KPIs for 1 day, 64 times in a continuous 12 month period;

- (h) suspension of the construction or O&M of a Facility pursuant to Clause 15.1(a)(i) (to the extent such Emergency is attributable to the Concessionaire) for a continuous period of 60 days;
- (i) suspension of construction or O&M of a Facility pursuant to Clause 15.2(a)(i)(A) (to the extent the Emergency is attributable to the Concessionaire) or a suspension pursuant to Clause 15.2(a)(i)(B), for a continuous period of 60 days;
- (j) a breach by the Concessionaire of its obligations under this Agreement which has a Material Adverse Effect on the ability of the Concessionaire to construct and/or operate and maintain the Facilities and such breach, if capable of being remedied, is not remedied within 30 days of issuance of written notice from the Executing Agency specifying such breach and requiring the Concessionaire to remedy the same;
- (k) any representation made or warranties given by the Concessionaire under this Agreement being found to be false or misleading in any material respect;
- (l) failure of the Concessionaire to submit and maintain a valid Performance Security in accordance with Clause 5.1 or a valid O&M Security in accordance with Clause 5.4;
- (m) failure of the Concessionaire to maintain a valid Mobilization Advance Guarantee in accordance with Clause 5.21;
- (n) breach by the Concessionaire of its obligations under Article 4 (*Site and Asset Ownership*), 10.2 (*Security Creation*) or 21.12 (*Assignment*);
- (o) breach of the Concessionaire's obligations under Article 12 (*Change in Ownership*);
- (p) failure of the Concessionaire to obtain, renew and maintain any Concessionaire Applicable Permit;
- (q) failure of the Concessionaire to comply with any Applicable Law (including specifically the EPA);
- (r) failure of the Concessionaire to obtain and maintain insurance cover in accordance with Clause 11.2;
- (s) failure of the Concessionaire or the Subcontractors to comply with the ESHS Documents in accordance with Clause 7.4;
- (t) the Concessionaire entering into liquidation or similar state or if any order is made for the compulsory winding up or dissolution of the Concessionaire or if the Concessionaire becomes unable to pay its debts or the appointment of a receiver or administrator in respect of the Concessionaire, its business and assets or any re-structuring, re-organisation, amalgamation, arrangement or

compromise affecting the Concessionaire's ability to fulfil its obligations under this Agreement or that otherwise has or may have a Material Adverse Effect; or

- (u) the breach of the Concessionaire's obligations under or the occurrence of an 'event of default' or analogous event under the Financing Documents or the Escrow Agreement, or termination of the Financing Documents, or the Escrow Agreement (for reasons attributable to the Concessionaire).

16.2. Notice of Intent to Terminate upon occurrence of a Concessionaire Event of Default

- (a) Without prejudice to the other provisions of this Agreement, upon the occurrence of a Concessionaire Event of Default, the Executing Agency may initiate termination by delivering a Notice of Intent to Terminate to the Concessionaire, with a copy to NMCG. The Notice of Intent to Terminate shall specify with reasonable detail the grounds on which termination is sought.
- (b) If, within 60 days from the date of the Notice of Intent to Terminate, the Concessionaire rectifies or remedies the Event of Default to the satisfaction of the Executing Agency or the Executing Agency is satisfied with the steps taken or proposed to be taken by the Concessionaire or the Event of Default has ceased to exist, the Executing Agency shall withdraw the Notice of Intent to Terminate, in writing.
- (c) If, within 60 days from the date of the Notice of Intent to Terminate, the Concessionaire does not rectify or remedy the Event of Default to the satisfaction of the Executing Agency or the Executing Agency is not satisfied with the steps taken or proposed to be taken by the Concessionaire to remedy the Event of Default, the Executing Agency shall issue a notice to the Lenders to exercise their substitution rights.
- (d) If, within 60 days from the date of receipt of the Notice of Intent to Terminate pursuant to Clause 16.2(c) or such longer period as may be mutually agreed between the Executing Agency and the Lenders, the Lenders have notified their intent to substitute the defaulting Concessionaire, then:
 - (i) the Executing Agency shall withdraw the Notice of Intent to Terminate, in writing, with a copy to the Lenders; and
 - (ii) the process set out in the Substitution Agreement for nomination and approval of a substitute concessionaire will apply.
- (e) If, within 60 days from the date of receipt of the Notice of Intent to Terminate pursuant to Clause 16.2(c) or such longer period as may be mutually agreed between the Executing Agency and the Lenders, the Lenders have not notified their intent to substitute the defaulting Concessionaire, then, the Executing Agency shall terminate the Agreement and the consequences set out in Article 17 shall apply.
- (f) Notwithstanding anything contained in this Clause 16.2, during the subsistence

of a Concessionaire Event of Default, the Parties shall continue to perform such of their respective obligations under this Agreement, which are capable of being performed in accordance with this Agreement.

16.3. **Executing Agency Events of Default**

An **Executing Agency Event of Default** means any of the following events, unless such an event has occurred as a consequence of a Concessionaire Event of Default, or a Force Majeure Event and where the Executing Agency has failed to remedy the defects within any specified time period (to the extent any time period is provided):

- (a) a breach by the Executing Agency of Clause 22.12(b) (*Assignment*);
- (b) a breach by the Executing Agency of its obligations under this Agreement which has a Material Adverse Effect on the ability of the Concessionaire to construct or operate and maintain a Facility and such breach, if capable of being remedied, is not remedied within 30 days of a notice being given by the Concessionaire;
- (c) failure to achieve successful completion of Trial Operations due to the reasons set out in Clause 7.14(i) by the Scheduled COD;
- (d) a breach by the Executing Agency of its obligations under Clause 7.8(g) or Clause 8.5(d), in relation to its rights, title and interest in the Site; or
- (e) any representation made or warranties given by the Executing Agency under this Agreement being found to be false or misleading in any material respect.

16.4. **NMCG Events of Default**

An **NMCG Event of Default** means any of the following events, unless such an event has occurred as a consequence of a Concessionaire Event of Default, or a Force Majeure Event and where NMCG has failed to remedy the defects within any specified time period (to the extent any time period is provided):

- (a) a failure by NMCG to pay any undisputed amounts due and payable for 90 consecutive days, notwithstanding service of a formal written demand by the Concessionaire;
- (b) a failure by NMCG to maintain the Minimum Escrow Balance for a period of 90 days;
- (c) a breach by NMCG of Clause 22.12(b) (*Assignment*); or
- (d) any representation made or warranties given by NMCG under this Agreement being found to be false or misleading in any material respect.

16.5. **Notice of Intent to Terminate upon occurrence of an Executing Agency Event of Default or an NMCG Event of Default**

- (a) Without prejudice to the other provisions of this Agreement, upon the occurrence of an Executing Agency Event of Default or an NMCG Event of Default, the Concessionaire may initiate termination of this Agreement by delivering a Notice of Intent to Terminate, which shall specify with reasonable detail the grounds on which termination is sought.
- (b) If, within 60 days from the date of the Notice of Intent to Terminate, the Executing Agency or NMCG, as the case may be, rectifies or remedies the Executing Agency Event of Default or the NMCG Event of Default, to the satisfaction of the Concessionaire or the Concessionaire is satisfied with steps taken or proposed to be taken by the Executing Agency or NMCG or the Executing Agency Event of Default or the NMCG Event of Default, as the case may be, has ceased to exist, the Concessionaire shall withdraw the Notice of Intent to Terminate.
- (c) If, within 60 days from the date of the Notice of Intent to Terminate, the Executing Agency Event of Default or the NMCG Event of Default has not been remedied or the Executing Agency or NMCG, as the case may be, has not taken steps or proposed to take steps to remedy the Executing Agency Event of Default or the NMCG Event of Default to the satisfaction of the Concessionaire, then the Concessionaire shall terminate the Agreement and the consequences set out in Article 17 shall follow.
- (d) During the subsistence of an Executing Agency Event of Default or an NMCG Event of Default, the Parties shall continue to perform such of their respective obligations under this Agreement, which are capable of being performed in accordance with this Agreement.

16.6. If an Event of Default affects only 1 Facility but not both the Facilities, then, it is clarified that a partial termination of this Agreement to exclude the Facility affected by the Event of Default shall not be permitted and any termination of this Agreement will be for both the Facilities.

17. CONSEQUENCES OF TERMINATION

17.1. Consequences of termination of the Agreement post the Effective Date but prior to the Construction Completion Date

In case of termination of the Agreement prior to the Construction Completion Date:

- (a) the Concessionaire shall cease all work in relation to construction of the Facilities, and the Power Plant;
- (b) the Concessionaire shall take all necessary steps to safeguard and protect the Facilities and the Power Plant (at whatever stage of completion) and all other equipment, materials and goods on the Site;
- (c) the Executing Agency shall require the Project Engineer to assess the Cost of the construction works undertaken by the Concessionaire in relation to the

Facilities as on the date of the Notice of Intent to Terminate and based on such assessment, NMCG shall pay the Termination Compensation in accordance with Article 18;

- (d) in case of termination of this Agreement due to a Executing Agency Event of Default or an NMCG Event of Default, the Executing Agency shall return the Performance Security and the Mobilization Advance Guarantees within 30 days from the date of the Notice of Intent to Terminate; and
- (e) the Concessionaire shall hand over the Site, the Facilities and the Power Plant, to the Executing Agency or its nominee in accordance with the Hand-back Requirements set out in Clause 19.3, to the extent applicable.

17.2. Consequences of termination of the Agreement post the Construction Completion Date but prior to the COD

In case of termination of the Agreement post the Construction Completion Date but prior to the COD:

- (a) the Concessionaire shall cease the Trial Operations of the Facilities and the Power Plant;
- (b) the Concessionaire shall take all necessary steps to safeguard and protect the Facilities, the Power Plant, and all other equipment, materials and goods on the Site; and
- (c) the Concessionaire shall handover the Site, the Facilities and the Power Plant, to the Executing Agency or its nominee in accordance with the Hand-back Requirements set out in Clause 19.3.

17.3. Consequences of termination of the Agreement after the COD

In case of termination of the Agreement after the COD, the following consequences shall apply:

- (a) the Concessionaire shall cease all work in relation to O&M of the Facilities and the Power Plant;
- (b) the Concessionaire shall take all necessary steps to safeguard and protect the Facilities, the Power Plant, and all other equipment, materials and goods on the Site;
- (c) in case of termination of this Agreement due to a Executing Agency Event of Default or an NMCG Event of Default, the Executing Agency shall return the O&M Security within 30 days from the date of the Notice of Intent to Terminate; and
- (d) the Concessionaire shall hand over the Site, the Facilities and the Power Plant, to Executing Agency or its nominee in accordance with the Hand-back Requirements set out in Clause 19.3.

17.4. Consequences of termination due to a Force Majeure Event

In case of termination of the Agreement due to a Force Majeure Event, the following consequences shall apply:

- (a) the Concessionaire shall hand over the Site, the Facilities and the Power Plant, to the Executing Agency on an "as is where is" basis and to the extent relevant, in accordance with the Hand-back Requirements set out in Clause 19.3;
- (b) the Executing Agency shall be required to return the Mobilization Advance Guarantees, Performance Security or the O&M Security, as the case may be, to the Concessionaire within 30 days from the date of the notice of termination under Clause 14.7; and
- (c) in case of termination due to an Indirect Political Force Majeure Event or a Direct Political Force Majeure Event, the Executing Agency shall (or shall require the Project Engineer) to assess the Cost of the construction work undertaken by the Concessionaire in relation to the Facilities as on the date of the notice of termination under Clause 14.7 and based on such assessment, pay the Termination Compensation in accordance with Clause 18.4.

17.5. Accrued Rights and Liabilities

- (a) Notwithstanding anything to the contrary contained in this Agreement, any termination of this Agreement shall be without prejudice to the accrued rights of a Party, including its right to claim and recover damages and other rights and remedies which it may have in law or contract. All accrued rights and obligations of a Party under this Agreement, including without limitation, all rights and obligations with respect to Termination Compensation, shall survive the termination of this Agreement, to the extent such survival is necessary for giving effect to such rights and obligations.
- (b) Nothing in Article 16 or this Article 17 shall prevent or restrict a Party to seek injunctive relief or a decree of specific performance or other discretionary remedies of the court.

18. TERMINATION COMPENSATION

18.1. Termination Compensation for Termination post the Effective Date but prior to the Construction Completion Date

- (a) For a Executing Agency Event of Default or an NMCG Event of Default

If the Agreement is terminated prior to the Construction Completion Date for a Executing Agency Event of Default or an NMCG Event of Default, NMCG shall be liable to pay to the Concessionaire the aggregate of:

- (i) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by the Executing Agency as on the

date of the Notice of Intent to Terminate;

- (ii) Debt Due as on the date of Notice of Intent to Terminate;
- (iii) Equity infused in the Concessionaire as on the date of Notice of Intent to Terminate along with interest on the Equity at the rate of the prevailing SBI MCLR + 3%;

LESS

- (iv) any unadjusted Mobilization Advance (and interest if any);
- (v) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

(b) For a Concessionaire Event of Default

If the Agreement is terminated prior to the Construction Completion Date for a Concessionaire Event of Default, NMCG shall pay to the Concessionaire, the aggregate of:

- (i) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by the Executing Agency as on the date of the Notice of Intent to Terminate;
- (ii) 85% of Debt Due;

LESS

- (iii) any unadjusted Mobilization Advance (and interest if any);
- (iv) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

18.2. Termination Compensation for Termination post the Construction Completion Date but prior to the COD

(a) For an Executing Agency Event of Default or an NMCG Event of Default

If the Agreement is terminated post the Construction Completion Date but prior to the COD for an Executing Agency Event of Default or an NMCG Event of Default, NMCG shall be liable to pay to the Concessionaire the aggregate of:

- (i) Construction Payments, if not already paid as on the date of the Notice of Intent to Terminate;
- (ii) Debt Due;

- (iii) Equity infused in the Concessionaire as on the date of Notice of Intent to Terminate along with interest on the Equity at the rate of the prevailing SBI MCLR + 3%;

LESS

- (iv) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

(b) For a Concessionaire Event of Default

If the Agreement is terminated post the Construction Completion Date but prior to the COD for a Concessionaire Event of Default, NMCG shall pay to the Concessionaire, the aggregate of:

- (i) Construction Payments, if not already paid as on the date of the Notice of Intent to Terminate;
- (ii) 85% of Debt Due;

LESS

- (iii) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

18.3. Termination Compensation for Termination post the COD

(a) For a Executing Agency Event of Default or an NMCG Event of Default

If the Agreement is terminated post the COD for a Executing Agency Event of Default or an NMCG Event of Default, NMCG shall be liable to pay to the Concessionaire the aggregate of:

- (i) Construction Payments that remain outstanding on the date of the Notice of Intent to Terminate;
- (ii) O&M Payments due to the Concessionaire as on the date of the Notice of Intent to Terminate;
- (iii) Capex Annuity for the unexpired portion of the O&M Period;

LESS

- (iv) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

(b) For a Concessionaire Event of Default

If the Agreement is terminated post the COD for a Concessionaire Event of Default, NMCG shall pay to the Concessionaire, the aggregate of:

- (i) Construction Payments that remain outstanding on the date of the Notice of Intent to Terminate;
- (ii) O&M Payments due to the Concessionaire as on the date of the Notice of Intent to Terminate;
- (iii) 85% of the Capex Annuity for the unexpired portion of the O&M Period;

LESS

- (iv) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

18.4. **Termination Compensation for Termination due to a Force Majeure Event**

(a) Non-Political Force Majeure Event

In the event of a termination of this Agreement as a result of a Non-Political Force Majeure Event in accordance with Clause 14.7(a), the Parties agree that the Concessionaire shall be entitled to retain all proceeds received under any insurance policies maintained by it in relation to the Site and the Project (subject to the Lenders' rights in respect of such insurance proceeds) and the Concessionaire shall not be entitled to any Termination Compensation (other than payment of any outstanding Construction Payments and/or O&M Payments due as on the date of the notice of termination under Clause 14.7).

(b) Indirect Political Force Majeure

- (i) If the Agreement is terminated due to an Indirect Political Force Majeure Event, prior to the COD, NMCG shall be liable to pay to the Concessionaire:

(A) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by the Executing Agency as on the date of the notice of termination under Clause 14.7;

(B) Debt Due;

LESS

(C) any insurance proceeds received and retained by the Concessionaire.

(ii) If the Agreement is terminated due to an Indirect Political Force Majeure Event post the COD, NMCG shall be liable to pay to the Concessionaire:

(A) Construction Payments that remain outstanding on the date of the notice of termination under Clause 14.7;

(B) O&M Payments due to the Concessionaire as on the date of the notice of termination under Clause 14.7;

(C) Debt Due;

LESS

(D) any insurance proceeds received and retained by the Concessionaire.

(c) Direct Political Force Majeure

(i) If the Agreement is terminated due to a Direct Political Force Majeure Event, prior to the COD, NMCG shall be liable to pay to the Concessionaire:

(A) Construction Payments due to the Concessionaire for Payment Milestones completed and certified by the Executing Agency as on the date of the notice of termination under Clause 14.7;

(B) Debt Due;

(C) Equity infused in the Concessionaire as on the date of the notice of termination under Clause 14.7 along with interest on the Equity at the rate of the prevailing SBI MCLR + 3%;

LESS

(D) any unadjusted Mobilization Advance (and interest if any);

(E) any insurance proceeds received and retained by the Concessionaire; and

(F) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

(ii) If the Agreement is terminated due to a Direct Political Force Majeure Event post the COD, NMCG shall be liable to pay to the Concessionaire:

(A) Construction Payments that remain outstanding on the date of the notice of termination under Clause 14.7;

(B) O&M Payments due to the Concessionaire as on the date of the notice of termination under Clause 14.7;

(C) Capex Annuity for the unexpired portion of the O&M Period;

LESS

(D) any insurance proceeds received and retained by the Concessionaire; and

(E) any amounts due and payable by the Concessionaire under this Agreement (including Liquidated Damages and any amount payable under Clause 19.2).

18.5. All Termination Compensation required to be paid by NMCG to the Concessionaire shall be paid within 60 days of handover of the Site, the Facilities and the Power Plant, to the Executing Agency in accordance with Article 19.

18.6. Full and Final Settlement

Notwithstanding anything to the contrary elsewhere in this Agreement, any Termination Compensation determined pursuant to this Article 18 shall, once paid, be in full and final settlement of any claim, demand and/or proceedings of the Concessionaire against NMCG and the Executing Agency, in relation to termination of this Agreement and the Concessionaire shall be excluded from all other rights and remedies in respect of such termination.

18.7. The provisions of this Article 18 shall survive the termination of this Agreement.

18.8. Forfeiture of Additional Performance Security.

Upon termination of the Concession Agreement for Concessionaire Event of Default, as per Clause 16.1 of the Concession Agreement, the Additional Performance Security(if any) submitted by the Selected Bidder / Concessionaire shall be forfeited by the Executing Agency .

19. TRANSFER ON TERMINATION

19.1. Transfer of the Site and the Facilities

Upon the expiry or early termination of this Agreement, the Concessionaire shall hand over the Site, the Facilities, and the Power Plant, to the Executing Agency or any other entity nominated by the Executing Agency in accordance with this Article 19.

19.2. Inspection of the Site and the Facilities

(a) No later than 30 days from the end of the 14th year of the O&M Period or 30 days from the date of termination of the Agreement, as the case may be, the Executing Agency shall or shall cause the Project Engineer to carry out a survey

of the Site, the Facilities and the Power Plant, to assess whether they have been maintained by the Concessionaire in accordance with its obligations under this Agreement, and are in working condition in line with the design life stipulated in the Technical Specifications.

- (b) The Executing Agency shall notify the Concessionaire at least 7 days prior to the date on which it wishes to carry out the survey of the Site, the Facilities and the Power Plant.
- (c) If the survey carried out by the Executing Agency or the Project Engineer shows that the Concessionaire has not or is not complying with its obligations under this Agreement, then the Executing Agency shall notify the Concessionaire of the rectification and/or maintenance work which is required to ensure that the condition of the Site, the Facilities and the Power Plant, is restored to the Hand-back Conditions.
- (d) The Concessionaire shall carry out such rectification and/or maintenance work to achieve the Hand-back Conditions within 30 days from the receipt of a notice from the Executing Agency in accordance with Clause 19.2(c) above, at its own cost and risk. Upon completion of the rectification and/or maintenance work, the Concessionaire shall request the Executing Agency to carry out a final survey and inspection of the Site, the Facilities, and the Power Plant. The Executing Agency shall carry out the final survey within 7 days of receipt of a notice from the Concessionaire pursuant to this Clause 19.2(d).

If the Executing Agency is satisfied with the results of the final survey, then the Executing Agency shall notify the Concessionaire within 7 days of carrying out the final survey that the Site, the Facilities and the Power Plant, comply with the Hand-back Conditions. If the Executing Agency is not satisfied with the results of the final survey, then the Executing Agency shall or shall cause the Project Engineer to estimate the cost of restoring the Site, the Facilities and/or the Power Plant, to the Hand-back Conditions and recover such cost from the Concessionaire.

19.3. **Hand-back Requirements**

On the expiry or early termination of this Agreement, the Concessionaire shall:

- (a) hand over to the Executing Agency or any entity nominated by the Executing Agency , the Site, the Facilities and the Power Plant;
- (b) to the extent that such rights and interests are not already vested in the Executing Agency , transfer all its rights and interest in the assets comprising in the Facilities and the Power Plant and execute such deeds and documents as may be necessary for this purpose and complete all related legal or other formalities;
- (c) hand over all documents relating to the Site, the Facilities and the Power Plant, including as-built records, Designs and Drawings, online monitoring and metering data, operating logs, manuals, reports, plans and records;

- (d) transfer to the Executing Agency or its nominee (free of cost) the license to use the Proposed Technology and other know-how relating to the Facilities and the Power Plant;
- (e) transfer or cause to be transferred to the Executing Agency or its nominee any Subcontract that the Executing Agency or its nominee has chosen to take over and terminate all other Subcontracts;
- (f) transfer to the Executing Agency or its nominee all Concessionaire Applicable Permits which the Executing Agency or its nominee may require and which can be legally transferred; and
- (g) remove from the Site all employees and workmen, and assets, equipment and materials that are not required to be taken over by the Executing Agency or its nominee.

19.4. The provisions of this Article 19 shall survive the termination of this Agreement.

20. VARIATION

20.1. Both the Executing Agency and the Concessionaire may, at any time during the Term, propose a Variation to the Scope of Work, Technical Specifications, and/or the Designs and Drawings.

20.2. Executing Agency Proposed Variation

- (a) The Executing Agency may propose a Variation in the Scope of Work, Technical Specifications or the approved Designs and Drawings. Provided that, the Executing Agency shall not propose a Variation, which: (i) is not technically feasible; or (ii) is not in compliance with any Applicable Law or Applicable Permit.
- (b) Within 15 days of receipt of a request for Variation from the Executing Agency , the Concessionaire shall submit a proposal to the Executing Agency (with a copy to the Project Engineer) setting out in sufficient detail the implications of the proposed Variation, including any implications on the Construction Plan, the Scheduled Milestone Completion Date, the Scheduled Construction Completion Date and Scope of Work and additional Costs incurred in undertaking the Variation or any reduction in Costs resulting from the Variation. It is clarified that the additional Costs incurred in undertaking the Variation or any reduction in Costs resulting from the Variation will be determined on the basis of the Executing Agency's schedule of rates for similar works.
- (c) Notwithstanding anything to the contrary in this Clause 20.2, the Concessionaire shall have the right to reject a Variation proposed by the Executing Agency if, in the Concessionaire's view, the proposed variation will result in: (i) the Concessionaire incurring additional Costs, of more than 25% of the Bid Project Cost of the relevant Facility; (ii) reduction in the Bid Project Cost of the relevant Facility by more than 25%; or (iii) a delay of more than 120 days in a Scheduled Milestone Completion Date or the Scheduled Construction Completion Date.

- (d) Based on its review of the proposal submitted by the Concessionaire, the Executing Agency may, at its sole discretion: (i) accept the proposal and the corresponding adjustment to the Construction Plan and/or the additional Costs or reduction in the relevant Bid Project Cost for undertaking the Variation; (ii) provide its comments on the proposal seeking amendments and/or justification for the implications put forth by the Concessionaire; or (iii) reject the proposal submitted by the Concessionaire and withdraw the proposed Variation, within 15 days from the date of receipt of the Concessionaire's proposal under Clause 20.2(b) above.
- (e) To the extent the Executing Agency seeks amendments and/or justification in the proposal submitted by the Concessionaire, the Concessionaire shall incorporate or address, in writing, the Executing Agency's comments and submit a revised proposal.
- (f) On approval of the proposal or the revised proposal, as the case may be, the Executing Agency shall issue a Variation Order and Concessionaire shall proceed with the Variation in accordance with the Variation Order.
- (g) If the Parties are unable to agree on the implications of a Variation proposed by the Executing Agency, which in Executing Agency's view is necessary or desirable for the Project, the Executing Agency shall have the right to require the Concessionaire to carry out the proposed variation at the cost determined in accordance with the Executing Agency's schedule of rates for similar works. Where Executing Agency's schedule of rates do not provide schedule of rates for similar works, then the cost of the works covered by the proposed Variation will be covered by the Project Engineer. Any dispute on the terms of the Variation will be resolved in accordance with Article 21.
- (h) On implementation of a Variation Order, the Concessionaire shall be entitled to the agreed adjustment to the Construction Plan, Scheduled Milestone Completion Date, Scheduled Construction Completion Date and/or payment of additional amounts, if any, set out in the Variation Order.

20.3. **Concessionaire Proposed Variation**

- (a) The Concessionaire may propose a Variation if it considers such Variation necessary or desirable to improve the efficiency, quality, reliability, durability, maintainability or safety of the relevant Facility.
- (b) To propose a Variation, the Concessionaire shall submit a proposal to the Executing Agency (with a copy to the Project Engineer), with a statement setting out:
 - (i) the need for a Variation;
 - (ii) the additional work required; and
 - (iii) adjustment to the Construction Plan, Scheduled Milestone Completion

Date and Scheduled Construction Completion Date;

- (c) Based on its review of the proposal submitted by the Concessionaire, if the Executing Agency is of the view that the proposed Variation is justified, then it will determine the cost of the proposed Variation using the Executing Agency 's schedule of rates for similar works and where the Executing Agency 's schedule of rates do not provide schedule of rates for similar works, then the cost of the works covered by the proposed Variation will be covered by the Project Engineer. Thereafter, the Executing Agency shall notify the Concessionaire of the additional cost determined by the Executing Agency for the proposed Variation and any other comments that the Executing Agency may have on the implications of the proposed Variation. To the extent the Executing Agency seeks amendments and/or justification in the proposal submitted by the Concessionaire, the Concessionaire shall incorporate or address, in writing, the Executing Agency's comments.
- (d) On the Concessionaire's acceptance of the costs determined by the Executing Agency for the proposed Variation and any other amendments sought by the Executing Agency to the Concessionaire's proposal, the Executing Agency shall issue a Variation Order and Concessionaire shall proceed with the Variation in accordance with the Variation Order.
- (e) On implementation of a Variation Order, the Concessionaire shall be entitled to the agreed adjustment in the Construction Plan and/or additional costs, as set out in the Variation Order.

20.4. Notwithstanding anything to the contrary in this Article 20, the Concessionaire shall be bound to implement any Variation that is necessitated by a Change in Law and any consequent adjustment in the Construction Plan and additional Costs shall be determined in accordance with Article 13.

20.5. Notwithstanding the above, a Variation made necessary due to any act, omission or default of the Concessionaire or any Subcontractor in the performance of the Concessionaire's obligations under this Agreement shall not entitle the Concessionaire to any adjustment in the Construction Plan or any other compensation or relief.

20.6. No Variation shall invalidate this Agreement.

21. DISPUTE RESOLUTION

21.1. Amicable Settlement

In the event of any dispute, controversy or difference between the Parties arising out of or relating to this Agreement (including a dispute relating to the validity or existence of this Agreement and any non-contractual obligations arising out of or in connection with this Agreement) (a **Dispute**), the representatives of the Parties shall, within 15 days of service of a written notice from one Party to the other Parties (the **Dispute Notice**) hold a meeting (the **Dispute Meeting**) in an effort to resolve the Dispute in good faith. In the absence of any agreement to the contrary, the Dispute Meeting shall be held at the office of the Executing Agency in Patna.

21.2. **Dispute Resolution by Arbitration**

- 21.2.1 If a Dispute is not resolved within 30 days after the service of a Dispute Notice, whether or not a Dispute Meeting has been held, any Party to the Dispute shall be entitled to refer the Dispute to arbitration to be finally resolved in the manner set out in this Clause 21.2 by issuing a notice to the other Party (**Notice of Arbitration**).
- 21.2.2 (a) The Arbitration Panel shall be constituted with three Arbitrators; each Party shall select one Arbitrator, and the third Arbitrator shall be appointed by the two Arbitrators so selected.
- (b) The Arbitration Panel may retain the services of financial and technical consultants, if it so deemed appropriate.
- (c) The Arbitration Panel shall endeavour to make an award on any Dispute referred to it within a period of ninety (90) Days from the date of its first meeting. However, such period may be extended by mutual agreement of the parties to the dispute or as the Arbitration Panel deems fit.
- (d) The costs and expenses of the Arbitration Panel shall be shared equally between the Parties; provided however that the Arbitration Panel shall be entitled to decide on the costs of the arbitration procedure.
- 21.2.3 (a) Where the Concessionaire is controlled by shareholder(s) incorporated outside India, arbitration shall be International Commercial Arbitration with proceedings administered by the Singapore International Arbitration Centre (SIAC) in accordance with UNCITRAL Arbitration Rules, the place of arbitration shall be Singapore and the arbitration shall be conducted in English.
- (b) Where the Concessionaire is controlled by shareholder(s) incorporated in India, arbitration shall be with conducted in accordance with the Arbitration and Conciliation Act, 1996, as amended from time to time. For arbitration proceedings under article 21.2.3 (b), the venue of arbitration shall be the place where the Executing Agency's office is located and the arbitration proceedings shall be conducted in English language. The Arbitration Panel shall have the powers to pass such interim orders to the extent permissible under the Arbitration and Conciliation Act, 1996.
- 21.2.4 Arbitration may be commenced at any time during the Concession Period. The obligations of the Parties shall not be altered by reason of any arbitration being conducted during the progress of the Works.
- 21.2.5 The Arbitrators shall make a reasoned award (the "Award"). Any Award made in any arbitration held pursuant to this Clause 21.2 shall be final and binding on the Parties as from the date it is made, and the

Concessionaire and the Executing Agency agree and undertake to carry out such Award without delay.

21.2.6 The Concessionaire and the Executing Agency agree that an Award may be enforced against the Concessionaire and/or the Executing Agency, as the case may be, and their respective assets wherever situated.

21.2.7 This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.

21.3. **Survival**

The provisions of this Article 21 shall survive the termination of this Agreement.

22. **REPRESENTATIONS AND WARRANTIES**

22.1. **Mutual Representations and Warranties**

Each Party represents and warrants to the other Parties that:

- (a) it has full power and authority to execute, deliver and perform its obligations under this Agreement, the Substitution Agreement, the Escrow Agreement and any other agreements required in relation to the Project;
- (b) it has taken all necessary action to authorise the execution, delivery and performance of this Agreement, the Substitution Agreement and the Escrow Agreement; and
- (c) there are no actions, suits or proceedings pending or to its best knowledge, threatened against or affecting it before any court, administrative body or arbitral tribunal which might materially and adversely affect its ability to meet or perform any of its obligations under this Agreement, the Substitution Agreement or the Escrow Agreement.

22.2. **Concessionaire's Representations and Warranties**

The Concessionaire represents and warrants to the Executing Agency and NMCG that:

- (a) it is duly organized, validly existing and of good standing under the laws of India;
- (b) it has the financial standing and capacity to design, finance, construct, complete, operate and maintain the Facilities in accordance with this Agreement;
- (c) this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with its terms, and its obligations under this Agreement will be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;

- (d) it is subject to the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising thereunder including any obligation, liability or responsibility hereunder;
- (e) the information furnished in the Bid of the Selected Bidder, and as updated on or before the date of this Agreement is true and accurate in all respects as on the Appointed Date;
- (f) the execution, delivery and performance of this Agreement will not conflict with, result in the breach of, constitute a default under any of the terms of its memorandum and articles of association/charter documents or any Applicable Laws or Applicable Permits or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;
- (g) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of the GoI or the GoB which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;
- (h) it has complied with all Applicable Laws and Applicable Permits in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities, which in the aggregate have or may have a Material Adverse Effect on its ability to perform its obligations under this Agreement;
- (i) none of its employees, consultants, service providers, suppliers, or Subcontractors, including any O&M contractor, as of this day, have been engaged in any corrupt, fraudulent, collusive, coercive or obstructive practice, as defined in Clause 23.18; and
- (j) no representation or warranty by it contained in this Agreement or in any other document furnished by it to the Executing Agency , NMCG, the GoI or the GoB in relation to Applicable Permits contains any untrue or misleading statement of material fact or omits to state a material fact necessary to make such representation or warranty.

22.3. **Executing Agency's Representations and Warranties**

The Executing Agency represents and warrants to the Concessionaire and NMCG that:

- (a) it is duly organized, validly existing and in good standing under the laws of India;
- (b) it has the financial standing and legal capacity to execute this Agreement and perform its obligations under this Agreement;

- (c) it has taken all necessary approvals to execute this Agreement (including any approval required under the State Water Supply and Sewerage Related Acts and perform its obligations under this Agreement;
- (d) this Agreement constitutes legal, valid and binding obligations enforceable against it in accordance with the terms hereof;
- (e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of the GoI or the GoB, which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement;
- (f) it has complied with all Applicable Laws and Applicable Permits in all material respects;
- (g) the Site is not subject to any mortgage, lien, charge or any other Encumbrance;
- (h) it does not have any liability for any Taxes, or any interest or penalty in respect thereof, of any nature, that may constitute a lien against the Site; and
- (i) all information provided by it in the RFP and this Agreement (including the Technical Specifications) in connection with the Project is, to the best of its knowledge and belief, true and accurate in all material respects.

22.4. NMCG's Representations and Warranties

NMCG represents and warrants to the Concessionaire and the Executing Agency that:

- (a) it is duly organized, validly existing and in good standing under the laws of India;
- (b) it has the financial standing and legal capacity to execute this Agreement and perform its obligations under this Agreement;
- (c) it has taken all necessary approvals to execute this Agreement and perform its obligations under this Agreement;
- (d) this Agreement constitutes legal, valid and binding obligations enforceable against it in accordance with the terms hereof;
- (e) it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of the GoI or the GoB, which may result in any Material Adverse Effect on its ability to perform its obligations under this Agreement; and
- (f) it has complied with all Applicable Laws and Applicable Permits in all material respects.

22.5. Acknowledgement

- (a) The Parties acknowledge and confirm that the Parties have relied upon and have entered into this Agreement on the basis of the representations, warranties and undertakings made by the Parties hereunder.
- (b) If any occurrence or circumstance comes to the attention of a Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately notify the other Parties. Such notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any obligation of a Party under this Agreement.
- (c) The Executing Agency , the Executing Agency Related Parties, NMCG and the NMCG Related Parties or any of their agents or employees shall not be liable to the Concessionaire in contract, tort, including negligence or breach of statutory duty, statute or otherwise as a result of:
 - (i) any inaccuracy, omission, unfitness for any purpose or inadequacy of any kind whatsoever in the information relating to the Project disclosed by the Executing Agency or NMCG to the Concessionaire; or
 - (ii) any failure to make available to the Concessionaire any materials, documents, plans or other information relating to the Project.

23. MISCELLANEOUS

23.1. Survival

- (a) Any cause or action which may have occurred in favour of any Party or any right which is vested in any Party under this Agreement as a result of any act, omission, deed, matter or thing done or omitted to be done by any Party before the expiry of the Term by efflux of time or otherwise in accordance with this Agreement, shall survive the expiry of the Agreement.
- (b) The provisions of this Agreement, to the fullest extent necessary to give effect thereto, survive the Term or the termination of this Agreement and the obligations of Parties to be performed or discharged following the termination of this Agreement, shall accordingly be performed or discharged by the Parties.

23.2. Entire Agreement

The Parties hereto acknowledge, confirm and undertake that this Agreement and the RFP constitutes the entire understanding between the Parties regarding the development of the Project and supersedes all previous written or oral representations and/or arrangements regarding the Project.

23.3. Non-exhaustive Remedies

- (a) Save and except as provided in this Agreement, the remedies available to the Concessionaire under this Agreement are not exhaustive and the

Concessionaire and third parties shall be entitled to all other rights and remedies and to take all actions in law and in equity in addition to the remedies provided for herein.

- (b) Save and except as provided in this Agreement, the exercise of any rights by any Party under this Agreement shall not preclude such Party from availing of any other rights or remedies that may be available to it under this Agreement or any other agreement in relation to the Project. All remedies available to the Parties shall be cumulative and the exercise or failure thereof of one or more remedies by any Party shall not limit or preclude the exercise of or constitute a waiver of any other remedies by such Party.

23.4. Notices

- (a) Any notice or request in reference to this Agreement shall be written in English language and shall be sent by email, registered post, courier or facsimile and shall be directed to the other Parties at the address mentioned below:

BUIDCO : Attention: Project Director
Address: 2nd Floor, Khadya Bhawan, Daroga Rai Path, Patna, Bihar 800001
Fax: [_____]
Email: buidcopd3@gmail.com

NMCG : Attention: Executive Director (Projects)
Address: 1st Floor, Major Dhyanchand National Stadium, India Gate, New Delhi - 110002
Tel: +91(11) 23049442
Fax: +91(11) 23049566
Email: ed.projects@nmcg.nic.in

Concessionaire : Attention: [●]
Address: [●]
Tel: [●]
Fax: [●]
Email: [●]

- (b) Any notice or demand served by registered post or courier shall be deemed to be duly served 48 hours after posting and a notice or demand sent by facsimile shall be deemed to have been served at the time of its transmission and in proving service of the same it will be sufficient to prove, in the case of a letter, that such letter was sent by registered post or courier, addressed and placed in the post and in the case of a facsimile transmission, that such facsimile was duly transmitted to a current facsimile number of the addressee at the address referred above.
- (c) Each Party may change the above address by prior written notice to the other Parties.

23.5. Governing Law and Jurisdiction

This Agreement shall be governed by the laws of India and shall be subject to the jurisdiction of the courts at Patna.

23.6. **Counterparts**

This Agreement may be executed in three counterparts, each of which, when executed and delivered, will be an original, and all three counterparts together shall constitute one and the same instrument.

23.7. **Language**

- (a) The formal text of this Agreement and other agreements in relation to the Project shall be in the English language.
- (b) All notices and communications between the Parties under this Agreement shall be in English and all arbitration proceedings undertaken pursuant to this Agreement shall be conducted in English.

23.8. **Confidentiality**

- (a) No recipient Party shall, without the prior written consent of the disclosing Party, at any time divulge or disclose or suffer or permit its representatives to divulge or disclose to any person or use for any purpose unconnected with the Project any Confidential Information during the Term and for a period of 5 years after the expiry or termination of this Agreement, except to its representatives officers, directors, advisors, employers, agents and Associates (including the Executing Agency Related Parties, the NMCG Related Parties and the Concessionaire Related Parties) who have a legitimate need to know the Confidential Information in order to perform their duties relating to the Agreement.
- (b) This Clause 23.8 shall not apply to Confidential Information, which:
 - (i) at the time of disclosure or thereafter has become part of public knowledge or literature without a breach of this Agreement;
 - (ii) is already in the possession of the Party receiving such Confidential Information before it was received from any other Party and which was not obtained under any obligation of confidentiality from the Party which disclosed such information;
 - (iii) was obtained from a third party (other than one disclosing it on behalf of a Party) who was free to divulge the same and who was not under any obligation of confidentiality in relation to such Confidential Information to the Party, which disclosed the information;
 - (iv) is disclosed by the Concessionaire to the Lenders, any actual or *bona fide* potential shareholders, investors or bankers (and their professional advisers) of the Concessionaire;

- (v) is required to be disclosed pursuant to any legal and mandatory requirement of any court, legislative or administrative body or any Government Authority, or the rules of any applicable stock exchange;
- (vi) is disclosed by the Concessionaire to its Associates or the permitted assignees and transferees;
- (vii) is disclosed by the Concessionaire to any Subcontractor of the Concessionaire;
- (viii) is disclosed to actual or prospective insurers, re-insurers and insurance brokers;
- (ix) is disclosed to any professional advisors or consultants of any persons to whom a Party is entitled to disclose Confidential Information under this Clause 23.8(b);
- (x) is disclosed to any Person in connection with the dispute resolution provisions under this Agreement;
- (xi) is independently developed by the receiving Party without reliance on the Confidential Information disclosed by the disclosing Party; or
- (xii) is disclosed to any Government Authority or any other body in any relevant jurisdiction in connection with the obtaining or renewal of any Applicable Permit required for the Project.

Provided that the Party making a disclosure of Confidential Information pursuant to (iv) and (vi) to (ix) (inclusive) above shall ensure that any Person to whom it makes such disclosure undertakes to hold such Confidential Information subject to the same confidentiality obligations as those set out in Clause 23.8(a) above.

- (c) A Party making a disclosure of Confidential Information pursuant to Clause 23.8(a) shall,
 - (i) at the time of making such disclosure, inform its representatives and Associates of their obligation of confidentiality pursuant to this Agreement and ensure their compliance; and
 - (ii) be liable for any breach of such obligations by such representatives and Associates.
- (d) In the event that a Party is required or requested to make a disclosure of Confidential Information referred to in Clause 23.8(b)(v) above, such Party shall prior to such disclosure (to the extent permissible by Applicable Law) use its best efforts to promptly notify the disclosing Party or its Associate so that appropriate protection order and/or other action can be taken if possible. In the absence of such a protection order restricting disclosure, the Party required to

make such disclosure may disclose only that portion of the Confidential Information which it is legally required to disclose and shall use reasonable efforts to obtain assurances that confidential treatment will be accorded to the Confidential Information.

- (e) The recipient party agrees that it, its Associates and representatives shall, upon request by the disclosing Party promptly:
 - (i) return, and use all reasonable endeavours to procure that any third party to whom the recipient party has disclosed the Confidential Information pursuant to this Agreement shall return, all the Confidential Information that is in tangible form (including, without limitation, Confidential Information contained on compact discs or other electronic storage media or devices) furnished, together with any copies or extracts; and
 - (ii) destroy, and use all reasonable endeavours to procure that any third party to whom the recipient party has disclosed the Confidential Information pursuant to this Agreement shall destroy, all analysis, compilations, studies or other documents which have been prepared and which reflect or refer to any Confidential Information,

provided that the recipient party shall be entitled to retain such Confidential Information which forms part of the permanent records of the recipient party or its Associates and which was prepared for the purposes of the review or decision-making process of the recipient party or such Affiliate and/or which the recipient party or its Associates is required to retain by Applicable Law if it continues to keep such Confidential Information confidential in accordance with this Agreement.

23.9. **Amendments**

- (a) Any provision of this Agreement may be amended, supplemented or modified only by an agreement in writing signed by all the Parties.
- (b) A Party may at any time request the other to enter into discussions to review the operation of any part of this Agreement and, but without commitment by the other Parties, to determine whether it should be amended by mutual agreement provided that, unless there is such mutual agreement, the provisions of this Agreement (as then most recently, if at all, amended) shall continue to apply whatever the outcome of any such discussions or review and whether or not any such discussions or review take place.

23.10. **Waivers and Consents**

- (a) Unless otherwise specified, any provision or breach of any provision of this Agreement may be waived before or after it occurs only if evidenced by an agreement in writing signed by the Parties.
- (b) Any consent under or pursuant to any provision of this Agreement must also be

in writing and given prior to the event, action or omission for which it is sought.

- (c) Any such waiver or consent may be given subject to any conditions thought fit by the Party giving it and shall be effective only in the instance and for the purpose for which it is given.

23.11. **Severability**

- (a) If any provision of this Agreement is or becomes illegal, invalid or unenforceable in any respect under any Applicable Law, the legality, validity or enforceability of the remaining provisions will not, in any way, be affected or impaired.
- (b) The Parties shall negotiate in good faith with a view to agreeing one or more provisions which may be substituted for any such invalid, illegal or unenforceable provision and which produce as nearly as is practicable in all the circumstances the appropriate balance of the commercial interests of the Parties.

23.12. **Assignment**

- (a) Except as expressly permitted in this Agreement, the Concessionaire shall not be entitled to divest, transfer, assign or novate all or substantially all of its rights, interests, benefits and obligations under this Agreement, without the prior written consent of the Executing Agency and NMCG.
- (b) The rights and obligations of Executing Agency or NMCG under this Agreement shall not be assigned, novated or otherwise transferred (whether by virtue of any Applicable Law or otherwise) to any Person other than a public body or a government company or a statutory corporation that:
 - (i) is a single entity;
 - (ii) acquires the whole of the Agreement;
 - (iii) has the legal capacity, power and authority to become a party to and to perform the obligations of the Executing Agency or NMCG under this Agreement, as the case may be; and
 - (iv) has sufficient financial standing or financial resources to perform the obligations of the Executing Agency or NMCG under this Agreement, as the case may be.

23.13. **No Agency or Partnership**

Nothing contained or implied in this Agreement shall constitute or be deemed to constitute a partnership or agency between the Parties and none of the Parties shall have any authority to bind, commit or make any representations on behalf of the other Parties.

23.14. **Costs and Expenses**

- (a) Each Party shall be responsible for paying its own costs and expenses incurred in connection with the negotiation, preparation and execution of this Agreement, the Substitution Agreement and the Escrow Agreement.
- (b) The Concessionaire shall bear the applicable stamp duty and registration fee (if applicable) in respect of this Agreement, the Substitution Agreement and the Escrow Agreement.

23.15. **Reservation of Rights**

No forbearance, indulgence, relaxation or inaction by the Concessionaire at any time to require performance of any of the provisions of this Agreement shall in any way affect, diminish or prejudice the right of the Executing Agency or NMCG to require performance of that provision, and no delay in exercising or omission to exercise any right, power or remedy accruing to the Executing Agency or NMCG upon any default or otherwise under this Agreement shall impair any such right, power or remedy or shall be construed to be a waiver thereof or any acquiescence in such default, nor shall the action or inaction of the Executing Agency or NMCG in respect of any default or any acquiescence by it in any default, affect or impair any right, power or remedy of the Executing Agency or NMCG in respect of any other default.

23.16. **Third Parties**

This Agreement and all rights hereunder are intended for the sole benefit of the Parties and, to the extent expressly provided, for the benefit of the Executing Agency Related Parties, NMCG Related Parties, the Concessionaire Related Parties and the Lenders, and shall not imply or create any rights on the part of, or obligations to, any other Person.

23.17. **Waiver of sovereign immunity**

The Executing Agency and NMCG unconditionally and irrevocably:

- (a) agree that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;
- (b) agree that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Executing Agency and NMCG with respect to its assets; and
- (c) consent to the enforcement of any judgment or award against them in any such proceedings.

23.18. **Fraud and Corruption**

It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans),

bidders, suppliers, contractors and their agents (whether declared or not), sub-contractors, sub-consultants, service providers or suppliers, and any personnel thereof, observe the highest standard of ethics during the procurement and execution of Bank-financed contracts.¹⁴ In pursuance of this policy, the Bank:

- (a) defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “corrupt practice” is the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;¹⁵;
 - (ii) “fraudulent practice” is 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;¹⁶
 - (iii) “collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;¹⁷
 - (iv) “coercive practice” is 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;¹⁸
 - (v) “obstructive practice” is
 - (A) deliberately destroying, falsifying, altering, or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or 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
 - (B) acts intended to materially impede the exercise of the Bank’s inspection and audit rights provided for under paragraph 1.16(e) below.
- (b) will reject a proposal for award if it determines that the bidder recommended for award, or any of its personnel, or its agents, or its sub-consultants, sub-contractors, service providers, suppliers and/or their employees, has, directly or indirectly, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for the contract in question;

¹⁴ In this context, any action to influence the procurement process or contract execution for undue advantage is improper.

¹⁵ For the purpose of this sub-paragraph, “*another party*” refers to a public official acting in relation to the procurement process or contract execution. In this context, “*public official*” includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

¹⁶ For the purpose of this sub-paragraph, “*party*” refers to a public official; the terms “*benefit*” and “*obligation*” relate to the procurement process or contract execution; and the “*act or omission*” is intended to influence the procurement process or contract execution.

¹⁷ For the purpose of this sub-paragraph, “*parties*” refers to participants in the procurement process (including public officials) attempting either themselves, or through another person or entity not participating in the procurement or selection process, to simulate competition or to establish bid prices at artificial, non-competitive levels, or are privy to each other’s bid prices or other conditions.

¹⁸ For the purpose of this sub-paragraph, “*party*” refers to a participant in the procurement process or contract execution.

- (c) will declare misprocurement and cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a recipient of any part of the proceeds of the loan engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices during the procurement or the implementation of the contract in question, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur, including by failing to inform the Bank in a timely manner at the time they knew of the practices;
- (d) will sanction a firm or individual, at any time, in accordance with the prevailing Bank's sanctions procedures,¹⁹ including by publicly declaring such firm or individual ineligible, either indefinitely or for a stated period of time: (i) to be awarded a Bank-financed contract; and (ii) to be a nominated²⁰;
- (e) will require that a clause be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers and contractors, and their sub-contractors, agents, personnel, consultants, service providers, or suppliers, to permit the Bank to inspect all accounts, records, and other documents relating to the submission of bids and contract performance, and to have them audited by auditors appointed by the Bank.

23.19. **Inspection and Audit**

The Concessionaire shall permit and shall cause its Subcontractors and subconsultants to permit, the Bank and/or persons appointed by the Bank to inspect the Site and/or the accounts and records relating to the performance of the Contract and the submission of the Bid, and to have such accounts and records audited by auditors appointed by the Bank if requested by the Bank. The Concessionaire's and its Subcontractors' and subconsultants' attention is drawn to Clause 23.18 which provides, inter alia, that acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 23.18.1 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility pursuant to the Bank's prevailing sanctions procedures).

In witness whereof the Parties hereto have signed this Agreement on this _____ day of _____ 2017.

The Executing Agency: BUIDCO

¹⁹ A firm or individual may be declared ineligible to be awarded a Bank financed contract upon: (i) completion of the Bank's sanctions proceedings as per its sanctions procedures, including, inter alia, cross-debarment as agreed with other International Financial Institutions, including Multilateral Development Banks, and through the application the World Bank Group corporate administrative procurement sanctions procedures for fraud and corruption; and (ii) as a result of temporary suspension or early temporary suspension in connection with an ongoing sanctions proceeding. See footnote 14 and paragraph 8 of Appendix 1 of these Guidelines.

²⁰ A nominated sub-contractor, consultant, manufacturer or supplier, or service provider (different names are used depending on the particular bidding document) is one which has either been: (i) included by the bidder in its pre-qualification application or bid because it brings specific and critical experience and know-how that allow the bidder to meet the qualification requirements for the particular bid; or (ii) appointed by the Borrower.

By: _____

Name:

Title: Project Director

NATIONAL MISSION FOR CLEAN GANGA (NMCG)

By:

Name:

Title:

[Insert name of the Concessionaire] (CONCESSIONAIRE)

By:

Name:

Title:

PROJECT INFORMATION MEMORANDUM
– Bhagalpur STP

Project Information Memorandum

1. Project background

To facilitate abatement of pollution and conservation of the river Ganga by adopting a river basin approach for comprehensive planning and management. National Mission for Clean Ganga (NMCG) under the Ministry of Water Resources, River Development & Ganga Rejuvenation, along with the BUIDCO has proposed to undertake the PPP Design and Transaction Support for the development of Sewage Treatment Plants (STPs) & associated infrastructure and integration of existing STPs in Bhagalpur city found near the banks of river Ganga in Uttar Pradesh.

The TA had reviewed and technically scrutinized the following documents and drawings as received from Executing Agency (EA) and had also carried out independent assessment of the technical requirements based on the available data and information gathered during site visit for preparation of bids for PPP design.

- Condition assessment report for Drains & sewerage infrastructure in Bhagalpur, January 2016.
- Detailed Project Report – Interception & Diversion for Bhagalpur city.
- Administrative Approval and Expenditure Sanction issued by NMCG vide no. T-13/2017-18/057/NMCG dated 12th October 2017. (Interception & Diversion and STP Scheme for Bhagalpur city).

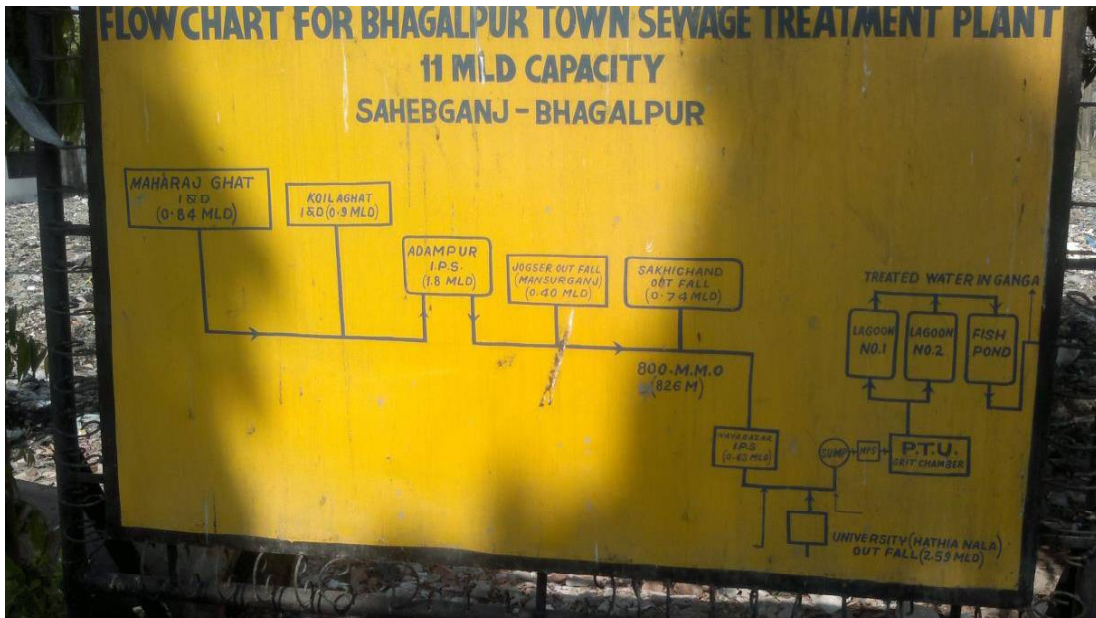
2. Bhagalpur

Bhagalpur is a municipal corporation town situated in the planes of the Ganga river basin at the height of 141 feet above sea level in Bihar, India. It is the third largest city of Bihar, and covers an area of 5357 Ha and lies between 25.07'N - 25.30'N Latitude and between 86.37'E - 87.30'E Longitude.

It is situated roughly at a distance of 220 km east of state capital Patna and 410 km North West of Kolkata. NH80 runs through the city and connects it directly to Patna. A branch railway line connects Bhagalpur to Mandar Hills (21 km). The city is railway connected by broad gauge loop line of Eastern Railway from Kiul to Bardwan. In terms of air connectivity, Bhagalpur has an airport with a single airstrip that is used occasionally. Patna airport and Malda Airport West Bengal are 220 km and 120 km from Bhagalpur respectively.

3. Bhagalpur existing sewerage facilities:

At present, the Bhagalpur has 11.00 MLD sewage treatment plant based on aerated lagoon, commissioned during 1994. It has been installed to treat the sewage from Maharajghat Nala, Koyla Ghat Nala, Adampur Nala, Naya Bazar Nala and University Nala (Hathia Nala). Since, the existing Maharaj Ghat, Koyla Ghat, Naya Bazar and Adampur pumping stations are not working, sewage from these nalas flows into river Ganga. Presently no sewage reaches STP.



Schematic diagram for current Infrastructure in Bhagalpur

3.1 Tapping of Nala / Interception & Diversion (I&D)

There are 21 drains (of different size) which are directly falling into river Ganga without treatment. The details of the drains are given below:

Bhagalpur - Nala, and I&D works Discharging into river Ganga

S. No.	Name of Nala	Flow measure during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
1	Maharaj Ghat	1.11	1.11		16654	1.82	1.82	0.50x1.00	Tapped (under dilapidated condition)	Proposed to tap and conveyed to STP by pumping.
2	Koyla Ghat	1.61	1.61		20269	2.21	2.21	1.00x1.50	Tapped (under dilapidated condition)	Proposed to tap and conveyed to STP by pumping.

S. No.	Name of Nala	Flow measured during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
3	Adampur	1.43	1.43		13754	1.50	1.50	1.50x1.00	Tapped (under dilapidated condition)	Proposed to intercept and divert to Koyla Ghat Nala
4	Mansoorganj	0.37	0.37		3929	0.43	0.43	1.50x0.50	Untapped	Proposed to tap and conveyed to STP by pumping.
5	Sakhichand	2.98	2.98		32532	3.55	3.55	0.50x0.50	Tapped (under dilapidated condition)	Proposed to intercept and divert to Mansoorganj Nala

S. No.	Name of Nala	Flow measured during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
6	Nayabazar	2.86	0.40	2.46	5008	0.55	0.55+2.46	1.00x1.50	Tapped (under dilapidated condition)	Proposed to tap and conveyed to STP by pumping.
7	University Nala	2.16	2.16		33386	3.64	3.64	1.00x1.50	Tapped (under dilapidated condition)	Proposed to tap and conveyed to STP by pumping.
8	Barari Ghat Nala	0.34	0.34		6075	0.66	0.66	0.50x1.00	Untapped	Proposed to tap and conveyed to STP by pumping.

S. No.	Name of Nala	Flow measured during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
9	Burhanath Nala	Not measured	Not measured		780	0.09	0.09	0.50x0.50	Untapped	Proposed to intercept and divert to Mansoorganj Nala
10	Hanuman Ghat Nala	1.20	1.20		20169	2.20	2.20	1.00x1.50	Untapped	Proposed to intercept and divert to Barari Ghat Nala
11	Mayaganj Bari Khenjarpu r (Maya	0.91	0.91		11877	1.3	1.3	1.50x1.00	Untapped	Proposed to intercept and divert to

S. No.	Name of Nala	Flow measured during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
	Ganj Nalap-2)									Maharaj Ghat Nala
12	Khirni Ghat	0.67	0.67		7410	0.81	0.81	1.00x1.50	Untapped	Proposed to intercept and divert to Mandir Ghat Nala
13	Mandir Ghat	0.34	0.34		4067	0.44	0.44	0.50x0.50	Untapped	Proposed to tap and conveyed to STP by pumping.

S. No.	Name of Nala	Flow measured during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
14	Shantibazar	0.91	0.7	0.21	10926	1.19	1.19+0.21	1.00x1.50	Untapped	Proposed to intercept and divert to Champa Nala
15	Nayabazar 2nd Nala	2.80	1.23	1.57	15593	1.70	1.70+1.57	1.00x1.50	Untapped	Proposed to intercept and divert to Naya Bazar Nala
16	Kali Ghat Nala	0.40	0.4		6026	0.66	0.66	1.00x1.50	Untapped	Proposed to intercept and divert to Mandir Ghat Nala

S. No.	Name of Nala	Flow measured during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
17	Champa Nagar Hari Tola	1.04	1.04		39087	4.26	4.26	1.50x1.50	Untapped	Proposed to intercept and divert to Champa Nala
18	Champa Nala road	0.36	0.36		13910	1.52	1.52	1.50x1.50	Untapped	Proposed to intercept and divert to Champa Nala
19	Ward no.42 Nala	0.53	0.53		42198	4.60	4.60	2.00x1.50	Untapped	Proposed to tap and conveyed to STP by pumping.

S. No.	Name of Nala	Flow measured during 2015 including industrial effluent (MLD)	Estimated domestic sewage based on Flow measured during 2015 (MLD)	Estimated industrial wastewater based on Flow measured during 2015 (MLD)	Estimated catchment population *	Estimated flow for 2035 based on catchment population (excluding industrial effluent)	Estimated flow for 2035 based on catchment population (including industrial effluent)	Size (WxD) m	Untapped/ Tapped	Status
20	Krishna road Nala	3.38	3.38		52047	5.68	5.68	2.00x1.50	Untapped	Proposed to tap and conveyed to STP by pumping.
21	Champa Nala	0.80	0.45	0.35	7286	0.79	0.79+0.35	1.00x1.50	Untapped	Proposed to tap and conveyed to STP by pumping.
	Total	26.2	21.67	4.58	362983	39.6	44.19			

*The population with households having sewerage facilities/ latrine facilities in which the raw sewage flows into open drains and population dependent on public latrine and open defecation are considered.

Note: The industrial effluent of 5.00MLD is getting mixed with the domestic sewage in the following nalas Shantibazar nala, Champa Nala, Champa Nala road, Champa Nagar Hari Tola, Naya Bazar 1st Nala and Naya Bazar 2nd Nala. The concessionaire has to design the STP considering the sewage characteristics of these Nalas. The test report is given the table below,

Table: Wastewater characteristic (Test date:30-05-2018)

Nala Name	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	pH	TDS (mg/l)	Color (Hazen)	E. coli form (MPN /100ml)
Champa Nala	281.88	348.48	226	7.69	1521.1	<56, Hazy	<7654
Champa Nala Road	453.46	573.76	119	7.94	1125	<2500, Brown	<100000
Champa Nagar Hari Tola	285.76	376.64	220	8.42	1453	<2500, Sky Blue	<6549
Shanti Bazar Nala	219.51	271.04	215	8.92	1325	<85, Hazy	7639
Naya Bazar Nala	324.69	411.84	565.00	8.19	1541	<2500, Pink	14325

4. Population projection and sewage generation estimation:

To adopt suitable method of population projection, the population of Year 2001 was taken as base data and thereafter the population of year 2011 was projected using all the 5 methods. After comparing the statistics of the projected population with the population as per Census 2011, the least variation shown methods were chosen for the population projection.

For population projection, the wards are categorized into core, proximally developed, proximally developing and far open. For core area, the arithmetic method is adopted and other area incremental increase method is adopted. The sewage generation of the zones are estimated by considering 135 lpcd. Zone wise population projection and respective sewage generation is given below:

Overview of sewerage zone

Zone	Population			Present Sewage treatment facility	Sewage generation		
	2020	2035	2050		2020	2035	2050
Bhagalpur	448745	534936	627617	-----	54	65	76

5. Proposed sewerage facilities:

It is proposed to intercept the outfall of all drains and divert it to STP site for further treatment by using gravity and pumping station. The following facilities are proposed.

- a) Interception and diversion (I&D) of 11 Nalas (i.e., Champa Nagar Haritola Nala, Santi Bajar Nala, Champa Nala Road, Naya Bajar 2nd Nala, Shakhichand Nala, Buranath temple Nala, Adampur Ghat Nala, Khirni Ghat Nala, Kali Ghat Nala, Bari Khanjarpur Nala, and Hanuman Ghat Nala).
- b) Intercept sewer is proposed to diverted sewage from I&D location to the pumping station. The length of the intercept sewers are given below:

Intercept sewer details

Sl. no.	Location	Length (m)
1	Champa Nagar Haritola Nala (I&D)- Santi Bajar Nala(I&D)	194.00
2	Santi Bajar Nala(I&D) - Champa Nala Road(I&D)	301.00
3	Champa Nala Road (I&D)- Champa Nala(PS)	104.00
4	Naya Bajar 2nd Nala (I&D)- Naya Bajar 1st Nala (PS)	293.00
5	Shakhichand Nala(I&D) - Buranath temple Nala (PS)	401.00
6	Buranath temple Nala(I&D) - Mansoor Ganj Nala (PS)	76.00
7	Adampur Ghat Nala(I&D) - Koyala Ghat Nala (PS)	662.00
8	Khirni Ghat Nala(I&D) - Kali Ghat Nala (I&D)	207.00
9	Kali Ghat Nala(I&D) - Mandir Ghat Nala(PS)	73.00
10	Bari Khanjarpur Nala(I&D) - Maharaja Ghat Nala (PS)	428.00
11	Hanuman Ghat Nala (I&D)- Barari Ghat Nala(PS)	1041.00
	Total	3780.00

- c) Sewage pumping stations cum tapping are proposed at 10 Nalas outfall locations. The location and capacity details are given below:

Pumping station details

Sl. no.	Pumping station location	Civil components design Capacity (MLD)	Electro-mechanical components design Capacity (MLD)
1	Champa Nala	16.00	10.30
2	University Nala	6.40	3.90
3	Naya Bazar Nala	8.80	7.00
4	Mansoorganj Nala	6.70	4.60
5	Koyala Ghat	8.00	4.90
6	Mandir Ghat	7.30	4.50
7	Maharaj Ghat Nala	5.10	3.20

Sl. no.	Pumping station location	Civil components design Capacity (MLD)	Electro-mechanical components design Capacity (MLD)
8	Barari Ghat Nala	4.70	2.90
9	Ward No 42 Nala	7.70	4.80
10	Krishna Road Nala	10.50	6.40

Note:

- Civil components capacity for pumping station is arrived at considering the entire catchment population.
- Electromechanical components capacity for pumping station is arrived at considering the restricted catchment population (i.e., household with piped sewer, septic tank with outlet, public latrine, and industrial effluent) that contribute sewage flow in the Nala.
- The proposed all pumping stations location are subjected to flooding, the concessionaire has to plan and design the pumping station by considering the HFL.

d) Rising main of total length 13.72 km is proposed. The rising main dia and length details are given below:

Rising main details

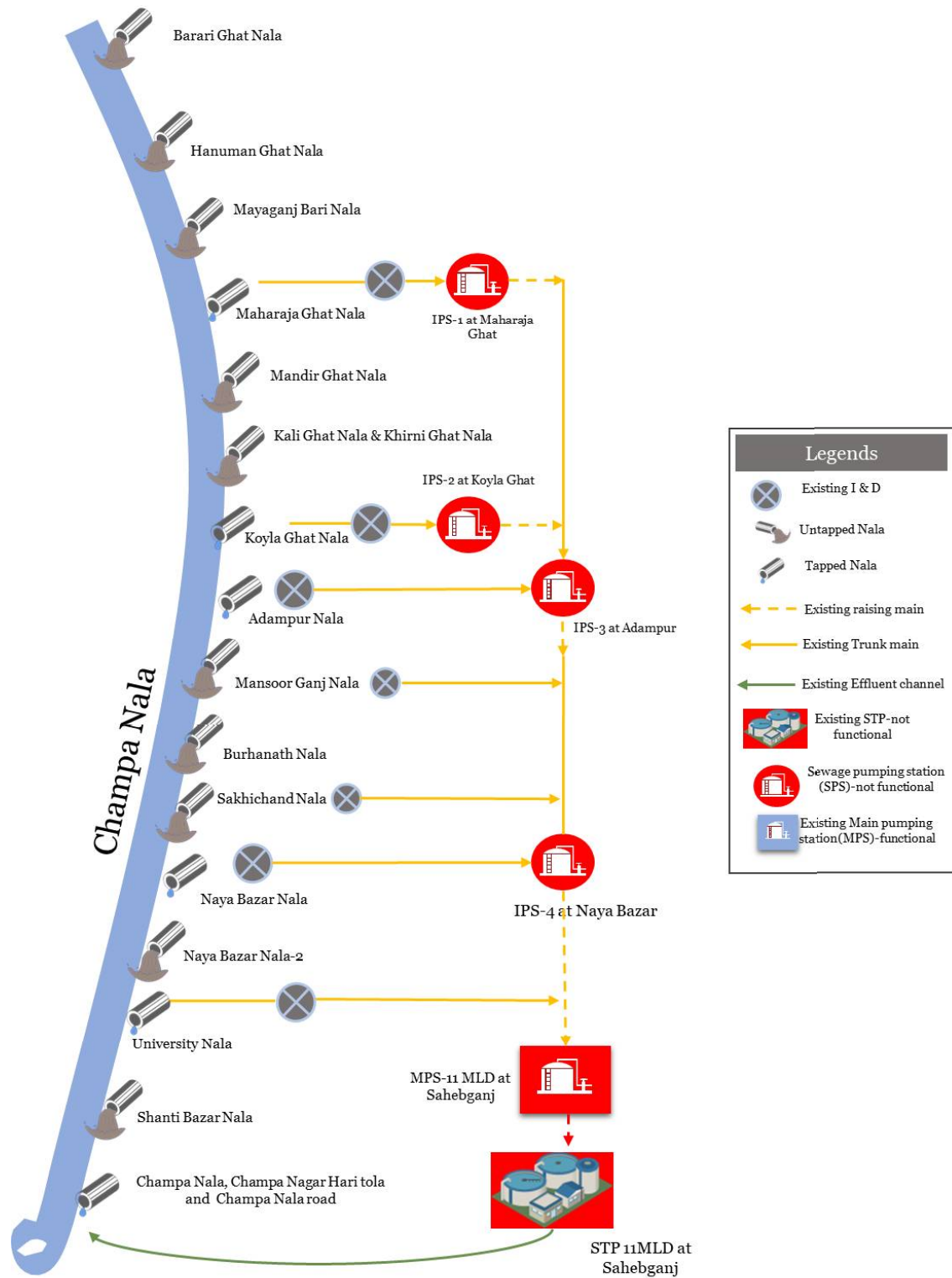
Sl. no.	Locations	Length(m)	Dia.(mm)
1	Champa Nala	1450.00	500
2	University Nala	400.00	300
3	Naya Bazar Nala	200.00	300
4	Mansoorganj Nala	375.00	350
5	Koyala Ghat	300.00	450
6	Mandir Ghat	300.00	350
7	Maharaj Ghat Nala	300.00	350
8	Barari Ghat Nala	3300.00	300
9	Ward No 42 Nala	3700.00	350
10	Krishna Road Nala	3400.00	450
	Total	13725.00	

e) Gravity main of total length 10.146 km is proposed. The sewer pipe dia and length details are given below:

Gravity main details

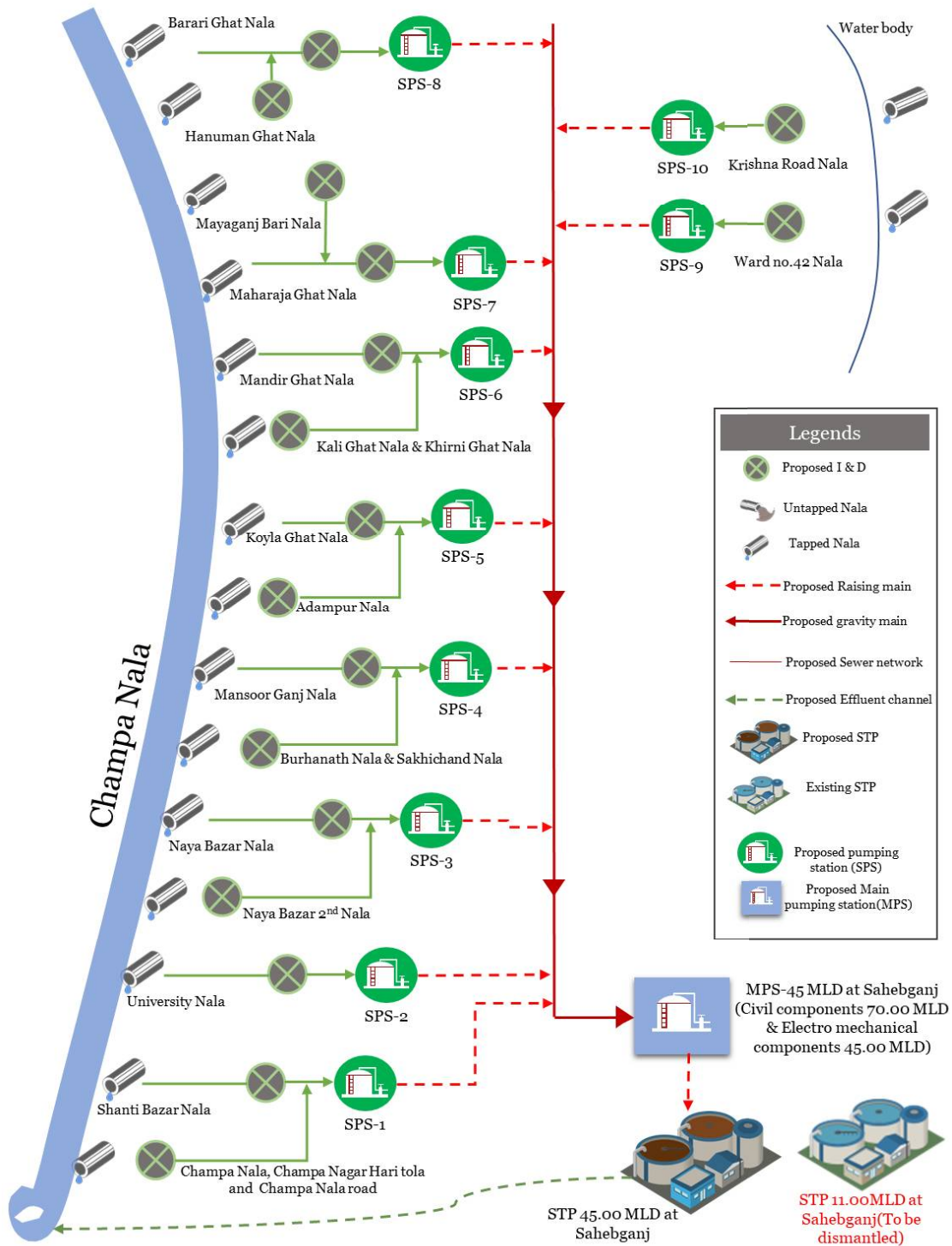
Sl. no.	NP3 Class Pipe(mm)	Length(m)
2	800	6166
3	1000	2146
4	1100	1120
5	1400	714
	Total	10146.00

- f) Sewage treatment plant of 45.00 MLD (40.00MLD domestic sewage +5.00 MLD industrial effluent) capacity. The STP campus is subjected to flooding during rainy season. The flood level shall be in the range +36.00m - +37.00m. The concessionaire must plan and design the STP by considering the HFL.
- g) Main pumping station with civil components design capacity of 70.00 MLD and electromechanical components design capacity of 45.00MLD.
- h) Septage treatment plant of 28.00m³ is proposed within the STP campus. At present ULB collecting the septage from household and discharging into nearby nalas. BUIDCO has informed that BUIDO will instruct the fecal sludge from Bhagalpur ULB limits to be transported to the FSTP module within the Bhagalpur STP.
The concessionaire will have to maintain minimum standards as per USEPA part 503 (US-EPA, 1992) guidelines which defines treated solids as Class A biosolids when they have 1,000 MPN/g of fecal coliforms, 3 MPN/4 g of Salmonella, 1 FPU/4 g of viruses and 1 helminth egg/4 g of treated sludge. And as well as KPI.
- i) O&M for all proposed facilities for period of 15 years.



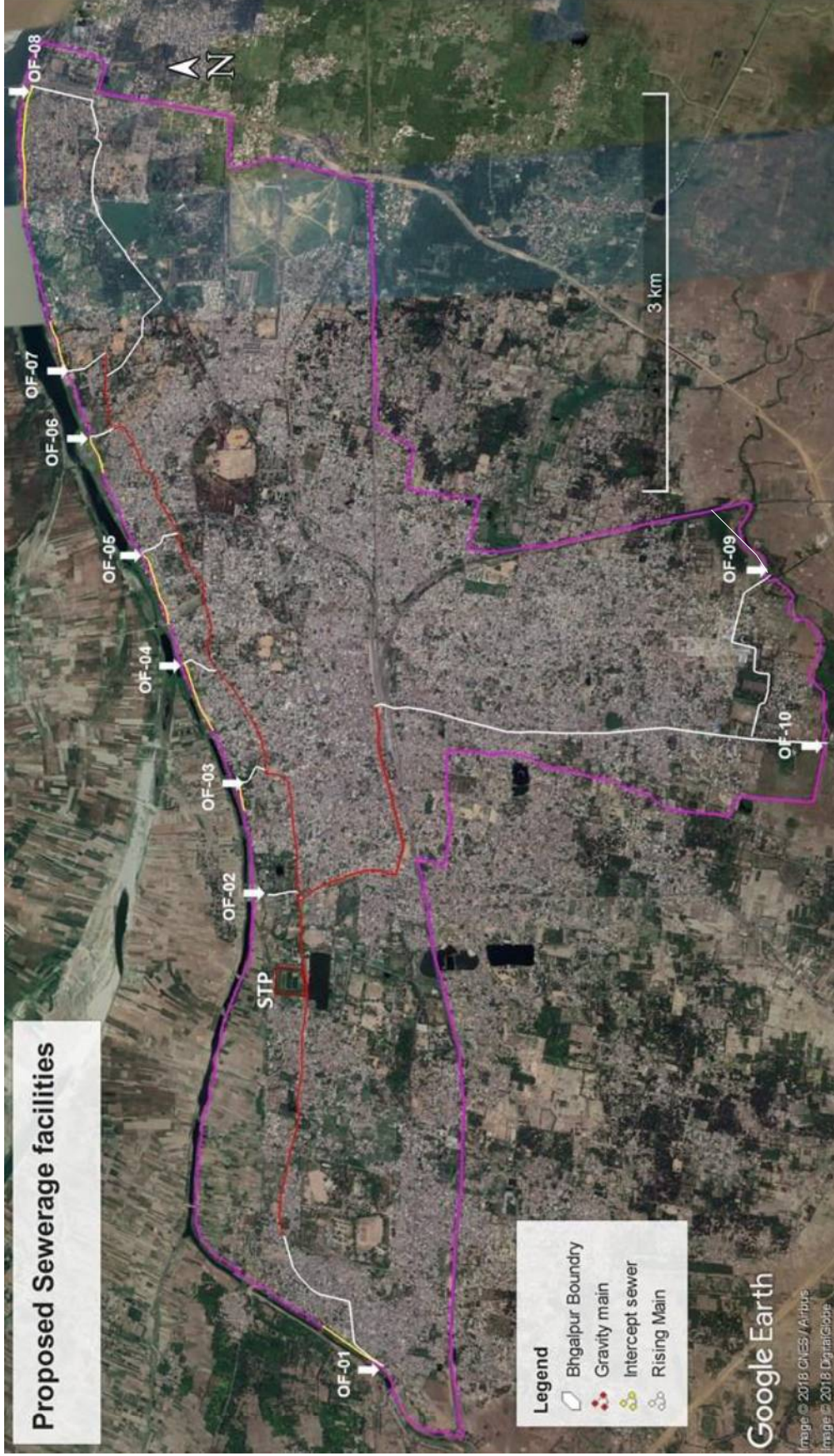
Schematic diagram for current Infrastructure in Bhagalpur

Bhagalpur Proposed Infrastructure



Schematic diagram for proposed Infrastructure in Bhagalpur

Proposed sewerage facilities at Bhagalpur





Aerated Lagoon



Grit Chamber Inlet



Pump in Aerated Lagoon



Grit Chamber

Bhagalpur MPS and STP



Naya Bazar Nala



Sakhichand Nala



Mansoorganj Nala



Hanuman Ghat Nala

Nala in Bhagalpur



Maharaja Ghat PS



Sump - Maharaja Ghat PS



CMS PS



Sump – CMS PS



Koila Ghat PS



Sump - Koila Ghat PS



Naya Bazar PS



Sump – Naya Bazar PS

Existing pumping station in Bhagalpur



Champa Nala



Champa Nagar Hari Tola



Champa Nala Road



University Nala



Koyla Ghat



Maharaj Ghat



Maya Ganj Nala-2



Khirni Ghat



Kali ghat



Mandhir Ghat



Barari Ghat



Burhanath Nala



Adampur Nala



Hanuman Ghat

Test reports for waste water collected from the Nala



NABL Certificate no :C/T/M-/6752 in lieu of /3829

PHEET Emblem

ISO : 9001-2015

OHSAS Certification

PHEET LAB

(NABL Accredited & ISO Certified: - 9001-2015)

A Lab for Testing of Water/Waste Water/Ambient Air/Stack Emission / Noise/Agricultural Soil & Food Adulteration under 01 Roof, Located in Bhagirathi Lane, Opposite Malaria Control Office, Ashok Rajpath, Mahendru, Patna-800006 / Mail: sharma.chandrabhan9@gmail.com & PHEETLAB@gmail.com, WW : Pheet-environment.com, M : 9546991815, LL : 9304285504

TEST REPORT

Sample/Report No. PHEET/18-19/WW/0608 (Revised) Report Issue Date:31/5-12/6-18
Name & Address:- Bihar Urban Infrastructure Development Corporation Ltd.
Description of Sample :- Raw Effluent
Latter No. 074 On Dated 23/05/18 Site:- Champa Nala
Sampe Collection Date:- 24/05/18
Sample Receiving Date:- 24/05/18
Start Date of Analysis:- 25/05/18 End Date of Analysis:- 30/5-11/6-18

Sr.No.	Test Parameters	Units Of Measurements	Results	Method reference
1	BOD (Bio Chemical Oxygen Demand)	mg/l	281.88	IS:3025(P-44)-1993 /2009
2	COD (Chemical Oxygen Demand)	mg/l	348.48	IS:3025(P-58)-2006 / 2012
3	pH	mg/l	7.69	IS:3025(P-11)-1983 /2003
4	TSS (Total Suspended Solids)	mg/l	226	IS:3025(P-17)-1984 /2004
5	E. Coliform(MPN Technipue0/100ml)	Number	<7654	IS:5887(P-1)-1976 /2003
6	TDS	mg/l	1521.1	IS: 3025 (p-16) -1984/2003
7	Color (Visual)	Hazen	Hazy, 56	IS: 3025(P-4) 1983/2002

REMARKS

Tested Waste Water sample is in between medium to strong in strength

END OF THE TEST REPORT

Page-1/1

Tested by
Anuj Kr Gupta
Jr. Chemist

Checked by
Aakanchha
Deputy Quality Manager

- Note**
- 1 Test Reports are valid for the Samples Tested in our Lab
 - 2 Samples would be preserved /Stored in our Lab, For next 15 Days, since the receiving date thereafter, would be disposed off.
 3. Samples Tested are not returnable, unless stated for
 4. Test Reports are not valid for Judicial Purposes

Approved & Issued by
Dr C. B. Sharma



NABL Certificate no :C/T/M-/6752 in lieu of /3829

PHEET Emblem

ISO : 9001-2015

OHSAS Certification

PHEET LAB

(NABL Accredited & ISO Certified: - 9001-2015)

A Lab for Testing of Water/Waste Water/Ambient Air/Stack Emission / Noise/Agricultural Soil & Food Adulteration under 01 Roof, Located in Bhagirathi Lane, Opposite Malaria Control Office, Ashok Rajpath, Mahendru, Patna-800006 / Mail: sharma.chandrabhan9@gmail.com & PHEETLAB@gmail.com, WW : Pheet-environment.com, M : 9546991815, LL : 9304285504

TEST REPORT				
Sample/Report No. PHEET/18-19/WW/0609 (Revised)		Report Issue Date:31/5-12/6-18		
Name & Address:- Bihar Urban Infrasructure Development Corporation Ltd.				
Description of Sample :- Raw Effluent			Site:- Champa Nala Road	
Latter No. 074 On Dated 23/05/18		Sampe Collection Date:- 24/05/18		
Sample Receiving Date:- 24/05/18		Start Date of Analysis:- 25/05/18		
		End Date of Analysis:-30/5-11/6-18		
Sr.No.	Test Parameters	Units Of Measurements	Results	Method reference
1	BOD (Bio Chemical Oxygen Demand)	mg/l	453.46	IS:3025(P-44)-1993 /2009
2	COD (Chemical Oxygen Demand)	mg/l	573.76	IS:3025(P-58)-2006 / 2012
3	pH	mg/l	7.94	IS:3025(P-11)-1983 /2003
4	TSS (Total Suspended Solids)	mg/l	119	IS:3025(P-17)-1984 /2004
5	E. Coliform(MPN Technipue)/100ml	mg/l	<100000	IS:5887(P-1)-1976 /2003
6	TDS	mg/l	1125	IS: 3025 (p-16) -1984/2003
7	Color (Visual)	Hazen	Brown, <2500	IS: 3025(P-4) 1983/2002
REMARKS				
Decidedly, it is of strong in strength				
End of the test report			Page-1/1	

Tested by
Anuj Kr Gupta
Jr. Chemist

Checked By
Aakarshina
Deputy Quality Manager

- Note
- 1 Test Reports are valid for the Samples Tested in our Lab
 - 2 Samples would be preserved /Stored in our Lab, For next 15 Days, since the receiving date thereafter, would be disposed off.
 3. Samples Tested are not returnable, unless stated for
 4. Test Reports are not valid for Judicial Purposes

Approved & Issued by
Dr. B. Sharma



NABL Certificate no :C/T/M-/6752 in lieu of /3829

PHEET Emblem

ISO : 9001-2015

OHSAS Certification

PHEET LAB

(NABL Accredited & ISO Certified: - 9001-2015)

A Lab for Testing of Water/Waste Water/Ambient Air/Stack Emission / Noise/Agricultural Soil & Food Adulteration under 01 Roof, Located in Bhagirathi Lane, Opposite Malaria Control Office, Ashok Rajpath, Mahendru, Patna-800006 / Mail: sharma.chandrabhan9@gmail.com & PHEETLAB@gmail.com, WW : Pheet-environment.com, M : 9546991815, LL : 9304285504

TEST REPORT

Sample/Report No. PHEET/18-19/WW/0610 (Revised) Report Issue Date:31/5-12/6-18
Name & Address:- Bihar Urban Infrastructure Development Corporation Ltd.
Description of Sample :- Raw Effluent
Latter No. 074 On Dated 23/05/18 Site:- Champa Nala Haritola
Sampe Collection Date:- 24/05/18
Sample Receiving Date:- 24/05/18
Start Date of Analysis:- 25/05/18 End Date of Analysis:- 30/5-11/6-18

Sr.No.	Test Parameters	Units Of Measurements	Results	Method reference
1	BOD (Bio Chemical Oxygen Demand)	mg/l	285.76	IS:3025(P-44)-1993 /2009
2	COD (Chemical Oxygen Demand)	mg/l	376.64	IS:3025(P-58)-2006 / 2012
3	pH	mg/l	8.42	IS:3025(P-11)-1983 /2003
4	TSS (Total Suspended Solids)	mg/l	220	IS:3025(P-17)-1984 /2004
5	E. Coliform(MPN Technipue)/100ml	mg/l	<6549	IS:5887(P-1)-1976 /2003
6	TDS	mg/l	1453	IS: 3025 (p-16) -1984/2003
7	Color (Visual)	Hazen	Sky Blue, <2500	IS: 3025(P-4) 1983/2002

REMARKS

Varying in between medium to strong in strength

End of the test report

Page-1/1

Tested by
Anuj Kr Gupta
Jr. Chemist

Checked By
Aakanchha
Deputy Quality Manager

- Note
- 1 Test Reports are valid for the Samples Tested in our Lab
 - 2 Samples would be preserved /Stored in our Lab, For next 15 Days, since the receiving date thereafter, would be disposed off.
 3. Samples Tested are not returnable, unless stated for
 4. Test Reports are not valid for Judicial Purposes

Approved & Issued by
Dr. C. B Sharma



NABL Certificate no :C/T/M-/6752 in lieu of /3829



PHEET Emblem



ISO : 9001-2015



OHSAS Certification

PHEET LAB

(NABL Accredited & ISO Certified: - 9001-2015)

A Lab for Testing of Water/Waste Water/Ambient Air/Stack Emission / Noise/Agricultural Soil & Food Adulteration under 01 Roof, Located in Bhagirathi Lane, Opposite Malaria Control Office, Ashok Rajpath, Mahendru, Patna-800006 / Mail: sharma.chandrabhan9@gmail.com & PHEETLAB@gmail.com, WW : Pheet-environment.com, M : 9546991815, LL : 9304285504

TEST REPORT				
Sample/Report No. PHEET/18-19/WW/0611 (Revised)		Report Issue Date:31/5-12/6-18		
Name & Address:- Bihar Urban Infrastructure Development Corporation Ltd.				
Description of Sample :- Raw Effluent				
Latter No. 074 On Dated 23/05/18				
Sampe Collection Date:- 24/05/18		Site:- Shanti Bajar Nala		
Sample Receiving Date:- 24/05/18				
Start Date of Analysis:- 25/05/18		End Date of Analysis:- 30/5-11/6-18		
Sr.No.	Test Parameters	Units Of Measurements	Results	Method reference
1	BOD (Bio Chemical Oxygen Demand)	mg/l	219.51	IS:3025(P-44)-1993 /2009
2	COD (Chemical Oxygen Demand)	mg/l	271.04	IS:3025(P-58)-2006 / 2012
3	pH	mg/l	8.92	IS:3025(P-11)-1983 /2003
4	TSS (Total Suspended Solids)	mg/l	215	IS:3025(P-17)-1984 /2004
5	E. Coliform(MPN Technipue)/100ml)	Number	7639	IS:5887(P-1)-1976 /2003
6	TDS	mg/l	1325	IS: 3025 (p-16) -1984/2003
7	Color (Visual)	Hazen	Hazy, 85	IS: 3025(P-4) 1983/2002
REMARKS				
Domestic waste is of medium strength				
End of the test report			Page-1/1	

Tested by
F. Sanjiv
Anuj Kr Gupta

Jr. Chemist

Checked By
Anandha
Anandha

Deputy Quality Manager

- Note
- 1 Test Reports are valid for the Samples Tested in our Lab
 - 2 Samples would be preserved /Stored in our Lab, For next 15 Days, since the receiving date thereafter, would be disposed off.
 3. Samples Tested are not returnable, unless stated for
 4. Test Reports are not valid for Judicial Purposes

Approved & Issued by
Dr. C. B. Sharma
Dr. C. B. Sharma



NABL Certificate no :C/T/M-/6752 in lieu of /3829

PHEET Emblem

ISO : 9001-2015

OHSAS Certification

PHEET LAB

(NABL Accredited & ISO Certified: - 9001-2015)

A Lab for Testing of Water/Waste Water/Ambient Air/Stack Emission / Noise/Agricultural Soil & Food Adulteration under 01 Roof, Located in Bhagirathi Lane, Opposite Malaria Control Office, Ashok Rajpath, Mahendru, Patna-800006 / Mail: sharma.chandrabhan9@gmail.com & PHEETLAB@gmail.com, WW : Pheet-environment.com, M : 9546991815, LL : 9304285504

TEST REPORT				
Sample/Report No. PHEET/18-19/WW/0612 (Revised)		Report Issue Date:31/5-12/6-18		
Name & Address:- Bihar Urban Infrastructure Development Corporation Ltd.				
Description of Sample :- Raw Effluent				
Latter No. 074 On Dated 23/05/18		Site:- Naya Bajar Nala		
Sampe Collection Date:- 24/05/18				
Sample Receiving Date:- 24/05/18				
Start Date of Analysis:- 25/05/18		End Date of Analysis:-30/5-11/6-18		
Sr.No.	Test Parameters	Units Of Measurements	Results	Method reference
1	BOD (Bio Chemical Oxygen Demand)	mg/l	324.69	IS:3025(P-44)-1993 /2009
2	COD (Chemical Oxygen Demand)	mg/l	411.84	IS:3025(P-58)-2006 / 2012
3	pH	mg/l	8.19	IS:3025(P-11)-1983 /2003
4	TSS (Total Suspended Solids)	mg/l	565	IS:3025(P-17)-1984 /2004
5	E. Coliform(MPN Technipue)/100ml	Number	14325	IS:5887(P-1)-1976 /2003
6	TDS	mg/l	1541	IS: 3025 (p-16) -1984/2003
7	Color (Visual)	Hazen	Pink, <2500	IS: 3025(P-4) 1983/2002
REMARKS				
Domestic waste is strong in strength				
End of the test report				Page-1/1

Tested by
A. S. Gupta
Anuj Kr Gupta
Jr. Chemist

Checked By
Aakanchha
Aakanchha
Deputy Quality Manager

- Note
- 1 Test Reports are Valid for the Samples Tested in our Lab
 - 2 Samples would be preserved /Stored in our Lab, For next 15 Days, since the receiving date thereafter, would be disposed off.
 3. Samples Tested are not returnable, unless stated for
 4. Test Reports are not valid for Judicial Purposes

Approved & Issued by
Dr. C. B. Sharma
Dr. C. B. Sharma

SCOPE OF WORK – Bhagalpur STP

Scope of work

Part A - Scope of work of activities to be undertaken at every site

In general, the scope includes as a minimum but not limited to replacement, renovation, repairing, installation, operation, & maintenance of all necessary sewerage infrastructures as necessary.

Designing, financing, rehabilitating, restoring, upgrading, supplying, constructing, erecting, installing, testing, commissioning and completing the following sewerage infrastructure works and facilities by the scheduled construction completion date and operating and maintaining the facilities and the associated infrastructure for 15 years from the date of COD, in compliance to applicable laws, applicable permits, technical specifications, designs and drawings, the construction plan, the EHS plan, the resource plan, Mobilization plan of manpower, material & machinery, QA/QC plan and good industry practices to ensure compliance with the KPIs.

The works should be completed in a manner as desired by executing agency and their authorized representatives, as per standard engineering practices, and as per the applicable/governing BIS codes or other relevant codes. The concessionaire shall verify and satisfy themselves with their own reassessment of the engineering requirements as per actual site requirements to ensure smooth operation and maintenance of the entire infrastructure during the concession period and handing over all the assets in good operating condition at the end of concession period. The details provided below is only for guidance purpose.

Necessary permits, approvals required during construction and operation stage need to be obtained by the concessionaire. Necessary field investigations such as topography survey, soil investigation and any other testing required to be carried out by the concessionaire to validate the design basis and assumptions.

The sewage and treated sewage testing need to be carried out by the concessionaire on a weekly basis at NABL accredited laboratory to validate the testing to be carried out on daily basis at the site level and the online parameters.

All the designs, drawings, specification need to be submitted to executing agency for approval. All the works shall be carried out only with the approval of the executing agency.

List of suggested vendors for equipments, materials, and machineries should be submitted by the concessionaire to executing agency for approval and the procurement/placement of order should be carried out after approval of the executing agency.

Appointment of subcontractors, agents, advisors and consultants and entering subcontracts to undertake the project with the prior approval of the executing agency. The concessionaire shall operate and maintain the facilities and the associated infrastructure and treat the sewage in a manner such that the KPIs are achieved, and the treated effluent and digested sludge comply with the discharge standards.

The by-products of the sewage treated at the STP (i.e., STP by-Products) will be trifurcated into screenings, digested sludge, and residual grit. The concessionaire will be required to dispose the STP by-products as follows:

- The residual grit and the screenings will be disposed at the waste disposal site to be identified by the executing agency within a radius of 10 km from the STP site, in accordance with technical specifications.
- The concessionaire shall dry the digested sludge at a sludge handling facility to be provided by the concessionaire at the site, and have the option to sell the digested sludge to farmers/other third-party buyers or dispose the digested sludge at the waste disposal site.
- The concessionaire shall transfer the treated sewage through the treated effluent disposal pipeline/channel to the discharge point for discharge into the river Ganga, sell to third parties or utilize for irrigation purposes free of cost.

Indicative engineering assessment of work - Bhagalpur

Sl. No.	Description	Quantity
1.	<p>Design, supply, installation, testing, and commissioning of 45.00 MLD (Domestic sewage 40.00MLD + industrial effluent 5.00 MLD) capacity STP at Bhagalpur, complete including all civil works & Electro-mechanical works by making necessary preparatory works to treat the sewage as per applicable disposal norms. The concessionaire must generate power using the by-product/biogas.</p> <p>The cost should include the dismantling of existing aerated lagoon of 11 MLD capacity and reinstating the land for developing the newly proposed STP.</p>	1 No

Sl. No.	Description	Quantity
	<p>Civil works shall include site grading, dressing, excavation, filling, PCC / RCC foundations, plastering, painting, grill and gates, masonry compound wall, internal water supply drainage, internal and approach road, street light, security guard room, footpath, landscaping, gardening etc., Rising of all STP components and MPS above the HFL.</p> <p>Electro-mechanical works shall include design, supply, installation, testing, and commissioning of all electro-mechanical components of STP including pumps, drive and drive controls- MCCs with local push button stations, tanks, pipelines, pipe fittings, valves and supports, all measuring instruments along with their power supply and instrument / signal cabling, power cabling, cable containments, earthing etc., and carry out the operation and maintenance of STP for the concession period.</p> <p>All HT/LT works as required/ as applicable at individual location including power supply tapping arrangement from the nearest available source and or making necessary augmentation to power supply arrangement for the required demand load. This shall inter- alia include submission of all necessary all drawing and document / obtaining load sanction safety certificate etc. as required</p> <p>The industrial effluent of 5.00MLD is getting mixed with the domestic sewage in the following nalas Shantibazar nala, Champa Nala, Champa Nala road, Champa Nagar Hari Tola, Naya Bazar 1st Nala and Naya Bazar 2nd Nala. The concessionaire has to design the STP considering the sewage characteristics of these Nalas. The test report shall be referred from PIM and schedule 10 The treated effluent must meet the discharge standard as mentioned in the KPI.</p> <p>Design, supply and laying of treated effluent conduit from STP to Champa Nala-630m and discharge point must be designed considering the HFL.</p>	
2.	<p>Design, supply, installation, testing, and commissioning of 28.00m³ septage treatment plant within the existing STP campus. All necessary civil and electromechanical items and all standard accessories must be installed by the concessionaire. And carry out operation and maintenance for the concession period.</p>	1

Sl. No.	Description	Quantity
	Design and construct all necessary buildings for administrative, laboratory, PLC room, buildings for E&M equipment, security guard room, staff quarters with size and FSI as per the CPWD norms provided in “Revised Plinth Area Norms for General Pool Residential Accommodation (GPRA) to be constructed for Central Govt. Employees and its applicability to all Govt. Departments, MOUD” and as necessary in the proposed STP complex and carry out the operation and maintenance for the concession period.	
3.	<p>Taking over of existing 11 MLD MPS, dismantling, revamping, reinstating the land, design, supply, installation, testing and commissioning of 45.00MLD main pumping station in the same location at Bhagalpur, the civil component of the pumping station must be designed for 70.00 MLD and electromechanical component must be designed for 45.00 MLD. All necessary civil works, electro-mechanical items and all standard accessories / fittings complete with fully automatic Y/D starters / VFD starters/ ATS starter panels (for both working and standby pumps) , power backup, CI / DI pipes & specials, level switches, earthing, cabling, structural supports / duck foot bends etc., as required as per site requirements, sanitary and plumbing works, cleaning of site and approach road, gate, compound wall, internal drainage, internal road, streetlight, security guard room, plastering, painting, flooring, lights and fans, wiring, rubber mats in front of electrical switch boards/panel boards, first air boxes, fire extinguishers, voltage stabilizer etc. And carry out operation and maintenance for the concession period. Rising of structure above the HFL.</p> <p>All HT/LT works as required/ as applicable at individual location including power supply tapping arrangement from the nearest available source and or making necessary augmentation to power supply arrangement for the required demand load. This shall inter- alia include submission of all necessary all drawing and document / obtaining load sanction safety certificate etc. as required.</p>	1 No
4.	Design, supply, installation, testing and commissioning of following pumping stations cum tapping of nala as mentioned below, All necessary civil works, electro-mechanical items and all standard accessories / fittings complete with fully automatic Y/D starters / VFD starters/ ATS starter panels (for both working and standby pumps), power backup, CI pipes & specials, level switches, earthing, cabling, structural supports / duck foot bends etc., as required as per site requirements, sanitary and plumbing	10 No (Refer drawing- Typical Outfall structure)

Sl. No.	Description				Quantity
	<p>works, cleaning of site and approach road, gate, compound wall, internal drainage, internal road, streetlight, security guard room, plastering, painting, flooring, lights and fans, wiring, rubber mats in front of electrical switch boards/panel boards, first air boxes, fire extinguishers, voltage stabilizer etc. And carry out operation and maintenance for the concession period.</p> <p>The concessionaire must design all the pumping station considering design capacity separately mentioned for civil and electromechanical component as given in the table below. The pumping station should be planned to have sufficient space required to install future pumps as per standards to meet the remaining capacity. The pumping station must be raised above the HFL.</p> <p>All HT/LT works as required/ as applicable at individual location including power supply tapping arrangement from the nearest available source and or making necessary augmentation to power supply arrangement for the required demand load. This shall inter- alia include submission of all necessary all drawing and document / obtaining load sanction safety certificate etc. as required.</p>				
	S. n#.	Location/Nala Name	Civil component design Capacity (MLD)	Electro-mechanical component design Capacity (MLD)	
	1	Champa Nala	16.00	10.30	
	2	University Nala	6.40	3.90	
	3	Naya Bazar Nala	8.80	7.00	
	4	Mansoorganj Nala	6.70	4.60	
	5	Koyala Ghat	8.00	4.90	

Sl. No.	Description				Quantity
	6	Mandir Ghat	7.30	4.50	
	7	Maharaj Ghat Nala	5.10	3.20	
	8	Barari Ghat Nala	4.70	2.90	
	9	Ward No 42 Nala	7.70	4.80	
	10	Krishna Road Nala	10.50	6.40	
5.	Design, Supply, delivery, laying and jointing of various diameter of DI K9 pipe in Rising mains from Pumping stations. S&S Centrifugally Cast (Spun) / Ductile Iron Pipes for conforming to IS: 8329 including fixing required specials and valves in appropriate locations including cutting off roads and restoration/ use of trenchless technology.				13725.00m
	S. n#.	Locations	Length (m)	Dia (mm)	(Refer drawing- Map showing location of IPS and STP & Sewer network in Bhagalpur)
	1	Champa Nala	1450	500	
	2	University Nala	400	300	
	3	Naya Bazar Nala	200	300	
	4	Mansoorganj Nala	375	350	
	5	Koyala Ghat	300	450	
	6	Mandir Ghat	300	350	
	7	Maharaj Ghat Nala	300	350	
	8	Barari Ghat Nala	3300	300	
	9	Ward No 42 Nala	3700	350	
	10	Krishna Road Nala	3400	450	
	Total		13725		

Sl. No.	Description	Quantity												
6.	Design, supply, installation, testing and commissioning of all hardware and software items related to provision of ONLINE MONITORING SYSTEM at all PS/LS, and STP for online real-time data transmission of various operating parameters from these LS/PS/STP to cloud-based web server over GSM / land telephony for monitoring from central office / sub-offices and by various authorized government agencies from fixed / portable devices / locations. The frequency of data storage for sewage / effluent quality shall be for every 2 hours and shall be to the nearest millisecond of each event. The Sequence-of -event (SOE) data shall be collected by the RTOLMS system from PLCs. The description of each event shall include the database description name, device state, the date, and the time (to the nearest millisecond) of each event. Information Storage and Retrieval (ISR) system shall collect and store analog data (telemetered and calculated) periodically at every 5 minute (configurable) and status data by exception.													
7.	<p>Design, supply, Laying of trunk sewer line of various diameter complying to IS 458-2003 (up to date amendment) with rubber ring and complete including cutting of existing roads and restoration/ use of trenchless technology, excavation of earth to required depth(s), dismantling the existing connections in existing sewer lines, removing of the existing sewer lines, painting of the inside of pipes with 30/40 grade, providing new sewer pipes, reconnecting the removed connections, jointing of pipes, leak testing, backfilling the excavated trench, ramming, consolidating and bringing back the surface to original condition including black topping, shoring, shuttering etc. and carry out operation and maintenance. The pipe shall be ISI marked.</p> <p>Providing and constructing brick masonry / RCC rectangular manhole of various and depths and bringing back the surface to original condition including blacktopping, providing Gully chambers in appropriate places etc., and carry out the operation and maintenance for the concession period.</p>	Refer drawing- Map showing location of IPS and STP & Sewer network in Bhagalpur												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NP3 Class Pipe(mm)</th> <th>Length(m)</th> </tr> </thead> <tbody> <tr> <td>800</td> <td>6166</td> </tr> <tr> <td>1000</td> <td>2146</td> </tr> <tr> <td>1100</td> <td>1120</td> </tr> <tr> <td>1400</td> <td>714</td> </tr> <tr> <td>Total length</td> <td>10146.00</td> </tr> </tbody> </table>	NP3 Class Pipe(mm)	Length(m)	800	6166	1000	2146	1100	1120	1400	714	Total length	10146.00	10146.00
NP3 Class Pipe(mm)	Length(m)													
800	6166													
1000	2146													
1100	1120													
1400	714													
Total length	10146.00													
8.	Design, supply, construction, testing & commissioning of civil, mechanical and electrical & instrumentation works for I&D works, tapping as	11 no												

Sl. No.	Description				Quantity
necessary at following Drain/Nala and carry out the operation and maintenance for the concession period. The tapping structure must be designed considering HFL					
	Sl. N#	Pumping station location cum tapping of Nala	Proposed I&D across the Nala	Size (WxD) m	Refer drawing- Map showing location of IPS and STP & Sewer network in Bhagalpur
1	Champa Nala	Shanti Bazar Nala		1.0 x 1.5	
			Champa Nagar Hari Tola Nala	1.5x 1.5	
			Champa Nala Road Nala	1.5 x 1.5	
2	Naya Bazar Nala (1nd Nala)		Naya Bazar Nala (2nd Nala)	1.0 x 1.5	
3	Mansoorg anj Nala	Burhanath Nala		0.5 x 0.5	
		Sakhichand Nala		0.5x0.5	
		Adampur Nala		1.5 x1.0	
4	Mandir Ghat	Khirmi Ghat		1.0x1.5	
		Kali Ghat Nala		1.0 x 1.5	
5	Maharaj Ghat		Maya Bari Khenjarpur Nala	1.5x 1.0	
6	Barari Ghat Nala		Hanuman Ghat Nala	1.0 x1.5	
9.	Laying of interceptor sewer line of various diameter, complying to IS 458-2003 (up to date amendment) with rubber ring and complete including cutting of existing roads and restoration/ use of trenchless technology, excavation of earth to required depth(s), dismantling the existing connections in existing sewer lines, removing of the existing sewer lines, painting of the inside of pipes with 30/40 grade, providing new sewer pipes, reconnecting the removed connections, jointing of pipes, leak testing, backfilling the excavated trench, ramming, consolidating and bringing back the surface to original condition including black topping, shoring,				3780m (Refer drawing- Map showing location of IPS and STP & Sewer network in Bhagalpur)

Sl. No.	Description		Quantity
	shuttering etc. and carry out operation and maintenance. The pipe shall be ISI marked.		
	S.n #	Location	Length (m)
	1	Champa Nagar Hari Tola Nala (I&D)- Shanti Bajar Nala(I&D)	194.00
	2	Shanti Bajar Nala (I&D) - Champa Nala Road (I&D)	301.00
	3	Champa Nala Road (I&D)- Champa Nala (PS)	104.00
	4	Naya Bajar 2nd Nala (I&D)- Naya Bajar 1st Nala (PS)	293.00
	5	Sakhichand Nala (I&D) - Burhanath temple Nala (PS)	401.00
	6	Burhanath temple Nala (I&D) - Mansoor Ganj Nala (PS)	76.00
	7	Adampur Ghat Nala (I&D) - Koyala Ghat Nala (PS)	662.00
	8	Khirmi Ghat Nala(I&D) - Kali Ghat Nala (I&D)	207.00
	9	Kali Ghat Nala (I&D) - Mandir Ghat Nala (PS)	73.00
	10	Bari Khenjarpur Nala (I&D) - Maharaja Ghat Nala (PS)	428.00
	11	Hanuman Ghat Nala (I&D) - Barari Ghat Nala (PS)	1041.00
		Total	3780
10.	Any other works as necessary for smooth operation of the sewerage system		

Part B - Overview of procedural activities to be undertaken (Submissions by concessionaire with timelines)

- a) Submit Basic Engineering Drawings as defined in the Agreement;
- b) Submit the Construction Plan for the for the Facilities and the Associated Infrastructure;
- c) Carry out all preparatory work like survey & investigations, clearing out debris and proper disposal of the extra surplus excavated earth to a suitable location as per Applicable Laws;

- d) Develop the site, landscaping, arboriculture, and horticulture at the STP Site and by providing earth filling, greenery, plantation, and diversion & extension of stormwater drainage network, etc. and maintain condition of landscape establishment;
- e) Design and construct all necessary buildings for administrative, laboratory, PLC room buildings for E&M equipment as per Technical Specifications;
- f) Undertake electrical and instrumentation works as per provisions detailed in key single line diagrams and plant control configuration diagrams.
- g) Provide electrical substation, as required, in accordance with the requirements of State power corporation limited;
- h) Keep the Facilities in clean, hygienic, tidy and safe conditions;
- i) Illuminate the STP with suitable arrangement, as per the Technical Specifications;
- j) Undertake trial runs, testing, commissioning of Facilities as per the requirements of Concession Agreement;
- k) Based on its assessment of the power supply, make necessary arrangements, as required, to ensure continuous uninterrupted operations of the Facilities during any power supply failure from the grid;
- l) Undertake Operations and Maintenance of Facilities as per Technical Specifications and safe disposal of Treated Effluent and STP By-Products;
- m) Develop and implement the environment, social, health and safety plans as per the requirements of the Concession Agreement;
- n) Implement quality system and environmental management system in accordance with ISO 9001 and ISO 14001;
- o) Prepare appropriate records and reports as outlined in the Concession Agreement;
- p) Undertake security control of the Facilities
- q) Carry out the required tests and laboratory analysis;
- r) Obtain and renew licenses, permits, and certificates necessary to operate the Facilities;
- s) Hand-back the Facilities and the Associated Infrastructure to the Bihar Urban Infrastructure Development Corporation Ltd (BUIDCO) at the end of the O&M Period;
- t) Develop the necessary Design and Drawings and other submissions, as per the requirements of the Concession Agreement. These submissions, inter-alia are outlined in the table below:

Submissions required from the Concessionaire

Submission & timeline	Description of submission
Construction Plan before effectiveness	Detailed construction plan for the Facilities and the Associated Infrastructure setting out the work plan to achieve each of the Payment Milestones, such that the Facilities and the

Submission & timeline	Description of submission
	<p>Associated Infrastructure are completed on or prior to the Scheduled Construction Completion Date. The should include the following sections at the minimum:</p> <ul style="list-style-type: none"> • Site manpower and labor mobilization details. Details of project management and health & safety personnel to be deployed at the site to be provided separately. • Detailed implementation schedule (including details of construction milestones) • Construction method statements • Details of civil works and equipment control • Quality assurance plans • Subcontracting details
<p>Designs and Drawings before Effectiveness</p>	<p>Process design and calculations:</p> <ul style="list-style-type: none"> • Description of Proposed Technology including proposed treatment process, process design calculations, and mass balance diagrams • Hydraulic calculations and Hydraulic Flow Diagram • Details of the aeration device stating the turndown ratio • Details of the sludge digestion system stating maintenance mechanism from outside the digester (without draining its contents) <p>Site layout</p> <ul style="list-style-type: none"> • Facilities layout: general arrangement drawings for the buildings, tanks, foundations, process units, approach road, Inlet Point, Outlet Point • Alignment drawings for Effluent Disposal Pipeline • Location of site office, staff quarters, • Location of batching - plant, go-down / yard, store/workshop, etc. • Details of the stormwater drainage inside the STP • Layout of the earthen embankment <p>Architectural Designs and Concepts</p> <ul style="list-style-type: none"> • Architectural design proposals for interior and exterior architecture along with an appropriate landscaping scheme

Submission & timeline	Description of submission
	<ul style="list-style-type: none"> • Architectural statement explaining the factors considered in the design • Architectural work shall include walls, roof, flooring and floor finish, roof waterproofing, down water pipes, windows, ventilators, doors, glazing, equipment access doors, painting and other ornamental works <p>Structural designs and calculations</p> <ul style="list-style-type: none"> • Basic design calculations of foundations • General arrangement drawings and explanatory sketches • Methods statement describing work procedure before commencing concrete work <p>Power</p> <ul style="list-style-type: none"> • Power single line diagrams • Process data sheets to define design criteria, installed capacities and loading rates of principal items of plant and equipment • Control philosophy report • Electrical load list
	<p>Instrumentation and Control</p> <ul style="list-style-type: none"> • Process and Instrumentation Diagrams • Instrument schedule & I/O schedule for each Motor Control Centre • Functional Design Specification - Comprising an overall description of the plant, its functioning and control, and description of each section of the control system covering modes of operation, manual overrides, set-point and parameter selection and adjustment. It shall describe the 'fail-safe' features incorporated into the design for the event of failure of a plant item or system or loss of an input signal affecting a control loop or process sequence. It shall also describe control actions taken and monitoring functions which remain available during a power failure, and any automatic controls or sequencing which take place during system start-up and shut-down. It shall include figures or drawings where appropriate.

Submission & timeline	Description of submission
	<ul style="list-style-type: none"> • Drawings and schedules – Including the following - <ul style="list-style-type: none"> ○ Process and instrumentation diagram which shall comply with BS 1646 (all parts) and BS 1553-1:1977. ○ General arrangement drawings of field-mounted instruments showing installation details. ○ General arrangement drawings of instrument and control panels, fully- dimensioned in plan and elevation views, showing foundation and fixing details, access doors, clearances, cable-entry positions, weight and lifting arrangement. ○ Layout drawings of panel fascias showing instruments, controls, and details of all labels. ○ Layout drawings of panel interior showing equipment, terminal blocks & cableways. ○ Annunciator arrangement and engraving details. ○ Internal circuit and wiring diagrams for instrument and control panels. ○ Schematic control diagrams. ○ Instrument loop diagrams. ○ Instrument wiring and piping diagrams. ○ Interconnection wiring diagrams. ○ Cable block diagrams, drawings, and schedules. ○ Instrument system and panel power distribution diagrams. ○ Programmable-device functional design specifications which shall include hardware details, logic flow charts, ladder diagrams and program listings. ○ Schedules of inputs to and outputs from programmable controllers and telemetry outstations. ○ Labeling schedules. ○ Comprehensive testing schedules for all off-site, on-site, pre-commissioning and commissioning tests and take-over tests. ○ Drawings necessary for the provision of ducts, openings, trenches, fixing holes for panels etc. • Data and calculations <ul style="list-style-type: none"> ○ Manufacturer’s catalogs and data sheets ○ Calculations to support control system design ○ Specification for protective coatings and painting

Submission & timeline	Description of submission
	<ul style="list-style-type: none"> • Certificates <ul style="list-style-type: none"> ○ Manufacturer’s works tests ○ Pre-installation checks ○ Pressure-testing schedules ○ Instrument loop test check sheets ○ Installed instrument performance tests ○ System tests ○ Statutory certificates of compliance (such as hazardous area equipment) <p>Pipework layout diagrams including all valves and penstocks</p> <p>Online Monitoring</p> <ul style="list-style-type: none"> • SCADA/instrumentation/process control system architecture • Geotechnical analysis and topography survey report <p>Topographical survey reports</p> <ul style="list-style-type: none"> • Site details & topography of STP Site, L-sections of channels & other works • Survey records, borehole records, and soil test reports <p>EHS Plan for Construction Period</p> <ul style="list-style-type: none"> • Health and Safety Standards • Environmental and Social Management Plan <p>Threshold Influent Standards proposed – which are the minimum standards, beyond the Influent Standards, that the Sewage must meet for it to be treated at the Facilities, in line with clause 7.2 (a) of the Concession Agreement.</p>
During Construction Period	<p>Detailed construction design and drawings:</p> <p>Information on equipment during installation</p> <ul style="list-style-type: none"> • Performance curves and drawings of equipment • Schedules of equipment • Quality plans for electrical, mechanical, instrumentation and SCADA works • Test and inspection certificates

Submission & timeline	Description of submission
Upon Construction Completion	As-Built Drawings <ul style="list-style-type: none"> • Final version of the design calculations • Key construction records and tests • Asset sheets
At least 30 days prior to the Scheduled Construction Completion Date	O&M Manual including the following: <ul style="list-style-type: none"> • O&M Procedures <ul style="list-style-type: none"> ○ Overall description of permits and standards, operation, and control of Facilities and Associated Infrastructure, operation and control of sludge handling facilities, sampling and laboratory analysis, records and reporting, maintenance, emergency O&M procedures ○ Overall plan for O&M of the Facilities and Associated Infrastructure with due consideration to the reliability of performance, flexibility to cope with variability, diligence to maintain tidiness and cleanliness, capability to respond to emergency situations and effectiveness to handle complaints and to meet the KPIs; ○ Provision of spare parts and special tools with quantity and particulars throughout the O&M Period for effective and uninterrupted operation of the Facilities and Associated Infrastructure; ○ Sampling and testing methodologies to determine physical, chemical and biological characteristics of raw Sewage and Effluent Water as per CPHEEO manual; ○ Methodology for sampling and testing of heavy metals in line with the CPHEEO manual ○ Inventory control of consumables such as fuel, sand and various types of chemicals, dangerous goods and hazardous materials; ○ Safe and proper storage and transfer of various types of materials and chemicals, dangerous goods, and hazardous materials to assure the continuous operation of the Facilities and Associated Infrastructure, the compliance with statutory requirements and avoidance of environmental nuisance;

Submission & timeline	Description of submission
	<ul style="list-style-type: none"> ○ Upkeep of the central control and monitoring system to ensure availability of reliable online and archived data ○ Arrangements for ensuring data security and integrity, and prevention of unauthorized alteration ○ Arrangements for data recovery in case of accidental loss of essential operational data ○ Arrangements for allowing flexibility of the computer database to store and process data upon introduction of new technologies and data management system ○ Preventative maintenance and corrective maintenance requirements ○ Precautionary measures and arrangements for inclement weathers ○ Procedures to record and handle complaints ○ Operational arrangements related to tests for KPIs ○ Procedures to prepare and submit routine records and reports to the BUIDCO ● Operational Contingency Plan <ul style="list-style-type: none"> ○ Identification of potential problems that may cause disruptions to operation and assessment of potential impacts ○ Measures to handle potential problems and prevent disruptions to operation ○ Measures to handle emergency situations that may cause disruptions to operation and shutdown of the Facilities ○ Precautions and procedures to resume operation after addressing of the emergency situations; and ○ Fire and emergency drill plans ● Human Resources Plan <ul style="list-style-type: none"> ○ Mobilization of labor for O&M ○ Means and flow of communication among field staff, staff at control rooms and truck drivers for disposal of the Digested Sludge;

Submission & timeline	Description of submission
	<ul style="list-style-type: none"> • Scheduled Maintenance Program for the first year post-COD • Emergency Procedures for: <ul style="list-style-type: none"> ○ Fire ○ Vehicle breakdown and accidents ○ Facilities closure ○ Procedure to handle excessive incoming Sewage due to rain, storm or infiltration ○ Floods ○ Inclement weather conditions ○ Unscheduled and Forced Outage ○ Spillage of chemicals ○ Labor disputes • Asset Management Plan: <ul style="list-style-type: none"> ○ Composite manual describing the functions and operations of each equipment ○ Composite manual for testing and servicing every system and individual item ○ Assets overview <ul style="list-style-type: none"> ▪ description of various components of the Facilities and Associated Infrastructure ▪ dependencies between the components ▪ asset management strategy ○ System performance <ul style="list-style-type: none"> ▪ design lives of plant, buildings, and structures; ▪ benchmarks, standards and guidelines adopted for performance tests, ▪ condition surveys and residual life assessments; ○ Asset remediation plans <ul style="list-style-type: none"> ▪ schedules for overhaul and replacement of plant ▪ schedules for refurbishment and renewal planned actions to bring or keep the assets above their minimum ▪ conditions required under the Concession Agreement

Submission & timeline	Description of submission
	<ul style="list-style-type: none"> ○ Operational arrangements related to the survey of the Hand-back Conditions <p>EHS Plan:</p> <ul style="list-style-type: none"> ● Waste (Screenings & Grit and other waste) management plan ● Sludge management plan, including a strategy and improvement measures and actions to treat and dispose of sludge, including sludge valorization opportunities in compliance with applicable standards ● Health and safety standards <ul style="list-style-type: none"> ○ Hazardous material management plan ○ Health and safety requirements to be followed by staff & sub-contractors ○ Traffic management plan during construction ○ Identification, elimination, and mitigation of safety and health risks ○ associated with the O&M of the Facilities and Associated Infrastructure; ● Environmental and social management system <ul style="list-style-type: none"> ○ Pollution prevention plan (water, air, noise) ○ Procedures, plans, and actions to achieve compliance with the requirements of the Concession Agreement; ○ Measures to enhance and sustain the good image of the Facilities and the Associated Infrastructure ○ Plan for maintaining good communication and relationship with all stakeholders <p>Guaranteed Energy Consumption in the format provided in the table below (refer to clause 9.4 (e) (ii) (C)). The figures presented in the last column (which corresponds to peak flow) should be equal to those quoted in the Financial Proposal.</p>
O&M Period	Annual scheduled maintenance program every year

Part C - Overview of SCADA system to be employed

The schematic representation of the required RTOLMS architecture to be provided by the bidder as part of Basic engineering package to meet the KPI requirements as per schedule 1 and 11.

Note: All pumping stations monitored/controlled through GSM / Landline MODEM

Typical parameters to be relayed to control monitoring station

Parameters	Description of soft signal	Lifting station/ Pumping station / Main pumping station (Typical)		STP & septage treatment plant			Biogas generation	Biogas DG set
		Sump/collection well	Pumps	Sump/collection well	Pumps	Other equipment		
Date & Time	Real time	✓	✓	✓	✓	✓	✓	✓
Liquid Level	High	✓		✓				
	Low	✓		✓				
Liquid flow	Inlet flow measurement	✓	✓	✓	✓			
Sewage quality	pH, BOD, COD, TDS, TSS, and colour.			✓				
Pump status for individual pumps	On, OFF, Trip		✓		✓	✓		

Parameters	Description of soft signal	Lifting station/ Pumping station / Main pumping station (Typical)		STP & septage treatment plant			Biogas generation	Biogas DG set
		Sump/collection well	Pumps	Sump/collection well	Pumps	Other equipment		
Flow rate in common header	Flow rate, head		✓		✓			
Electrical parameter for individual pumps & main switchboard	Voltage, Current, KWH, PF, KVA		✓		✓	✓		
No of operating personnel			✓		✓	✓	✓	
Temperature - Ambient, liquid		✓	✓					
Biogas monitoring	Online status for various activity						✓	
Gas generation	Cum / day, cumulative gas generation, gas quality						✓	
DG set running hours								✓

Parameters	Description of soft signal	Lifting station/ Pumping station / Main pumping station (Typical)		STP & septage treatment plant			Biogas generation	Biogas DG set
		Sump/collection well	Pumps	Sump/collection well	Pumps	Other equipment		
Electrical parameter for individual Biogas based engine generator, DG set, pumps & main switchboard	Voltage, Current, KWH, PF, KVA							√

Schedule 2: Format of the Substitution Agreement
[ON APPROPRIATE STAMP PAPER]

This Substitution Agreement (**Substitution Agreement**) is executed on this [●] day of [●] 2018 at name of place:

BETWEEN

- (1) **BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (BUIDCO)**, is a flagship company owned by Government of Bihar, with its registered office at second floor, Khadhya bhavan, Road no.-2, Daroga Prasad Rai Path, R Block, Patna 800001 (hereinafter referred to as the **BUIDCO**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (2) **NATIONAL MISSION FOR CLEAN GANGA**, a statutory body constituted under the Environment (Protection) Act, 1986, with its registered office at [] (hereinafter referred to as **NMCG**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (3) *insert name of the Concessionaire*, a company organized, incorporated, registered and existing under the Companies Act, with its registered office at _____ [*insert address*] acting through _____, _____ [*insert name of the authorised signatory and his/her designation*] duly authorized by resolution dated _____ [*insert date of the Board Resolution*] (hereinafter referred to as the **Concessionaire**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (4) [*Insert name of the Lenders' Representative*] a company organized, incorporated, registered and existing under the Companies Act, with its registered office at [insert address] (hereinafter referred to as the Lenders' **Representative**, which expression shall, unless it be repugnant to the context having its registered office at [address], [acting for itself and for and on behalf of the Lenders listed in Annexure 1].

The BUIDCO, NMCG, the Concessionaire and the Lenders' Representative are hereinafter collectively referred to as **Parties** and individually as **Party**.

WHEREAS:

- A With a view to implement the Namami Gange programme and the Ganga 2016 Order, the Jal Nigam, in association with NMCG, has decided to undertake the development and rehabilitation of STPs along with other Facilities and Associated Infrastructure at Bhagalpur on a PPP basis, through a hybrid annuity model.

- B. For this purpose, the BUIDCO selected the Concessionaire post a bid process to undertake: development of one STP, with a proposed capacity of 45 MLD, at Baghalpur on a PPP basis, through a hybrid annuity model. While the Executing Agency i.e., BUIDCO will be the principal executing agency and bidding authority for the Project, NMCG will be responsible for making payments to the Concessionaire.
- C. The BUIDCO, NMCG and the Concessionaire executed a Concession Agreement dated [insert date] to implement the Project (**Concession Agreement**).
- D. The Lenders have agreed to finance the Project in accordance with the terms and conditions of the Financing Documents and have requested the BUIDCO and NMCG to enter into this Substitution Agreement for securing their interests through substitution of the Concessionaire to a nominated Company, in accordance with this Substitution Agreement.
- E. The Parties have agreed to execute this Substitution Agreement on the terms and conditions mentioned herein below.

IT IS AGREED as follows:

1 DEFINITIONS AND INTERPRETATION

1.1 Definitions

The capitalised terms used but not defined in this Agreement shall have the meaning ascribed to them in the Concession Agreement:

Annexure	means an annexure to this Substitution Agreement.
Article	means an article of this Substitution Agreement.
Clause	means a clause of this Substitution Agreement.
Companies Act	means the (Indian) Companies Act, 1956 and the (Indian) Companies Act, 2013, as amended from time to time, as the context may require.
Company	means a company incorporated under the Companies Act or a foreign company incorporated under the relevant statute of its jurisdiction.
Concession Agreement	has the meaning ascribed to it in Recital C.
Concessionaire	means a Concessionaire Event of Default as defined under the
Event of Default	Concession Agreement.

Dispute	means any difference or dispute of whatsoever nature relating to this Substitution Agreement between the Parties arising under, out of or in connection with this Substitution Agreement.
Financial Assistance	means all funded and non-funded financial assistance, including loans, advances and guarantees or any re-financing that the Concessionaire has availed of for the Project from the Lenders, as set out in the Financing Documents.
Financial Default	means a Concessionaire event of default as set out under the Financing Documents.
Financing Documents	means, collectively, the documents entered into or to be entered into by the Concessionaire with the Lenders, in respect of all funded and non-funded financial assistance, including loans, advances and or any re-financing that the Concessionaire may avail of for the Project from the Lenders and includes any document providing Security to the Lenders.
Indemnified Party	has the meaning ascribed to it in Clause 7.2.
Indemnifying Party	has the meaning ascribed to it in Clause 7.2.
Lenders	means the financial institutions set out in Annexure 1.
Lenders' Dues	means the aggregate of all monies owed by the Concessionaire to the Lenders under the Financing Documents on account of principal thereunder for funding the whole or any part of the cost to be incurred for implementing the Project and all accrued interest, additional interest, liquidated damages, commitment fees, commission, prepayment premium, costs, charges and other monies including financing charges and fees owed by the Concessionaire to the Lenders under the Financing Documents for the Project that are payable under the Financing Documents, up to the date of the Notice of Intent to Terminate or notice of termination issued under the Concession Agreement, or up to the date of issuance of the Notice of Financial Default under the Financial Documents.
Notice of Dispute	has the meaning ascribed to it in Clause 8.1.
Notice of Financial Default	has the meaning ascribed to it in Clause 3.2(a).
Notice of Intent to Terminate	means a notice issued by the BUIDCO upon occurrence of a Concessionaire Event of Default in accordance with the Concession Agreement, conveying its intention to terminate the Concession Agreement.

Person	means any individual, company, corporation, partnership, joint venture, trust, society, sole proprietor, limited liability partnership, co-operative society, government company, unincorporated organization or any other legal entity.
Project	has the meaning ascribed to it in Recital B.
Proposal	shall have the meaning ascribed to it in Clause 4.1(c).
RFP	means the request for proposal dated [●] issued by the BUIDCO, for conducting a bid process to implement the Project.
Selectee	means a new Company proposed by the Lenders pursuant to this Substitution Agreement for performing the rights and obligations of the Concessionaire for the remaining Term of the Concession Agreement.

1.2. Interpretation

In this Substitution Agreement, unless the context otherwise requires:

- (a) Any reference to a statutory provision shall include such provision as modified or re-enacted or consolidated from time to time.
- (b) The words importing the singular shall mean the plural and vice-versa; and words importing the masculine shall include the feminine and neuter and vice-versa.
- (c) Headings in this Substitution Agreement are for convenience of reference only.
- (d) The references to the word 'include' or 'including' or to the phrase 'in particular', shall be construed without limitation.
- (e) References to any date or time of day are to Indian Standard Time; any reference to day shall mean a reference to a calendar day; any reference to a month shall mean a reference to a calendar month, any reference to a year shall mean a reference to a calendar year.
- (f) The references to any agreement or deed or other instrument shall be construed as a reference to such agreement, deed, or other instrument as may be amended, varied, supplemented or novated, from time to time.
- (g) A requirement that a payment be made on a day which is not a Business Day shall be construed as a requirement that the payment be made on the next Business Day.
- (h) Whenever provision is made for the giving or issuing of any notice, endorsement, consent, approval, permission, certificate or determination by any person, such notice, etc., shall be reasonably given, shall not be unreasonably withheld or delayed and shall be in writing and the words 'notify', 'endorse', 'approve', 'permit', 'certify' or 'determine' shall be construed accordingly. Where any notice, consent or approval is to be given

by either of the Parties, the notice, consent or approval shall be given on their behalf only by any authorized persons.

- (i) The words written and in writing include a facsimile transmission and any means of reproducing works in a tangible and permanently visible form.
- (j) The provisions of the Clauses and Annexures of this Agreement shall be interpreted in such a manner that will ensure that there is no inconsistency in interpretation between the intent expressed in the Clauses or Annexures.
- (k) In the event of any ambiguities or discrepancies between two Clauses of this Agreement, the provisions of the specific Clause relevant to the issue under consideration shall prevail over those in other Clauses.
- (l) The rule of construction, if any, that an agreement should be interpreted against the Party responsible for the drafting and preparation thereof shall not apply to this Agreement.

2. ASSIGNMENT

The Concessionaire hereby agrees to assign its rights, title and interest under the Concession Agreement to and in favour of the Lenders pursuant to and in accordance with this Substitution Agreement and the Concession Agreement by way of Security in respect of the Financial Assistance provided by the Lenders.

The BUIDCO and NMCG hereby consent to assignment by the Concessionaire of its rights, title and interest under the Concession Agreement by way of Security to and in favour of the Lenders in connection with the Financial Assistance provided by the Lenders.

3. SUBSTITUTION OF THE CONCESSIONAIRE

3.1. Right of Substitution

The BUIDCO and NMCG hereby irrevocably agree to substitute the Concessionaire with a Selectee, selected by the Lenders in accordance with the provisions of this Substitution Agreement and approved by the BUIDCO, by novation of the Concession Agreement in favour of the Selectee. The BUIDCO and NMCG further agree that they shall provide all necessary consents and assistance to effect such substitution of the Concessionaire with a Selectee.

It is clarified that nothing contained herein shall entitle the Lenders to design, develop, construct, complete, operate or maintain the Facilities themselves under and in accordance with the Concession Agreement either individually or collectively.

3.2. Procedure in case of a Financial Default

- (a) Upon occurrence of a Financial Default, the Lenders' Representative shall notify the Concessionaire by a notice, with a copy simultaneously sent to the BUIDCO and NMCG, about the occurrence of a Financial Default and the amount of the Lenders' Dues (**Notice of Financial Default**).

The Notice of Financial Default shall be conclusive evidence of occurrence of the Financial Default and the Lenders' Dues, and shall be final, conclusive and binding upon the Concessionaire for the purpose of this Substitution Agreement and the Financing Documents.

The Parties agree that the BUIDCO shall have the right to trigger a Concessionaire Event of Default and issue a Notice of Intent to Terminate under the Concession Agreement upon receipt of a Notice of Financial Default.

- (b) The Lenders' Representative (on behalf of the Lenders) may, within 60 days after the issuance of the Notice of Intent to Terminate on account of the Financial Default, make a representation to the BUIDCO, stating the intention to substitute the Concessionaire by a Selectee (**Substitution Notice under Financing Documents**).

In the event that the Lenders' Representative issues the Substitution Notice under Financing Documents, then, within 90 days of issue of such notice, the Lenders shall be entitled to undertake and complete the substitution of the Concessionaire by a Selectee, in accordance with the provisions of this Substitution Agreement. The Lenders' right to substitute the Concessionaire shall be without prejudice to any other right or remedy available to the Lenders under the Financing Documents and/or this Substitution Agreement.

- (c) If the Lenders' Representative does not convey the intention to substitute the Concessionaire with a Selectee within 60 days of the Notice of Intent to Terminate, or the Lenders fail to substitute the Concessionaire within the time period set out in (b) above, the BUIDCO shall be entitled to terminate the Concession Agreement in accordance with its provisions.

3.3. Procedure in case of a Concessionaire Event of Default

- (a) Upon occurrence of a Concessionaire Event of Default, the BUIDCO shall provide the Lenders with a copy of the Notice of Intent to Terminate issued by it in accordance with the Concession Agreement, notifying the Lenders about the occurrence of a Concessionaire Event of Default in reasonable detail.

The Notice of Intent to Terminate shall be conclusive evidence of occurrence of the Financial Default, and shall be final, conclusive and binding upon the Concessionaire for the purpose of this Substitution Agreement and the Financing Documents.

- (b) The Lenders' Representative (on behalf of the Lenders) may, within 60 days after the issuance of the Notice of Intent to Terminate make a representation to the BUIDCO, stating the intention to substitute the Concessionaire by a Selectee (**Substitution Notice under Concession Agreement**).

In the event that the Lenders' Representative issues the Substitution Notice under Concession Agreement, then, within 90 days of issue of such notice, the Lenders shall be entitled to undertake and complete the substitution of the Concessionaire by a Selectee, in accordance with the provisions of this Substitution Agreement. The Lenders' right to substitute the Concessionaire shall be without prejudice to any other

right or remedy available to the Lenders under the Financing Documents and/or this Substitution Agreement.

- (c) If the Lenders' Representative does not convey the intention to substitute the Concessionaire with a Selectee within 60 days of the Notice of Intent to Terminate, or the Lenders fail to substitute the Concessionaire within the time period set out in (b) above, the BUIDCO shall be entitled to terminate the Concession Agreement in accordance with its provisions.

34. **Criteria for Selection of Selectee**

- (a) The Lenders' Representative shall apply the following criteria while selecting a Company as the Selectee:
 - (i) the Company shall meet the technical and qualification criteria set out in the RFP, demonstrating that it has the necessary experience and technical qualification to construct and operate and maintain the Facilities and the Associated Infrastructure for the remaining Term;
 - (ii) the Company shall be capable of properly discharging the duties, obligations and liabilities of the Concessionaire under the Concession Agreement;
 - (iii) the Company shall provide Security to the satisfaction of the Lenders for the repayment of Lenders' Dues;
 - (iv) the Company shall have the capability and shall unconditionally consent to assume the liability for the payment and discharge of dues of the Concessionaire to the BUIDCO under and in accordance with the Concession Agreement and of Lenders' Dues upon terms and conditions as agreed to with the Lenders;
 - (v) the Company shall have not been in breach of any agreement between itself and NMCG, the BUIDCO, the GoI or the Government of Bihar; and
 - (vi) any other appropriate condition or criterion determined by the Lenders [or the BUIDCO], whereby continuity in the performance of the Concessionaire's obligations under the Concession Agreement is maintained and the Security in favour of the Lenders under the Financing Documents is preserved.
- (b) At any time prior to the approval of a Company as the Selectee by the BUIDCO pursuant to this Substitution Agreement, the BUIDCO may require the Lenders' Representative to satisfy the BUIDCO as to the eligibility of such Selectee and the decision of the BUIDCO in this behalf shall be reasonable, final, conclusive and binding on the Lenders and such Selectee.

4 MODALITIES OF SUBSTITUTION

4.1. **Modalities**

The following modalities shall be applicable to any substitution of the Concessionaire by the Selectee:

- (a) the Lenders' Representative may invite, negotiate, procure offers either through private negotiations or public auction or process of tender or otherwise for the substitution of the Concessionaire by another Company;
- (b) the Lenders' Representative shall on behalf of the Lenders propose to the BUIDCO, with a copy to NMCG, pursuant to Clause 4.1(c), the name of such Company proposed to be the Selectee for acceptance and shall apply to the BUIDCO for:
 - (i) grant to such Company, as substitute to the Concessionaire, the right to design, construct, finance, operate, maintain and transfer the Facilities and the Associated Infrastructure under and in accordance with and subject to and on the terms and conditions set out in the Concession Agreement;
 - (ii) novation of the Concession Agreement to such Company, upon being approved as the Selectee, on the same terms and conditions for the remaining Term under the Concession Agreement; and
 - (iii) the execution of a new substitution agreement with such Company, upon being approved as the Selectee, for the remaining Term, on the same terms and conditions as set out in this Substitution Agreement.
- (c) the Lenders' Representative shall be entitled, within the time period set out in Clause 3.2(b) or Clause 3.3(b) above as the case may be, to select and propose a Company as the Selectee to the BUIDCO (with a copy to NMCG) for its approval (**Proposal**). The Proposal of the Lenders' Representative pursuant to this Clause 4.1(c) shall contain the details of such Company (including information in relation to the Company's ability to meet the technical and financial criteria set out in the RFP), the Lenders' Dues and any other data and information as may be relevant for the BUIDCO to consider and take a decision on the Proposal.

Without prejudice to the foregoing, the Lenders' Representative agrees and undertakes to provide to the BUIDCO (and NMCG), such further and other information and clarifications in respect of any data, particulars or information, furnished by the Lenders' Representative as the BUIDCO and/or NMCG may reasonably require. The BUIDCO shall convey its approval or otherwise of such Proposal, including such Company proposed as the Selectee, in its sole discretion within [15] days of (i) the date of receipt of the Proposal by the BUIDCO; or (ii) the date when the last of any further information and clarifications in respect of any data, particulars or information comprised in the Proposal, have been provided by the Lenders' Representative to the BUIDCO, whichever is later. It is expressly agreed between the Parties that the Proposal shall be accompanied by an unconditional undertaking of the Company proposed as the Selectee that it shall, upon approval by the BUIDCO of the Proposal, perform and fulfill the terms and conditions of the Concession Agreement as if such Company was the original signatory to the Concession Agreement and shall be liable for and shall assume, discharge and pay the Lenders' Dues under and in accordance with the terms and conditions of the Financing Documents. Upon approval of the Proposal by the BUIDCO, the Company shall become the Selectee hereunder;

- (d) the BUIDCO shall, upon its satisfaction of the eligibility of the Selectee and in accordance with the provisions of this Substitution Agreement and subject to the provisions of Clause 4.1(e), proceed to substitute the Concessionaire with the Selectee by novation of the Concession Agreement or such other form of document as the BUIDCO and NMCG may reasonably require, on the same terms and conditions as set out under the Concession Agreement for the remaining Term;
- (e) the substitution as aforesaid shall be subject to the Selectee completing corporate compliances for executing the documents and obtaining Applicable Permits necessary for implementing and/or operating and maintaining the Facilities and the Associated Infrastructure under and in accordance with the Concession Agreement;
- (f) the BUIDCO shall have the right to object to the choice of the proposed Selectee after hearing the Lenders' Representative, provided however, that in the event of a refusal as stated above, the Lenders' Representative may propose another Company as the Selectee, within 90 days of the issuance of the Substitution Notice under Financing Documents or Substitution Notice under Concession Agreement, as the case may be. In the event that no objection is raised with respect to the Company proposed to be the Selectee by the BUIDCO within the period set forth in Clause 4.1(c), the Company proposed as the Selectee shall be deemed to have been accepted by the BUIDCO;
- (g) the substitution as aforesaid, shall be deemed to be complete only upon the Selectee accepting and complying with the terms and conditions stipulated in the Concession Agreement; and
- (h) all actions of the Lenders' Representative hereunder shall be deemed to be on behalf of the Lenders and be binding upon them. The Lenders' Representative is authorised to receive payment of compensation, payment to cure default and any other payments, consideration for transfer in accordance with the Substitution Notice under Financing Documents or Substitution Notice under the Concession Agreement, as the case may be, the Concession Agreement and the Financing Documents and give valid discharge on behalf of all the Lenders.

4.2 **Waiver of Concessionaire's Right to Remedy**

The Concessionaire hereby irrevocably agrees and waives any right to challenge the Lenders' decision to apply to the BUIDCO for substitution as aforesaid and neither the Concessionaire nor the BUIDCO shall be entitled to prevent the Lenders' Representative from proceeding to seek such a substitution of the Concessionaire by the Selectee as provided in this Article 4. The Concessionaire agrees and confirms that the the Concessionaire shall not have any right to seek re-evaluation of the the Concessionaire's assets and the Concession Agreement, otherwise than as contracted in the Financing Documents while the BUIDCO permits substitution as hereinbefore provided, pursuant to the Lenders' Representative's request. The Parties acknowledge that the rights of the Lenders under this Article 4 are irrevocable and shall not be contested in any proceedings before any court of law and the Concessionaire shall not have any right or remedy to prevent, obstruct, injunct or restrain the BUIDCO and/or the Lenders from effecting or causing the substitution as aforesaid. No third party shall have the right to question the decision of the Lenders/Lenders' Representative, the BUIDCO or NMCG in relation to substitution of the Concessionaire.

43. **No Guarantee**

Nothing contained in this Article 4 shall mean or be interpreted as provision of any guarantee or surety by the BUIDCO or NMCG and it is expressly agreed that the BUIDCO and NMCG have not provided any surety, guarantee or counter guarantee whether directly or indirectly for the recovery of amount of Financial Assistance advanced by the Lenders to the Concessionaire.

5. **INTERIM PROTECTION**

If the Lenders notify the BUIDCO of a Financial Default and until such time that a Selectee is approved in accordance with this Substitution Agreement, the Lenders agree that the BUIDCO shall (either itself or through an entity nominated by it) be entitled to maintain, preserve and protect the Facilities and the Associated Infrastructure if, in the BUIDCO's opinion, it is necessary and required for the construction or operation and maintenance of the Facilities and the Associated Infrastructure. In case of such interim protection during the O&M Period, the BUIDCO or an entity nominated by the BUIDCO shall operate and maintain the Facilities and the Associated Infrastructure pending the substitution of the Concessionaire by the Selectee.

6. **STAND-STILL**

The BUIDCO agrees that on the occurrence of any Concessionaire Event of Default or a Financial Default, it shall not exercise: (a) its Nigam's right to step-in in place of the Concessionaire; (b) suspend or terminate the Concession Agreement; or (c) take any action for the winding-up of the Concessionaire or the appointment of a receiver or administrator in respect of the Concessionaire's business and assets, until expiry of the time period available to the Lenders to exercise the substitution rights, as set out in Article 3.

7. **INDEMNITY**

7.1 **Indemnity**

- (a) The Concessionaire shall indemnify, defend and hold harmless the BUIDCO, NMCG, the Lenders and the Lenders' Representative against any and all proceedings, actions and third party claims for any loss, damage, cost and expenses of whatever kind and nature arising out of any breach by the Concessionaire of any of its obligations under this Substitution Agreement or on account of failure of the Concessionaire to comply with Applicable Laws and Applicable Permits.
- (b) The Lender shall indemnify, defend and hold harmless the BUIDCO and NMCG against any and all proceedings, actions and third party claims for any loss, damage, cost and expenses arising out of the Lenders' or the Lenders' Representative's failure to fulfill their obligations under this Substitution Agreement, materially or adversely affecting the performance of the Concessionaire's, the BUIDCO's or NMCG's obligations under the Concession Agreement, other than any loss, damage, cost and expenses arising out of acts done in discharge of their lawful functions by the Lenders/Lenders' Representative.

72 **Notices and Contest of Claims**

In the event that any Party receives a claim from a third party in respect of which it is entitled to the benefit of an indemnity under Clause 7.1 or in respect of which it is entitled to reimbursement (**Indemnified Party**), it shall notify the other Party responsible for indemnifying such claim hereunder (**Indemnifying Party**) within 30 days of receipt of claim and shall not settle or pay the claim without prior approval of the Indemnifying Party, such approval not being unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim, it may conduct the proceedings in the name of the Indemnified Party and shall bear all costs involved in contesting it. The Indemnified Party shall provide all cooperation and assistance in contesting any claim and shall sign all such writings and documents as the Indemnified Party may reasonably require.

8 DISPUTE RESOLUTION

81 **Amicable Settlement**

In the event of a Dispute, either Party may give the other written notice at any time of a Dispute having arisen (**Notice of Dispute**). The Notice of Dispute shall set out brief details of the nature of the Dispute.

The Parties agree that they shall endeavor to resolve any Dispute amicably and in good faith within 30 days of a Notice of Dispute being served by one Party on the other Party in respect of that Dispute. In the event that resolution of the Dispute is reached pursuant to this Clause 8.1, the resolution and its terms shall be recorded in writing and signed by one representative from each of the Parties.

82 **Dispute Resolution by Arbitration**

Failing amicable settlement and/or settlement of a Dispute pursuant to the provisions of Clause 8.1, each of the Parties unconditionally and irrevocably agrees to the submission of such Dispute to binding arbitration governed by the Arbitration and Conciliation Act, 1996.

Any arbitration proceedings commenced pursuant to this Clause 8.2 shall be referred to as the **Arbitration**.

If a Dispute is referred to Arbitration by any Party, such Dispute shall be resolved by a sole arbitrator to be appointed by mutual agreement of the Parties. If Parties fail to appoint an arbitrator within 30 days after service of the notice of Arbitration, such arbitrator shall be appointed in accordance with the provisions of the Arbitration Act.

83 **Place of Arbitration**

The place of the Arbitration shall be New Delhi.

84 **English Language**

The request for the Arbitration, the answer to the request, the terms of reference, any written submissions, any orders and rulings pursuant to the Arbitration shall be in English and, if oral hearings take place, English shall be the language to be used in the hearings.

8.5 Fees and Expenses

The fees and expenses of the arbitrator and all other expenses of the Arbitration shall be initially borne and paid by respective Parties, subject to determination by the arbitrator. The arbitrator may provide in the award for the reimbursement to the prevailing Party of its costs and expenses in bringing or defending the Arbitration claim, including legal fees and expenses incurred by such Party.

8.6 Performance of Obligations during the Pendency of the Arbitration Proceedings

The Substitution Agreement and rights and obligations of the Parties shall remain in full force and effect pending the award under any Arbitration proceedings pursuant to this Article 8.

8.7 Survival

The provisions of this Article 8 shall survive the termination of the Substitution Agreement.

9. GOVERNING LAW AND JURISDICTION

The Substitution Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the courts in Allahabad shall have exclusive jurisdiction over matters arising out of or relating to this Substitution Agreement.

10. MISCELLANEOUS

10.1 Representations and Warranties

The Parties hereto expressly represent and warrant that they are duly empowered to sign and execute this Substitution Agreement.

10.2 Notices

Notices under this Substitution Agreement shall be sent to the addresses first hereinabove mentioned and Annexure 1 (in case of Lenders). Any change in the address of any Party shall be duly notified by registered post acknowledgement due and delivered to other Parties.

10.3 Amendments to Substitution Agreement

- (a) This Substitution Agreement shall not be affected by re-organisation of any Lender, Lenders' Representative, the BUIDCO, NMCG and the successor-in-interest of such Lender, Lenders' Representative, the BUIDCO or NMCG shall have the benefit of this Substitution Agreement.
- (b) No amendment, variation or modification to this Substitution Agreement shall be valid and effectual unless made in writing and executed by the duly authorised representatives of all the Parties.

- (c) All stamp duties or other imposts and charges as are applicable on this Substitution Agreement or on novation of the Concession Agreement for the purpose of substitution as specified in this Substitution Agreement shall be borne by the Concessionaire. In the event of Lenders making such payment in the interim, such amount shall be deemed to be a part of the Lenders' Dues.

10.4 Harmonious Construction

- (a) For the purpose of giving full and proper effect to this Substitution Agreement, the Concession Agreement and this Substitution Agreement shall be read together and construed harmoniously. The terms of this Substitution Agreement shall prevail in the event of any inconsistencies with the Concession Agreement.
- (b) The consultation, recommendation or approval of the Lenders' Representative under this Substitution Agreement shall always be taken as consultation, recommendation or approval of every concerned Lender and each such Lender shall be bound by the same and hereby waives its right to question or dispute it.
- (c) This Substitution Agreement shall be in addition to and shall not be in derogation of the terms of the Financing Documents.
- (d) It shall not be necessary for the Lenders or the Lenders' Representative to enforce or exhaust any other remedy available to them before invoking the provisions of this Substitution Agreement.

In witness whereof the Parties hereto have signed this Agreement on this _____ day of _____ 2018.

Bihar Urban Infrastructure Development Corporation Limited (BUIDCO)

By: Project Director, BUIDCO

Name:

Title: Project Director

NATIONAL MISSION FOR CLEAN GANGA

By: Deputy Secretary, National Mission for Clean Ganga, New Delhi

Name:

Title: Deputy Secretary

[CONCESSIONAIRE]

By:

Name:

Title:

[LENDERS'REPRESENTATIVE]

By:

Name:

Title:

ANNEXURE 1

S.No.	Details of Lenders
1.	<p>[<i>insert name of the Lender</i>], a company organized,</p> <p>incorporated, registered and existing under the Companies Act, with its registered office [<i>insert address</i>]</p> <p>Company Identification Number [<i>insert</i></p> <p><i>Company Identification Number</i>].</p>
2.	<p>[<i>insert name of the Lender</i>], a company organized,</p> <p>incorporated, registered and existing under the Companies Act, with its registered office [<i>insert address</i>]</p> <p>Company Identification Number [<i>insert</i></p> <p><i>Company Identification Number</i>].</p>

**Schedule 3: Format of the Escrow Agreement
(ON APPROPRIATE STAMP PAPER)**

THIS ESCROW AGREEMENT (this **Escrow Agreement**) is entered into at [] on [] by and among:

- (1) **BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (BUIDCO)**, is a flagship company owned by Government of Bihar, with its registered office at second floor, Khadhya bhavan, Road no.-2, Daroga Prasad Rai Path, R Block, Patna 800001 (hereinafter referred to as the **BUIDCO**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (1) **NATIONAL MISSION FOR CLEAN GANGA**, a statutory body constituted under the Environment (Protection) Act, 1986, with its registered office at 1st Floor, Major Dhyanchand National Stadium, India Gate, New Delhi - 110002 (hereinafter referred to as **NMCG**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (1) *insert name of the Concessionaire*, a company organized, incorporated, registered and existing under the Companies Act, with its registered office at _____ *[insert address]* acting through _____ *[insert name of the authorised signatory and his/her designation]* duly authorized by resolution dated _____ *[insert date of the Board Resolution]* (hereinafter referred to as the **Concessionaire**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns);

AND

- (2) *[Insert name of Escrow Bank]*, a bank duly constituted in accordance with Applicable Laws and carrying on the business of banking in India as a Scheduled Commercial Bank, with its registered office at *[insert address]* and acting for the purposes of this Escrow Agreement through its branch office at *[insert address]* (hereinafter referred to as **Escrow Bank**, which expression shall unless repugnant to the context or meaning thereof includes its successors and permitted assigns).

The BUIDCO, NMCG, the Concessionaire and the Escrow Bank are collectively referred to as **Parties** and individually as **Party**.

WHEREAS:

A With a view to implement the Namami Gange programme and the Ganga 2016 Order, the BUIDCO, in association with NMCG, has decided to undertake the development and rehabilitation of STPs along with other Facilities and Associated Infrastructure at Bhagalpur on a PPP basis, through a hybrid annuity model.

- B. For this purpose, the BUIDCO selected the Concessionaire post a bid process to undertake: development of one STP, with a proposed capacity of 45 MLD, at Bhagalpur on a PPP basis, through a hybrid annuity model. While the Executing Agency i.e., BUIDCO will be the principal executing agency and bidding authority for the Project, NMCG will be responsible for making payments to the Concessionaire.
- C. The BUIDCO, NMCG and the Concessionaire executed a Concession Agreement dated [] to implement the Project (**Concession Agreement**), which is annexed to this Escrow Agreement.
- D. In consideration of the Concessionaire designing, developing, financing, constructing, rehabilitating, operating and maintaining the Facilities on the Site for the Term, NMCG is required to pay the Concessionaire: (i) during the relevant Construction Period, the relevant Construction Payments upon satisfactory completion of Payment Milestones; and (ii) during the O&M Period, the relevant O&M Payments comprising the Capex Annuity, the O&M Charges and the Power Charges (subject to the cap of the Power Charges based on the Guaranteed Energy Consumption),
- E. As per the provisions of the Concession Agreement, NMCG, the BUIDCO, the Concessionaire are required to enter into an escrow agreement with an escrow bank and NMCG is required to open an escrow account with such escrow bank and maintain the Minimum Escrow Balance for the payment of the Construction Payments and the O&M Payments.
- F. The escrow account shall be funded by NMCG in accordance with the terms of this Escrow Agreement and such account shall serve to secure NMCG's payment obligations towards the Concessionaire under the Concession Agreement.
- E. The Escrow Bank is willing to serve as an escrow bank in accordance with the terms and conditions of this Escrow Agreement.

NOW, THEREFORE, the Parties hereto agree as follows:

1 DEFINITIONS AND INTERPRETATION

- 1.1 Capitalized terms used but not defined in this Escrow Agreement shall have the meaning given to them in the Concession Agreement.
- 1.2 In this Escrow Agreement, unless the context otherwise requires:
 - (a) Any reference to a statutory provision shall include such provision as modified or re-enacted or consolidated from time to time.
 - (b) The words importing the singular shall mean the plural and vice-versa; and words importing the masculine shall include the feminine and neuter and vice-versa.
 - (c) Headings in this Escrow Agreement are for convenience of reference only.

- (d) The references to the word 'include' or 'including' or to the phrase 'in particular', shall be construed without limitation.
- (e) References to any date or time of day are to Indian Standard Time; any reference to day shall mean a reference to a calendar day; any reference to a month shall mean a reference to a calendar month, any reference to a year shall mean a reference to a calendar year.
- (f) The references to any agreement or deed or other instrument shall be construed as a reference to such agreement, deed, or other instrument as may be amended, varied, supplemented or novated, from time to time.
- (g) Whenever provision is made for the giving or issuing of any notice, endorsement, consent, approval, permission, certificate or determination by any person, such notice, etc., shall be reasonably given, shall not be unreasonably withheld or delayed and shall be in writing. Where any notice, consent or approval is to be given by either of the Parties, the notice, consent or approval shall be given on their behalf only by any authorized persons.
- (h) The words written and in writing include a facsimile transmission and any means of reproducing works in a tangible and permanently visible form.
- (i) The provisions of the clauses of this Escrow Agreement shall be interpreted in such a manner that will ensure that there is no inconsistency in interpretation between the intent expressed in the clauses.
- (j) In the event of any ambiguities or discrepancies between two clauses of this Escrow Agreement, the provisions of the specific clause relevant to the issue under consideration shall prevail over those in other clauses.
- (k) The rule of construction, if any, that an agreement should be interpreted against the Party responsible for the drafting and preparation thereof shall not apply to this Escrow Agreement.

2 **ESCROW ACCOUNT**

21 **Appointment**

- (a) NMCG, the BUIDCO and the Concessionaire hereby appoint the Escrow Bank to serve as the escrow bank for the purposes of this Escrow Agreement and the Escrow Bank hereby accepts this appointment.
- (b) NMCG hereby settles in trust with the Escrow Bank a sum of INR 1,000 (Rupees one thousand). The Escrow Bank has accepted the above amount of INR 1,000 (Rupees one thousand) in trust declared and, subject to the terms and conditions in this Escrow Agreement, agreed to act as trustee for the benefit of the Concessionaire, NMCG and the BUIDCO.

- (c) The Escrow Bank shall hold and safeguard the Escrow Account and any monies held therein, during the term of this Escrow Agreement and shall treat the amount in the Escrow Account as monies deposited by NMCG with the Escrow Bank in trust in accordance with the provisions of this Escrow Agreement. In performing its functions and duties under this Escrow Agreement, the Escrow Bank shall act as an agent of NMCG, the BUIDCO and the Concessionaire.

22 **Escrow Account**

- (a) Within 5 days of the date of this Escrow Agreement, NMCG shall establish a bank account in the name of [●], which shall be an interest bearing, no lien account, denominated in Indian Rupees for the benefit of the Concessionaire (the **Escrow Account**).
- (b) Immediately upon opening the Escrow Account, the Escrow Bank shall provide details of the Escrow Account in writing to the Concessionaire and the BUIDCO, including the date of opening of the Escrow Account.
- (c) The Parties agree and acknowledge that:
 - (i) the Escrow Account shall be opened pursuant to, and specifically for the purposes of, this Escrow Agreement and shall be used and operated only for the purposes and in the manner provided in this Escrow Agreement and for no other use or purposes and in no other manner;
 - (ii) the Escrow Bank shall maintain the Escrow Account in accordance with the terms of this Escrow Agreement and its usual practices and applicable regulations;
 - (iii) the Escrow Bank and the Concessionaire, after consultation with NMCG, shall agree on the detailed mandates, terms and conditions and operating procedures for the Escrow Account but in the event of any inconsistency between this Escrow Agreement and such mandates, terms and conditions or procedures in this Escrow Agreement shall prevail;
 - (iv) the Escrow Bank shall not have any interest, banker's lien, charge or right of set-off or grant any lien over the amounts lying to the credit of the Escrow Account; and
 - (v) no instructions shall be given to the Escrow Bank which is not contemplated by or which is contrary to or inconsistent with this Escrow Agreement. In the event any such inconsistent or contrary instruction is given, the same shall be null and void and the Escrow Bank shall not be obliged to act upon, and shall ignore, such instructions and continue to comply with the provisions of this Escrow Agreement.

23 **Deposits into Escrow Account**

- (a) Minimum Escrow Balance

- (i) NMCG shall deposit an amount equivalent to the first 2 Payment Milestones prior to the Effective Date. From the Effective Date, it shall ensure that the Escrow Account is funded with an amount equivalent to the next 2 Payment Milestones until the Bhagalpur Facilities COD or; and
- (ii) On and from the Bhagalpur Facilities COD , whichever is earlier, and until the Expiry Date, NMCG shall deposit the O&M Payments in the Escrow Account such that the Escrow Account is funded at all times with the relevant Capex Annuity (along with interest), the relevant O&M Charges and the estimated Power Charges for the next 2 years for the Bhagalpur Facilities and the Trans- Facilities,

(the **Minimum Escrow Balance**).

- (b) NMCG shall ensure that the minimum balance in the Escrow Account at all times during the Term is not less than the Minimum Escrow Balance.

If at any time during the O&M Period, the balance in the Escrow Account falls below the Minimum Escrow Balance, NMCG shall promptly, and in any event, no later than 90 days, fund the Escrow Account such that the Minimum Escrow Balance is maintained.

- (c) The Parties agree that a failure to maintain the Minimum Escrow Balance for 90 days would be treated as a NMCG Event of Default and in such case, the consequences set out in the Concession Agreement shall apply.
- (d) It is clarified that any interest earned on the amounts deposited by NMCG in the Escrow Account will be counted towards the Minimum Escrow Balance.

24 **Withdrawals from Escrow Account during the Construction Period**

- (a) Upon successful completion and verification of a Payment Milestone as per the Concession Agreement, the BUIDCO is required to approve the Invoice raised by the Concessionaire within 10 days of receipt of the Invoice and issue a Payment Certificate to the Escrow Bank. The Payment Certificate shall convey the BUIDCO's approval for the release of the amount specified in the Invoice for the relevant Payment Milestone, less any necessary deductions or adjustments in accordance with this Escrow Agreement and/or Applicable Laws (including for payments to be made by the Concessionaire under applicable labour laws).
- (b) If, within 10 days from the date of receipt of an Invoice, the BUIDCO does not dispute an Invoice, then the Invoice shall be deemed to have been accepted by the BUIDCO, and the Concessionaire shall have the right to issue instructions to the Escrow Bank (with a copy to the BUIDCO and NMCG) to release the amounts specified in the Invoice, upon the expiry of the 10-day period. Any such instruction issued by the Concessionaire to the Escrow Bank shall be accompanied with the Invoice raised by the Concessionaire for the relevant Payment Milestone.

- (c) Immediately upon receipt of a Payment Certificate from the BUIDCO in accordance with clause 2.4(a) above or upon receipt of instructions from the Concessionaire in accordance with clause 2.4(b), the Escrow Bank shall release the amount specified in the Payment Certificate or if no Payment Certificate has been issued, then the amount specified in the relevant Invoice to the bank account of the Concessionaire mentioned below:

Bank:

Account number: BIC (SWIFT):

Address of Bank:

[Insert bank account details]

The Concessionaire may change the above bank account details by giving a 5-day prior written notice to the Escrow Bank, NMCG and the BUIDCO.

- (d) Upon any termination of the Concession Agreement during the Construction Period of the Bhagalpur Facilities, NMCG shall issue instructions to the Escrow Bank requesting it to release and transfer any amounts due and payable to the Concessionaire, including termination payments, if any, as certified by NMCG in a statement and any remaining amounts standing to the credit of the Escrow Account shall be transferred to the following account of NMCG:

Bank:

Account number: BIC (SWIFT):

Address of Bank:

[Insert bank account details]

NMCG may change the above bank account details by giving 5-day prior written notice to the Escrow Bank, the Concessionaire and the BUIDCO.

2.5 Identification and Separation

The Escrow Bank shall clearly identify in its records the Escrow Account as an escrow account and shall keep the funds standing to the credit of the Escrow Account separated and segregated from the Escrow Bank's own funds or funds of any of its other customers or third parties.

2.6 Fees

NMCG shall pay [Rs. [] per annum] as fees to the Escrow Bank for the establishment and management of the Escrow Account. NMCG shall pay such fees to the Escrow Bank within 10 days of receipt of an invoice from the Escrow Bank.

2.7 Escrow Account Statements

The Escrow Bank shall provide monthly statements regarding the Escrow Account to NMCG, the BUIDCO and the Concessionaire.

3. ESCROW AMOUNT

- 3.1 Promptly upon NMCG transferring any amount to the Escrow Account, the Escrow Bank shall send a notice to the Concessionaire and the BUIDCO notice informing them of the transfer.
- 3.2 The Escrow Bank shall hold all amounts in the Escrow for the sole benefit of the concessionaire. Subject to clause 2.4(d) of this Escrow Agreement, the Escrow Bank shall not release any amount in the Escrow Account to any person other than the Concessionaire.
- 3.3 The Escrow Bank shall not apply any right of set-off against the amount in the Escrow Account, grant any lien over such amount, or apply any fee or deduction in relation to such amount.

4. RIGHTS, DUTIES AND OBLIGATIONS OF THE ESCROW BANK

- 4.1 The Escrow Bank:
- (a) may, in the absence of bad faith, fraud, wilful default or gross negligence on its part, rely as to any matters of fact which might reasonably be expected to be within the knowledge of NMCG or the BUIDCO, as the case may be, upon a certificate signed by or on behalf of NMCG or the BUIDCO, as the case may be;
 - (b) may, in the absence of bad faith, fraud, wilful default or gross negligence on its part, rely upon the authenticity of any communication or documents believed by it to be authentic;
 - (c) shall, within 5 days after receipt, deliver a copy to the BUIDCO and NMCG of any notice or document received by the Escrow Bank from the Concessionaire or any other Person hereunder or in connection herewith;
 - (d) shall, within 5 days after receipt, deliver a copy to the Concessionaire of any notice or document received by the Escrow Bank from the BUIDCO or NMCG in connection herewith; and
 - (e) shall maintain all records of deposits and withdrawals from the Escrow Account for the term of this Escrow Agreement.
- 4.2 The duties of the Escrow Bank are only as herein specifically provided, and are purely administrative in nature. The Escrow Bank shall neither be liable for, nor chargeable with knowledge of, the terms and conditions of any other agreement, instrument or document in connection herewith, including, without limitation, the Concession Agreement, and shall be required to act in respect of the amounts in the Escrow Account only as provided in this Escrow Agreement. This Escrow Agreement sets out all the obligations of the Escrow Bank with respect to any and all matters pertinent to the Escrow Account contemplated hereunder and no additional obligations of the Escrow Bank shall be implied from the terms of any other agreement. The Escrow Bank shall incur no liability in connection with the discharge of its obligations under this Escrow Agreement or in connection therewith, except such liability as may arise from the Escrow Bank's negligence, wilful misconduct or otherwise from any breach of this Escrow Agreement. Such liability, however, shall not exceed the amount in the Escrow Account at the date of the said breach by the Escrow Bank.

4.3 The Escrow Bank shall not be required to perform any acts which will violate any Applicable Laws.

4.4 In the event of any bankruptcy proceedings or enforcement proceedings against any of the Parties pursuant to Applicable Laws, the Escrow Bank shall, notwithstanding the provisions of this Escrow Agreement, act and perform in accordance with Applicable Laws.

5 **ESCROW AGREEMENT DEFAULTS**

5.1 The following events shall constitute an event of default by the Concessionaire (an **Escrow Default**), unless such event of default has occurred as a result of any act or omission of NMCG or the BUIDCO:

- (a) in case the Concessionaire diverts funds drawn from the Escrow Account for a project/activity/usage other than the Project, and fails to cure such breach by not depositing an equal amount in the Escrow Account within 5 days; or
- (b) in the case of any other breach, by failing to remedy the breach within 5 days to the satisfaction of the BUIDCO and NMCG.

5.2 The Parties agree that an Escrow Default in terms of this Escrow Agreement shall be treated as a Concessionaire Event of Default under the Concession Agreement, and the consequences of an Escrow Default shall be dealt with in accordance with the Concession Agreement.

5.3 Upon the occurrence of an Escrow Default, the Concessionaire agrees that NMCG shall have the right to direct the Escrow Bank to suspend withdrawals from the Escrow Account until further notice from NMCG.

6 **MISCELLANEOUS**

6.1 **Representations and Warranties**

Each Party represents and warrants that:

- (a) it has the authority to enter into this Escrow Agreement;
- (b) this Escrow Agreement constitutes a legally valid and binding obligation, enforceable against it in accordance with its terms;
- (c) its entry into and/or performance under this Escrow Agreement will not be in breach of any express or implied terms of any contract with or other obligation to any third party; and
- (d) it is solvent and able to perform all of its obligations under this Escrow Agreement.

6.2 **Notices**

Any notice or other communication to be given or made under this Escrow Agreement to the Parties shall be in writing. Except as otherwise provided in this Escrow Agreement, such notice,

request or other communication shall be delivered by registered mail or facsimile to the Party(ies) at the following addresses:

NMCG: Attention: Deputy Secretary, National Mission for Clean Ganga, New Delhi
Address: 1st Floor, Major Dhyanchand National Stadium, India Gate, New Delhi - 110002
Tel: +91(11) 23049442
Fax: +91(11) 23049566
[Email: ed.projects@nmcg.nic.in](mailto:ed.projects@nmcg.nic.in)

BUIDCO:

Attention: Project Director, BUIDCO
Address: second floor, Khadhya bhavan, Road no.-2, Daroga Prasad Rai Path, R Block, Patna 800001
Tel: 0612-2506208
Fax:
[Email: buidcopd3@gmail.com](mailto:buidcopd3@gmail.com)

[Concessionaire]: []

Escrow Bank: []

6.3 Entire Agreement

This Escrow Agreement constitutes the entire agreement and understanding between the Parties with respect to its subject matter (i.e., escrow arrangement) and replaces and supersedes all prior agreements, arrangements, undertakings or statements regarding such subject matter.

6.4 Amendments

No variation of or amendment to this Escrow Agreement shall be effective unless made in writing and executed by all the Parties hereto.

6.5 Harmonious Construction

For the purpose of giving full and proper effect to this Escrow Agreement, the Concession Agreement and this Escrow Agreement shall be read together and construed harmoniously. The terms of this Escrow Agreement shall prevail in the event of any inconsistencies with the Concession Agreement.

6.6 Assignment

Neither this Escrow Agreement nor any of the rights or obligations hereunder may be assigned by a Party without the prior written consent of the other Parties, provided that the Concessionaire shall be entitled, to the extent permitted by Applicable Law and as may be required under any Financing Documents entered into by the Concessionaire, to assign or create liens over its rights and interests under or pursuant to this Escrow Agreement.

6.7 Severability

Whenever possible, each provision of this Escrow Agreement shall be interpreted in such a way as to be effective and valid under Applicable Law, but if any provision of this Escrow Agreement is unenforceable or invalid under Applicable Law, such provision shall be ineffective only to the extent of such unenforceability or invalidity, and the remaining provisions of this Escrow Agreement shall continue to be binding and in full force and effect.

6.8 **Confidentiality**

The Parties, their employees, representatives and agents shall keep the provisions of this Escrow Agreement strictly confidential and, except as may be required by Applicable Laws, shall make no disclosure thereof to any Person, except the Parties' respective legal counsels and professional advisers, without the prior written consent of the other Parties.

6.9 **Termination**

This Escrow Agreement shall be automatically terminated upon the expiry of the Term or termination of the Concession Agreement and after disbursement of all amounts due and payable to the Concessionaire under the Concession Agreement, including termination payments, if any.

6.10 **Dispute Resolution Mechanism**

- (a) If any dispute arises out of or in connection with this Escrow Agreement, this dispute shall not affect the Parties' duty to continue the performance of all of their undisputed obligations.
- (b) If any dispute arises, a Party shall give notice to the other Parties of the same, whereupon the Parties shall meet promptly and in good faith to attempt to reach an amicable settlement.
- (c) All disputes not settled amicably pursuant to (b) above shall be heard by the competent courts of Bihar.

6.11 **Governing Law**

This Escrow Agreement shall be governed by and construed in accordance with the laws of India.

IN WITNESS WHEREOF, the Parties hereto have caused these presents to be executed by its authorized representatives as of the date first written above.

For NMCG

By: Deputy Secretary, National Mission for Clean Ganga, New Delhi

Name:

Title: Deputy Secretary

For BUIDCO

By: Project Director, BUIDCO

Name: []

Designation: Project Director

For Concessionaire

By.

Name: [I

Designation: [I

For Escrow Bank

By.

Name: [I

Designation: [I

Schedule 4: Format of the Mobilization Advance Guarantee

[ON APPROPRIATE STAMP PAPER]

Guarantee No. : [●]
Amount of Guarantee : [●]

This Mobilization Advance Guarantee is executed on this [] day of [] at []

BY

[] With its registered office at [] and a branch office at [] (hereinafter referred to as the "**Bank**", which expression shall unless repugnant to the context thereof, be deemed to include its successors-in-interest and permitted assigns)

IN FAVOUR OF

- (1) **BIHAR URBAN INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED (BUIDCO)**, is a flagship company owned by Government of Bihar, with its registered office at second floor, Khadhya bhavan, Road no.-2, Daroga Prasad Rai Path, R Block, Patna 800001 (hereinafter referred to as the **BUIDCO**, which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and permitted assigns)

WHEREAS

- A. [_____][*insert name of the Concessionaire*] with its registered office at _____ [*insert address*], hereinafter referred to as the "**Concessionaire**", which expression shall unless repugnant to the context thereof, be deemed to include its successors-in-interest and permitted assigns) has executed a concession agreement dated [] with the BUIDCO and National Mission for Clean Ganga ("**Concession Agreement**") in relation to design, construction, rehabilitation, operation and maintenance of sewage treatment plants along with other facilities and associated infrastructure at Bhagalpur, by the Concessionaire.
- B. In terms of Clause 6.15 of the Concession Agreement, the Concessionaire is required to furnish a Mobilization Advance Guarantee to the BUIDCO in the form of an unconditional, irrevocable and on demand bank guarantee for securing the Mobilization Advance made to the Concessionaire in accordance with the Concession Agreement ("**Mobilization Advance Guarantee**") for INR [*insert amount*] (Rupees []) ("**Guaranteed Amount**").
- C. At the request of the Concessionaire and for sufficient consideration, the Bank has agreed to issue this guarantee in favour of the BUIDCO.

NOW THEREFORE THIS DEED WITNESSETH AS FOLLOWS:

- 1 Capitalised terms used herein but not defined shall have the meaning ascribed to them in the Concession Agreement.

2. The Bank shall upon a written demand from the BUIDCO informing the Bank of the Concessionaire's failure to fulfill its obligations under the Concession Agreement, pay to the BUIDCO, within 5 (five) days of receipt of such written demand from the BUIDCO, without further proof or conditions and without contest, recourse, demur or protest and without any enquiry to the BUIDCO or the Concessionaire, forthwith and in full amount, without any deductions or set off or counter claims whatsoever, the sum claimed by the BUIDCO in such demand not exceeding an amount equivalent to the Guaranteed Amount. The Bank will pay the amount specified in the demand notwithstanding any direction to the contrary given or any dispute raised by the Concessionaire or any other person.

The Bank agrees that this Mobilization Advance Guarantee does not limit the number of claims that may be made by the BUIDCO against the Bank provided that such claims taken together shall not exceed the Guaranteed Amount.

Any payment made hereunder shall be made free and clear of and without deduction for, or on account of, any present or future taxes, deductions or withholdings of any nature whatsoever and by whomsoever imposed, and where any withholding on a payment is required by any Applicable Law, the Bank shall comply with such withholding obligations and shall pay such additional amount in respect of such payment such that the BUIDCO receives the full amount due hereunder as if no such withholding had occurred.

3. This Mobilization Advance Guarantee shall be a continuing guarantee during its currency and shall remain in force and effect until the entire Bhagalpur Mobilization Advance secured by such Mobilization Advance Guarantee has been adjusted against the Bhagalpur Construction Payments.
4. The obligations of the Bank herein are absolute and unconditional, irrespective of the value, genuineness, validity, regularity or enforceability of the Concession Agreement or the insolvency, bankruptcy, reorganisation, dissolution or liquidation of the Concessionaire or any change in ownership of the Concessionaire or any purported assignment by the Concessionaire or any other circumstance whatsoever which might otherwise constitute a discharge or defence of a guarantor or a surety.

Further, this Mobilization Advance Guarantee is in no way conditional upon any requirement that the BUIDCO first attempts to procure the Guaranteed Amount from the Concessionaire or any other person, or resort to any other means of obtaining payment of the Guaranteed Amount.

5. The Bank hereby agrees that its liability under this Mobilization Advance Guarantee shall not be discharged by virtue of any agreement between the Concessionaire and the BUIDCO, whether with or without the Bank's knowledge, or by reason of the BUIDCO showing any indulgence or forbearance to the Concessionaire.
6. The Bank's obligations under this Mobilization Advance Guarantee for the Guaranteed Amount is primary, independent and absolute and not by way of surety only.
7. The obligations of the Bank under this Mobilization Advance Guarantee shall not be affected by any act, omission, matter or thing which, but for this provision, would prejudice or diminish the Guaranteed Amount in whole or in part, including (whether or

not known to it or the BUIDCO):

- (a) any time or waiver granted to, or composition with, the Concessionaire or any other person;
 - (b) any incapacity or lack of powers, authority or legal personality of or dissolutions or change in the status of the Concessionaire or any other person;
 - (c) any variation of the Concession Agreement so that references to the Concession Agreement in this Mobilization Advance Guarantee shall include each variation;
 - (d) any unenforceability, illegality or invalidity of any obligation of any person under the Concession Agreement or any unenforceability, illegality or invalidity of the obligations of the Bank under this Mobilization Advance Guarantee or the unenforceability, illegality or invalidity of the obligations of any person under any other document or guarantee, to the extent that each obligation under this Mobilization Advance Guarantee shall remain in full force as a separate, continuing and primary obligation, and its obligations be construed accordingly, as if there were no unenforceability, illegality or invalidity;
 - (e) any extension, waiver, or amendment whatsoever which may release a guarantor or the Bank (other than performance or indefeasible payment of a Guaranteed Amount);
or
 - (f) any part performance of the Concession Agreement by the Concessionaire or by any failure by the NMCG to timely pay or any failure by NMCG or the BUIDCO to timely perform any of its obligations under the Concession Agreement.
8. So long as any sum remains owing by the Concessionaire to the BUIDCO, the Bank shall not exercise any right of subrogation or any other rights of a guarantor or enforce any guarantee or other right or claim against the Concessionaire (whether in respect of its liability under this Mobilization Advance Guarantee or otherwise) or claim in the insolvency or liquidation of the Concessionaire or any such other person in competition with the BUIDCO. If the Bank receives any payment or benefit in breach of this Clause 8, it shall hold the same in trust for the BUIDCO.
9. The Bank represents, warrants and undertakes to the BUIDCO that:
- (a) it has the power to execute, deliver and perform the terms and provisions of this Mobilization Advance Guarantee and has taken all necessary action(s) to authorize the execution, delivery and performance by it of this Mobilization Advance Guarantee;
 - (b) the Bank has duly executed and delivered this Mobilization Advance Guarantee, and this Mobilization Advance Guarantee constitutes its legal, valid and binding obligation enforceable in accordance with its terms except as the enforceability thereof may be limited by applicable bankruptcy, insolvency, moratorium or other similar laws affecting the enforcement of creditors' rights generally and by general equitable principles;

- (c) neither the execution, delivery or performance by the Bank of this Mobilization Advance Guarantee, nor compliance by it with the terms and provisions hereof will: (i) contravene any material provision of any law, statute, rule or regulations or any order, writ, injunction or decree of any court or governmental instrumentality; (ii) conflict or be inconsistent with or result in any breach of any of the material terms, covenants, conditions or provisions of, or constitute a default under any agreement, contract or instrument to which the Bank is a party or by which it or any of its property or assets is bound; or (iii) violate any provision of the Bank's constituent documents;
 - (d) no order, consent, approval, license, authorization or validation of, or filing, recording or registration with (except as have been obtained or made prior to the date hereof), or exemption by, any governmental or public body or authority, or any subdivision thereof, is required to authorize, or is required in connection with: (i) the execution, delivery and performance of this Mobilization Advance Guarantee; or (ii) the legality, validity, binding effect or enforceability of this Mobilization Advance Guarantee; and
 - (e) this Mobilization Advance Guarantee will be enforceable when presented for payment to a Scheduled Bank (as defined by the Reserve Bank of India Act, 1934) at Patna
10. This Mobilization Advance Guarantee is a continuing one and all liabilities to which it applies or may apply under the terms hereof shall be conclusively presumed to have been created in reliance hereon. No failure or delay on the part of the BUIDCO in exercising any right, power or privilege hereunder and no course of dealing between the BUIDCO and the Bank, or the Concessionaire, shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, power or privilege.
11. If any one or more of the provisions contained in this Mobilization Advance Guarantee are or become invalid, illegal or unenforceable in any respect, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby, and the Bank shall enter into good faith negotiations with the BUIDCO to replace the invalid, illegal or unenforceable provision.
12. The Bank hereby agrees to execute and deliver all such instruments and take all such actions as may be necessary to make effective fully the purposes of this Mobilization Advance Guarantee.
13. This Mobilization Advance Guarantee may be executed in one or more duplicate counterparts, and when executed and delivered by the Bank and the BUIDCO shall constitute a single binding agreement.
14. Any demand, notice, request or other communication to be given or made under this Mobilization Advance Guarantee shall be deemed to have been duly given or served:
- (a) Upon the BUIDCO, second floor, Khadhya bhavan, Road no.-2, Daroga Prasad Rai Path, R Block, Patna 800001, marked for the attention of the Office of the Project Director;

- (b) Upon a Scheduled Bank (as defined by the Reserve Bank of India Act, 1934), at Patna India.
- 15. The Bank:
 - (a) acknowledges that the Lenders will review this Mobilization Advance Guarantee and may require changes thereto as a condition of granting any Financial Assistance and/or providing political risk insurance; and
 - (b) shall consider any such requirements in good faith.
- 16. This Mobilization Advance Guarantee shall be governed by, and construed in accordance with, the laws of India. The Bank irrevocably agrees that any legal action, suit or proceeding arising out of or relating to this Mobilization Advance Guarantee may be brought in the courts in Bihar.
- 17. The BUIDCO may assign or transfer all or any part of its interest herein together with the Concession Agreement to any other person with prior consent of to the Bank. The Bank may not assign or transfer any of its rights or obligations under this Mobilization Advance Guarantee.

IN WITNESS WHEREOF the Bank has set its hands hereunto on the day, month and year first hereinabove written.

Signed and delivered by [*insert name of Bank*] Bank by hand

Schedule 5

Scope of Work of the Project Engineer

The Project Engineer shall assist the Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) in supervising the construction, rehabilitation, operation and maintenance of the Facilities and shall work closely with the Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) to monitor compliance with the KPIs. The detailed scope of work of the Project Engineer, to be read in conjunction with the provisions of the Concession Agreement, is outlined below:

- a) The Project Engineer shall review the Designs and Drawings to be provided by the Concessionaire. These will include, *inter-alia*, the site layout plan, process design, drawings, structural calculations, mechanical, electrical and instrumentation works, quality plans, implementation schedules, and the environment, health & safety plans for all Facilities. On the basis of its review, the Project Engineer shall provide its recommendations to the BUIDCO.
- b) During relevant Construction Periods, the Project Engineer shall inspect the relevant Facilities at least once a month and prepare an inspection report, setting out the progress of the construction of the relevant Facilities, defects or deficiencies, if any, and status of compliance with the Construction Plan, Technical Specifications and Designs and Drawings and the Guaranteed Interim Availability.
- c) The Project Engineer shall be responsible to monitor the implementation of the approved environment, health & safety plan by the Concessionaire. The Project Engineer shall also verify the material safety data sheets of hazardous chemicals if any.
- d) The Project Engineer shall review the construction progress of the project as per the Payment Milestones proposed by the Concessionaire and provide necessary recommendations to the Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) for the purpose of issuance of Milestone Construction Certificates.
- e) The Project Engineer shall assist Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) in estimating the Interim Availability Liquidated Damages and Delay Liquidated Damages as applicable.
- f) At the end of the Construction Period for different Facilities, the Project Engineer shall review the relevant Facilities and provide necessary recommendations to the Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) with regards to the issuance of the respective Construction Completion Certificates to the Concessionaire to certify completion of construction of such Facilities, and the satisfaction of all other conditions required to be fulfilled by the Concessionaire.
- g) The Project Engineer shall monitor the Trial Operations of different Facilities during their respective Trial Periods and provide necessary recommendations to the Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) for the purpose of the issuance of the respective COD Certificates to the Concessionaire. The review shall be based on the Trial Operations Procedures outlined in the Concession Agreement and include the following.
 - Verify quality of installations, operation of equipment and workmanship;
 - Verify the Discharge Standard of the Treated Effluent, Treated Water and Facilities By-Products;
 - Verify the consumption of electricity and generation of power if any vis-à-vis the guaranteed energy consumption

- h) The Project Engineer shall review the O&M Manual and the Scheduled Maintenance Program submitted by the Concessionaire and provide its recommendations to the BUIDCO.
- i) During the O&M Period, the Project Engineer shall inspect all the Facilities at least once a month and prepare an inspection report, setting out the defects or deficiencies, if any, and status of compliance with the relevant KPIs (including specifically, the Influent Standards and the Discharge Standards).
- j) The Project Engineer shall review the reports generated from the Online Monitoring Systems of different Facilities to assess adherence to their relevant KPIs and submit the monthly KPI Adherence Reports to the BUIDCO.
- k) The Project Engineer shall assist Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) in estimating the Availability Liquidated Damages, the Performance Liquidated Damages and the Power Consumption Liquidated Damages as applicable.
- l) The Project Engineer shall inspect laboratories where tests are conducted on samples to ensure conformance and compliance with laboratory procedures and requirements.
- m) During the Term, and as requested by the BUIDCO, the Project Engineer shall provide its opinion and assessment on the implications of the events related to Emergency, Change in Law, Force Majeure, Fundamental Change in Law, Minor casualty, Total casualty, Variation and Unforeseen Site Conditions.
- n) The Project Engineer shall participate in the survey to determine the Hand-back Conditions as per the Hand-back Requirements. It shall review the survey report of the Hand-back Conditions submitted by the Concessionaire and provide its recommendations to the Bihar Urban Infrastructure Development Corporation Limited (BUIDCO) on the compliance with the Hand-back Requirements.

Schedule 6

Liquidated Damages

1. Availability of Main Pumping Stations and Sewage Pumping Stations (part of Bhagalpur Associated Infrastructure)

Parameter	Value
Guaranteed Availability of each pumping station after COD	100%
Hours in the month for which a specific pumping station was not Available (A)	
Non-Availability for the specific pumping station (B)	$= [(A) / 720] \times 100$
LDs for non- adherence for the specific pumping station (INR)	$= (B) \times 2,000$

2. Availability of Sewage Treatment Plant (Bhagalpur STP)

Parameter	Value
	After COD Guaranteed Availability.
After COD - Guaranteed Availability	100%
Hours in the month for which the relevant Facilities were not Available (A)	
Non-Availability (B)	$= [(A) / 720] \times 100$
LDs for non- adherence (INR)=	$(B) \times 30,000$

3. Treated Effluent and Digested Sludge liquidated damages for Bhagalpur STP

Parameter	Liquidated
-----------	------------

	Damages (INR)
A. Treated Effluent	
BOD	5,000
TSS	5,000
Fecal Coliform	5,000
COD	5,000
Color	5,000
B. Digested Sludge	
Outlet Concentration of dewatered sludge	3,000
Volatile suspended solids	3,000
Fecal coliform limit	3,000

C. Treated sludge from septage management	
Parameter	Liquidated Damages (INR)
Outlet Concentration of dewatered sludge	3,000
Faecal coliform	3,000
Salmonella	3,000
Viruses	3,000
helminth egg	3,000

SCHEDULE 7 - APPLICABLE PERMITS

Concessionaire Applicable Permits No.	Applicable Permit	Authority
1.	Temporary Power Connection (During Construction Period)	Electricity Board/ other temporary sources
2.	Consent to Operate	State Pollution Control Board
3.	Consent for storage of hazardous materials	Director of Explosives
4.	Consent Firefighting system	Firefighting Department
5.	CEIG approval – stage 1 for construction & stage 2 on completion of project	Chief electrical inspector to Government

The Concessionaire will be liable to obtain all Applicable Permits (other than the Bihar Urban Infrastructure Development Corporation Ltd (BUIDCO) Applicable Permits) that are necessary for construction, operation and maintenance of the Facilities.

BUIDCO shall assist the Concessionaire in obtaining all the required permits.

BUIDCO Applicable Permits

Sl. No.	Applicable Permit	Authority
1	Electricity Board approval during various stages – request for load sanction, remittance of deposit, installation of incomings, etc	Electricity Board
2	Layout and building plan approval	ULB/DTCP
3	Consent to establish	State Pollution Control Board (SPCB)
4	Tree cutting	Forest Department
5	Road cutting & crossing	Public Works Department
6	Railway Crossing	Commissioner Railway safety
7	Revenue road cutting & crossing	Panchayat/Local Authority
8	Obtaining No Objection Certificate for various sewerage facilities under the ULB for handing them over to JN	ULB/District Administration
9	Construction of weirs/pipeline crossings	Irrigation Department/ULB

Sl. No.	Applicable Permit	Authority
10	Approach Road to new Facilities	Forest Department/ Panchayat/ Local Authority/Irrigation Department
11	Consent to Operate for Existing Facilities	ULB and SPCB

The Concessionaire shall proactively assist the BUIDCO in obtaining all the required permits

Schedule 8 – ESHS Requirements

Part 1 – Link to the Environment and Social Management Framework (ESMF) to be followed for NGRBA Projects

1. Environmental and Social Management Framework of NGRBA Project:
<http://nmcg.nic.in/Disclosure.aspx>

Part 2 – The World Bank Group Safeguard Policies and Performance Standards

Given below are the links to relevant World Bank Group Safeguard Policies and Performance Standards with respect to Environment, Social, Health and Safety requirements to be followed while developing the ESHS Documents -

2. WBG Safeguard Policies / Performance Standards:
<https://policies.worldbank.org/sites/PPF3/Pages/Manuals/Operational%20Manual.aspx>
3. WBG Guidance Note on Project Induced Labor Influx:
<http://pubdocs.worldbank.org/en/497851495202591233/Managing-Risk-of-Adverse-impact-from-project-labor-influx.pdf>

Part 3 - Requirements for preparation of ESHS Management Strategies and Implementation Plans (ESHS-MSIP)

The Concessionaire shall submit comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP). These strategies and plans shall describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the Concessionaire, and its subcontractors.

In developing these strategies and plans, the Concessionaire shall have regard to the ESHS provisions of the Concession Agreement including those as may be more fully described in the following:

- a. Works Requirements described in Concession Agreement;
- b. Environmental and Social Impact Assessment (ESIA);
- c. Environmental and Social Management Plan (ESMP);
- d. Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

.....

Metrics for Progress Reports

The following Metrics should be used for regular reporting:

- a. *environmental incidents or non-compliances with Concession Agreement requirements, including contamination, pollution or damage to ground or water supplies;*
- b. *health and safety incidents, accidents, injuries and all fatalities that require treatment;*
- c. *interactions with regulators: identify agency, dates, subjects, outcomes (report the negative if none);*
- d. *status of all permits and agreements:*
 - i. *work permits: number required, number received, actions taken for those not received;*
 - ii. *status of permits and consents:*
 - *list areas/facilities with permits required (quarries, asphalt & batch plants), dates of application, dates issued (actions to follow up if not issued), dates submitted to resident engineer (or equivalent), status of area (waiting for permits, working, abandoned without reclamation, decommissioning plan being implemented, etc.);*
 - *list areas with landowner agreements required (borrow and spoil areas, camp sites), dates of agreements, dates submitted to resident engineer (or equivalent);*
 - *identify major activities undertaken in each area this month and highlights of environmental and social protection (land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation);*
 - *for quarries: status of relocation and compensation (completed, or details of monthly activities and current status).*
- e. *health and safety supervision:*
 - i. *safety officer: number days worked, number of full inspections & partial inspections, reports to construction/project management;*
 - ii. *number of workers, work hours, metric of PPE use (percentage of workers with full personal protection equipment (PPE), partial, etc.), worker violations observed (by type of violation, PPE or otherwise), warnings given, repeat warnings given, follow-up actions taken (if any);*
- f. *worker accommodations:*

- i. number of expats housed in accommodations, number of locals;*
 - ii. date of last inspection, and highlights of inspection including status of accommodations' compliance with national and local law and good practice, including sanitation, space, etc.;*
 - iii. actions taken to recommend/require improved conditions, or to improve conditions.*
- g. HIV/AIDS: provider of health services, information and/or training, location of clinic, number of non-safety disease or illness treatments and diagnoses (no names to be provided);*
- h. gender (for expats and locals separately): number of female workers, percentage of workforce, gender issues raised and dealt with (cross-reference grievances or other sections as needed);*
- i. training:*
 - i. number of new workers, number receiving induction training, dates of induction training;*
 - ii. number and dates of toolbox talks, number of workers receiving Occupational Health and Safety (OHS), environmental and social training;*
 - iii. number and dates of HIV/AIDS sensitization training, no. workers receiving training (this month and in the past); same questions for gender sensitization, flaglady/flagman training.*
- j. environmental and social supervision:*
 - i. environmentalist: days worked, areas inspected and numbers of inspections of each part of the Facilities created, highlights of activities/findings (including violations of environmental and/or social best practices, actions taken), reports to environmental and/or social specialist/construction/site management;*
 - ii. sociologist: days worked, number of partial and full site inspections of each part of the Facilities created, highlights of activities (including violations of environmental and/or social requirements observed, actions taken), reports to environmental and/or social specialist/construction/site management; and*
 - iii. community liaison person(s): days worked (hours community center open), number of people met, highlights of activities (issues raised, etc.), reports to environmental and/or social specialist /construction/site management.*

- k. *Grievances: list this month's and unresolved past grievances by date received, complainant, how received, to whom referred to for action, resolution and date (if completed), data resolution reported to complainant, any required follow-up (Cross-reference other sections as needed):*
 - i. *Worker grievances;*
 - ii. *Community grievances*
- l. *Traffic and vehicles/equipment:*
 - i. *traffic accidents involving project vehicles & equipment: provide date, location, damage, cause, follow-up;*
 - ii. *accidents involving non-project vehicles or property (also reported under immediate metrics): provide date, location, damage, cause, follow-up;*
 - iii. *overall condition of vehicles/equipment (subjective judgment by environmentalist); non-routine repairs and maintenance needed to improve safety and/or environmental performance (to control smoke, etc.).*
- m. *Environmental mitigations and issues (what has been done):*
 - i. *dust: number of working bowsers, number of waterings/day, number of complaints, warnings given by environmentalist, actions taken to resolve; highlights of quarry dust control (covers, sprays, operational status); % of rock/muram/spoil lorries with covers, actions taken for uncovered vehicles;*
 - ii. *erosion control: controls implemented by location, status of water crossings, environmentalist inspections and results, actions taken to resolve issues, emergency repairs needed to control erosion/sedimentation;*
 - iii. *quarries, borrow areas, spoil areas, asphalt plants, batch plants: identify major activities undertaken this month at each, and highlights of environmental and social protection: land clearing, boundary marking, topsoil salvage, traffic management, decommissioning planning, decommissioning implementation;*
 - iv. *blasting: number of blasts (and locations), status of implementation of blasting plan (including notices, evacuations, etc.), incidents of off-site damage or complaints (cross-reference other sections as needed);*

- v. *spill cleanups, if any: material spilled, location, amount, actions taken, material disposal (report all spills that result in water or soil contamination);*
- vi. *waste management: types and quantities generated and managed, including amount taken offsite (and by whom) or reused/recycled/disposed on-site;*
- vii. *details of tree plantings and other mitigations required undertaken this month;*
- viii. *details of water and swamp protection mitigations required undertaken this month.*

n. *compliance:*

- i. *compliance status for conditions of all relevant consents/permits, for the Work, including quarries, etc.): statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance;*
- ii. *compliance status of ESMP/ESIP requirements: statement of compliance or listing of issues and actions taken (or to be taken) to reach compliance*
- iii. *other unresolved issues from previous months related to environmental and social: continued violations, continued failure of equipment, continued lack of vehicle covers, spills not dealt with, continued compensation or blasting issues, etc. Cross-reference other sections as needed.*

Part 4 – Requirements for the preparation of the Code of Conduct

The Concessionaire shall submit the Code of Conduct that will apply to the Concessionaire's employees and subcontractors. The Code of Conduct shall ensure compliance with the ESHS provisions of the Concession Agreement, including those as may be more fully described in the following:

- a. Works Requirements described in Concession Agreement;
- b. Environmental and Social Impact Assessment (ESIA);
- c. Environmental Management Plan (EMP);
- d. Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

MINIMUM REQUIREMENTS FOR THE CODE OF CONDUCT

A minimum requirement for the Code of Conduct should be set out, taking into consideration the issues, impacts, and mitigation measures identified in:

- project reports e.g. ESIA/ESMP
- consent/permit conditions
- required standards including World Bank Group EHS Guidelines and Performance Standards
- national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines and PS)
- relevant standards e.g. Workers' Accommodation: Process and Standards (Indian Standards, and in the absence of such Indian Standards those of IFC and EBRD)
- relevant sector standards e.g. workers accommodation
- grievance redress mechanisms.

The types of issues identified could include risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behavior and crime, and maintaining a safe environment etc.

A satisfactory code of conduct will contain obligations on all project staff (including sub-contractors and day workers) that are suitable to address the following issues, as a minimum.

Compliance with applicable laws, rules, and regulations of the jurisdiction

1. Compliance with applicable health and safety requirements (including wearing prescribed personal protective equipment, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
2. The use of illegal substances
3. Non-Discrimination (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, birth, age, disability, or political conviction)
4. Interactions with community members (for example to convey an attitude of respect and non-discrimination)
5. Sexual harassment (for example to prohibit use of language or behavior, in particular towards women or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
6. Violence or exploitation (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior)
7. Protection of children (including prohibitions against abuse, defilement, or otherwise unacceptable behavior with children, limiting interactions with children, and ensuring their safety in project areas)
8. Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)

9. Avoidance of conflicts of interest (such that benefits, Concession Agreement, or employment, or any sort of preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection)
10. Respecting reasonable work instructions (including regarding environmental and social norms)
11. Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
12. Duty to report violations of this Code
13. Non retaliation against workers who report violations of the Code, if that report is made in good faith.

The Code of Conduct should be written in plain language and signed by each worker to indicate that they have:

- received a copy of the code;
- had the code explained to them;
- acknowledged that adherence to this Code of Conduct is a condition of employment; and
- understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities.

Part 5 – Guidelines for staffing of a Core team of 3 people for implementation of the Concessionaire's ESHS obligations as per Clause 7.5 (b) (iii) of the Concession Agreement

SN	Key Position	Minimum Qualifying Requirement		
		Total Work Experience (years)	Experience in Similar Works (years)	Minimum Education Qualification
1.	Health Expert & Safety Specialist*	10	5	B.E. /B. Tech or Equivalent with Specialization / additional qualification in EHS related field.
2.	Environmental Specialist *	10	5	B.E./B. Tech or Equivalent with Specialization / additional qualification in

SN	Key Position	Minimum Qualifying Requirement		
		Total Work Experience (years)	Experience in Similar Works (years)	Minimum Education Qualification
				Environment related field
3.	Social Specialist*	10	5	Master's degree in Social Work or equivalent

* He/she should have worked as a sole expert for Urban Infrastructure projects. Experience in environment / safety / Social Risk Assessment, resettlement and rehabilitation and Management plans related to similar project would be preferred.

Part 6 – Minimum Requirements and Guidelines for the preparation of the Screening Report as per Clause 7.2 (a) (ii) of the Concession Agreement

The extent of assessment required to identify and mitigate the impacts largely depends upon the complexities of project activities. The scrutiny and screening will be based on a detailed Environment and Social Screening exercise, summarized in the following Format:

Environment and Social information format for screening			
	Project Title:		
	Implementing agency:		
	Project cost:		
	Project components:		
	Project location (Area/ district)		
	Screening Criteria	Assessment of category (High/ low)	Explanatory note for categorisation

1	<p>Is the project in an eco-sensitive area or adjoining an eco-sensitive area? (Yes/No) If Yes, which is the area? Elaborate impact accordingly.</p>		
2	<p>Will the project create significant/ limited/ no social impacts?</p> <ul style="list-style-type: none"> ● Involuntary land taking resulting in loss of income from agricultural land, plantation or other existing land-use. ● Involuntary land taking resulting in relocation of title holder or non-titleholder households. ● Any reduction of access to traditional and river dependent communities (to river and areas where they earn for their primary or substantial livelihood). ● Any displacement or adverse impact on tribal settlement(s). ● Any specific gender issues. 		
3	<p>Will the project create significant / limited / no environmental impacts during the construction stage? (Significant / limited / no impacts)</p> <ul style="list-style-type: none"> ● Clearance of vegetation/ tree-cover ● Direct discharge of construction run-off, improper storage and disposal of excavation spoils, wastes and other construction materials adversely affecting water quality and flow regimes. ● Flooding of adjacent areas ● Improper storage and handling of substances leading to contamination of soil and water ● Elevated noise and dust emission ● Disruption to traffic movements ● Damage to existing infrastructure, public utilities, amenities etc. ● Failure to restore temporary construction sites ● Possible conflicts with and/or disruption to local community ● Health risks due to unhygienic conditions at workers' camps ● Safety hazards during construction 		
4	<p>Will the project create significant / limited / no environmental impacts during the operational stage? (Significant / limited / no impacts)</p> <ul style="list-style-type: none"> ● Flooding of adjacent areas ● Impacts to water quality due to effluent discharge ● Gas emissions 		

	<ul style="list-style-type: none"> • Safety hazards 		
5	Do projects of this nature / type require prior environmental clearance either from the MOEF&CC or from a relevant state Government department? (MOEF&CC/ relevant State Government department/ No clearance at all)		
6	Does the project involve any prior clearance from the MOEF&CC or State Forest department for either the conversion of forest land or for tree-cutting? (Yes/ No). If yes, which?		
7	Please attach photographs and location maps along with this completed Environmental Information Format For Screening.		
Overall assessment			

*Detailed explanation/ justification for arriving at specific category (high/ low) to be provided in the specified column

SCHEDULE 9 - KEY PERFORMANCE INDICATORS

1. Key performance indicators

1.1. Availability

The Concessionaire shall ensure that the Availability of the Facilities and the Associated Infrastructure on every day during the O&M Period shall be 100% (the “Guaranteed Availability”).

1.2. Treated Effluent Quality

The Treated Effluent shall meet the following requirements.

Parameter	Unit	Value
- pH		6.5-8.5
BOD	mg/L	≤30
TSS	mg/L	≤100
COD	mg/L	≤100
Faecal Coliform	MPN/100 mL	<1000
Color	Hazen	≤300

The Concessionaire shall not be responsible for adherence to the above requirements of Treated Effluent in an event the values of the Influent Standards are as per table below.

Item/ Parameter/ Description	Units	Values
pH		>9.00
BOD	mg/L	<80 & >300
COD	mg/L	>600
TSS	mg/L	>500
Color	Hazen	>3000

1.3. Digested sludge

The digested sludge shall meet the following requirements.

Units	Digested Sludge Consistency
Outlet Concentration of dewatered sludge	More than 20% solids
Volatile suspended solids	Less than 38% w/w of Digested Sludge
Faecal coliform limit	Less than 20,00,000 Most Probable Number per gram of total dry solids (20,00,000 MPN / gTS).

The digested sludge from Septage management facility shall meet the minimum standards as per USEPA part 503 (US-EPA, 1992) as follows:

Units	Treated Sludge Consistency
Outlet Concentration of dewatered sludge	More than 20% solids
Faecal coliform	1000 MPN / g
Salmonella	3 MPN/4 g
Viruses	1 FPU/4 g
helminth egg	1 helminth egg/4 g

1.4. Energy guarantee

The concessionaire shall guarantee the maximum number of units of power per MLD of treated sewage. This should be less or equivalent to consumption power units in terms of units in each of during the O&M period (other than any units expected to be generated and consumed from any power plant proposed to be set up by the Concessionaire), to operate and maintain the Facilities including STP, pump houses and other associated Infrastructure (at varying volumes and BOD of sewage).

1.5. Assessment of compliance to KPIs

The assessment of compliance to KPIs for each of the parameters shall be checked in accordance with the reports from online monitoring system or laboratory tests as set out in the Schedule 10 (Part D).

SCHEDULE 10 - TECHNICAL **REQUIREMENT**

Schedule-10

Technical requirement

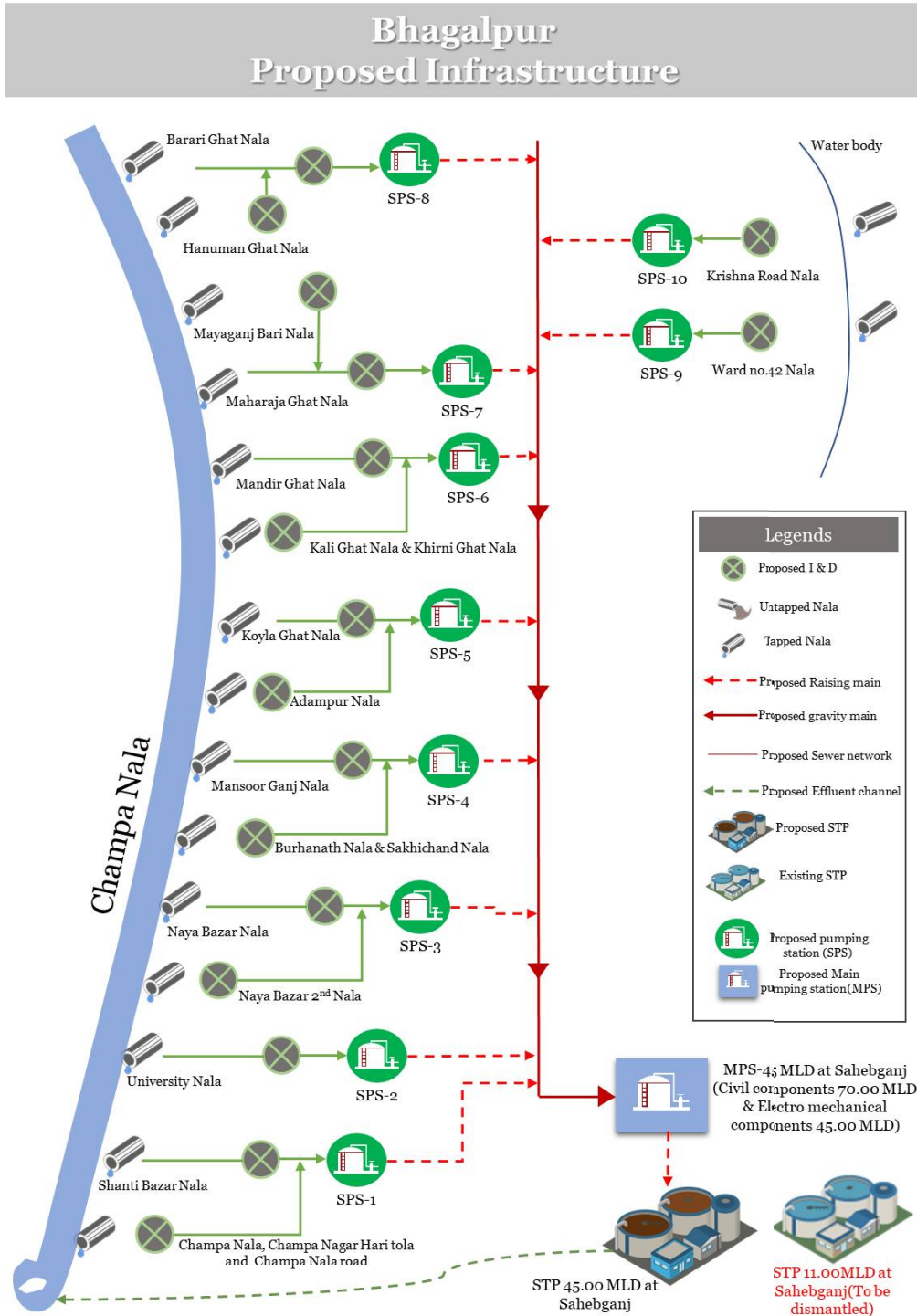
Contents

Part	Section	Title
A		Process requirements and design criteria of sewage work
B		Technical specifications
	G1	General requirement
	G2	Materials and workmanship
	G3	General civil specifications
	G4.1	General Mechanical Specifications
	G5.1	General Electrical Specifications
	G5.2	Technical specification for Diesel generator set
	G5.3	Erection, testing and commissioning
	G5.4	Instrumentation works
	G5.5	SCADA (Online Monitoring System) for STP and LS/ PS
	G5.6	Inspection and testing at manufacturer's works
C		Testing and Commissioning
D		Specifications for Operation and Maintenance
E		Electrical load list

**PART A - PROCESS REQUIREMENTS
AND DESIGN CRITERIA OF SEWERAGE
WORK**

PART A - PROCESS REQUIREMENTS AND DESIGN CRITERIA OF SEWERAGE WORK

1. Schematic diagram of proposed Infrastructure – Bhagalpur



2. Raw sewage characteristic for STP

The Influent standards for STP design purpose are stated below.

Item/ Parameter/ Description	Units	Values
Design Capacity	MLD	45.00
pH		6.0-9.0
BOD	mg/L	80-300
COD	mg/L	<600
TSS	mg/L	<500
Colour	Hazen	<3000

Note: The industrial effluent from predominantly from dyeing industries is getting mixed with the domestic sewage in the following nalas Shantibazar nala, Champa Nala, Champa Nala road, Champa Nagar Hari Tola, Naya Bazar 1st Nala and Naya Bazar 2nd Nala. The concessionaire has to design the STP considering the sewage characteristics of these Nalas. The test report is given the table below,

Table: Wastewater characteristic (Test date:30-05-2018)

Nala Name	BOD (mg/l)	COD (mg/l)	TSS (mg/l)	pH	TDS (mg/l)	Color (Hazen)	E. coli form (MPN /100ml)
Champa Nala	281.88	348.48	226	7.69	1521.1	<56, Hazy	<7654
Champa Nala Road	453.46	573.76	119	7.94	1125	<2500, Brown	<100000
Champa Nagar Hari Tola	285.76	376.64	220	8.42	1453	<2500, Sky Blue	<6549
Shanti Bazar Nala	219.51	271.04	215	8.92	1325	<85, Hazy	7639
Naya Bazar Nala	324.69	411.84	565.00	8.19	1541	<2500, Pink	14325

The concessionaire must make sure that the treated effluent meet the discharge standard as mentioned in the KPI.

3. Raw septage characteristic:

Standard characteristics for septage handling as defined in the CPHEEO manual (Page 9-42 and 9-43) will apply. The Concessionaire can make also his own assessment.

4. General design requirements

The Concessionaire shall design the Facilities in accordance with the provisions of the IS codes, Central Public Health and Environmental Engineering Organisation (CPHEEO) manual on Sewerage and Sewage Treatment, Good Industry Practices and Applicable Laws.

The precedence for process and hydraulics shall be CPHEEO manual followed by the IS codes and Good Industry Practices. The precedence for civil, structural, mechanical & electrical processes shall be IS Codes followed by CPHEEO manual and Good Industry Practices.

The STP shall be designed by the Concessionaire to receive and treat all combinations of Sewage influent flows and loads arriving at the sewerage district in accordance with the Influent Standards specified above.

The peak factor for the design shall be 2.25. It is observed that peak hours are generally from 5 a.m. to 10 a.m. and from 5 p.m. to 8 p.m.

4.1. Design life

- o The STP components and the Associated facilities shall be designed and constructed to provide the minimum service life as prescribed in CPHEEO

4.2. Per Capita Water Supply and Sewage Generation

As per National Policy of water conservation, per capita water supply rate is considered as 135 lpcd which includes domestic, institutional and commercial demand. Based on the guidelines of CPHEEO Sewerage manual, the per capita sewage generation works out to be 150 lpcd with return factor of 80%. Hence, the per capita sewage generation for sewer network design is adopted as 135 lpcd.

4.3. Infiltration

Estimate of flow in sanitary sewers have to include flows due to infiltration of ground water. In light of general geological structure, ground water occurrence and topography, the ground water infiltration is considered for the proposed networks. For the design purpose, infiltration is considered as 10%.

4.4. Peak factors

The peak factors with respect to contributing population for domestic sewage are furnished below. The peak factors are applied to the projected population for the design year considering an average per capita sewage flow based on allocation. The details of peak factor considered as indicated below.

Details of peak factors considered	
Contributing population	Peak factor
Upto 20,000	3.00
>20,000 upto 50,000	2.50
>50,000 upto 7,50,000	2.25
Above 7,50,000	2.00

(Source: Manual on Sewerage and Sewage Treatment-Second Edition -1993 by CPHEEO)

4.5. Design flows

Design flows are essentially peak dry weather flows. Peak dry weather flows would comprise of peak domestic sewage flow plus infiltration as per below.

Pipe	Sectional Average flow	Cumulative Average flow	Cumulative Infiltration	Peak flow
(a)	(b)	(c)	(d)	(e)
	= Sectional population x sewage (water supply rate x return factor)	= Sectional Sewage Average flow + cumulative average flow from previous connecting node(s)	= 10% of Cumulative Sewage Average flow	= (c) x Peak Factor + (d) = Cumulative Sewage Average flow x Peak Factor + Cumulative Infiltration

4.6. IS codes for Sewerage System

Proposed sewerage system shall generally conform to the following publications of the Indian Standards Institution:

IS: 458	Precast Concrete Pipes (With and Without Reinforcement) – Specification
IS: 14333	High density polyethylene pipe for sewerage
IS: 15328	Un-plasticised Non-Pressure Polyvinyl Chloride (PVC-U) Pipes for use in Underground Drainage and Sewerage Systems
IS: 783	Code of Practice for Laying of Concrete Pipes
IS:4111 (Part 1)	Code of Practice for Ancillary Structures in Sewerage System: Part 1 Manholes
IS:4111 (Part 4)	Code of Practice for Ancillary Structures in Sewerage system: Part 4 Pumping stations and pumping mains (rising mains)
IS: 5455	Specification for Cast Iron Steps for Manholes
IS: 10151	Polyvinyl Chloride (PVC) and its Copolymers for its Safe Use in Contact with Foodstuffs, Pharmaceuticals and Drinking Water
IS: 6280	Specification for Sewage Screens
IS: 5600	Pumps-Sewage and Drainage
IS: 8329	Centrifugally Cast (Spun) Ductile Iron Pressure Pipes for Water, Gas and Sewage Specification`
IS: 11972	Code of practice for safety precautions to be taken when entering a sewerage System
IS: 12592	Precast Concrete Manhole Cover And Frame — Specification
IS: 13496	General Requirements of Suction Machine for Cleaning Sewers, Manholes and Ancillary Structures Provided On Sewer Line and Closed Storm Water Drains
IRC: 6	Standard Specifications and Code of Practice for Road Bridges – Section II – Loads and Stresses

4.7. Design parameters for gravity collection system

4.7.1. Design formula

Manning's formula is adopted for design of gravity sewers.

Q_f	=	$A \times V_f$
V_f	=	$1/N \times R^{2/3} \times S^{1/2}$

Where,		
Q_f	=	Flow rate when pipe flows full in cumecs
V_f	=	Velocity when pipe flows full in mps

4.7.2. Coefficient of Roughness

For sewers with diameters within range of 150-1400mm, RCC pipes with S&S joints have been proposed where Manning's coefficient 'n' is considered as 0.011. For HDPE pipes Manning's coefficient 'n' is considered as 0.011. For design purpose, n/N is considered as constant. For existing pipe, the capacity has been checked considering n value as 0.011 after rehabilitation with FRP segment.

4.7.3. Pipe Material for Gravity Sewers

- o For Property / House Sewer Connections
uPVC pipes can be considered for short length Property / House sewer connections from road-side chamber to street manhole.
- o For Gravity Sewers

RCC pipes are found technically suitable and of least cost for gravity sewers compared to other materials. RCC NP3 class pipes conforming to IS: 458 with Sulphate Resistant Cement and rubber ring joints are proposed. For highway crossings and pipe jacking, RCC NP4 pipes are proposed.

HDPE pipes of Class PN 6.0 are also considered for initial stretches (150 to 200mm dia.) in very congested area and narrow lanes.

4.7.4. Design Capacity of Sewers

Sewers are designed to carry estimated peak flows generated in the design year. As far as possible, they will be designed to run maximum 80% full at ultimate peak flow as per the CPHEEO Manual. This is to ensure proper ventilation and to prevent the sewage getting septic.

4.7.5. Self Cleansing Velocities

To ensure that deposition of suspended solids does not take place, self-cleansing velocities using Shield's formula will be considered in the design of sewers.

$$V = (1/n) \times R^{1/6} \{K_S (S_S - 1) \times d_p\}^{1/2}$$

K_S = Dimensionless constant @ 0.04 to start motion of granular particle and @ 0.8 for adequate self cleansing velocity.

S_S = Specific Gravity of Particle

d_p = Particle size

The above formula indicates that velocity required to transport material in sewers is mainly dependent on the particle size and specific gravity and only slightly dependent on conduit shape and depth of flow.

When considering typical values of particle size and specific gravity, minimum partial design flow velocities of 0.6 m/s at present peak flows and 0.8 m/s at ultimate peak flows are considered desirable, provided the depth of sewers do not necessitate provision of too many pumping stations. Also, the velocity in a sewer is recommended not to exceed 3 m/s to control the erosion of sewer. Further, in initial stretches where flow is very less and 0.6m/s velocity at present peak flow is not achieved, flushing arrangement has been proposed.

The flow velocity in the sewers should be such that the suspended materials in sewage do not get silted up; i.e. the velocity should be such as to cause automatic self-cleansing effect. The generation of such a minimum self cleansing velocity in the sewer, at least once a day is important, because if certain deposition takes place and is not removed, it will obstruct free flow, causing further deposition and finally leading to the complete blocking of the sewer.

The smooth interior surface of a sewer pipe gets scoured due to continuous abrasion caused by the suspended solids present in sewage. It is, therefore, necessary to limit the maximum velocity in the sewer pipe. This limiting or non-scouring velocity will mainly depend upon the material of the sewer.

Thus the sewers are designed on the assumption that although silting might occur at minimum flow, it would be flushed out during peak flows. Erosion of sewers is caused by sand and other gritty material in the sewer and also by excessive velocity.

Based on above, the velocity criteria which is considered is as given below.

Minimum velocity	=	0.60 m/s initial peak flow
	=	0.80 m/s ultimate peak flow
Maximum velocity	=	3.00 m/s (It is recommended to restrict it to 2.5m/sec)

An attempt shall be made to obtain adequate self cleansing velocities in the design of sanitary sewer at the average or at least at the maximum flow at the beginning of the design period. If the velocity criteria do not meet for initial stretches of sewers due to less flow, these stretches will need to be flushed at regular intervals to avoid clogging of sewers.

4.7.6. Minimum size and gradient of sewers

The minimum size of sewers in the design of sewerage system is proposed as 200 mm. It helps in cleaning, maintenance, reducing the occurrence of blockages, etc. However, 150 mm diameter sewer has been proposed in small lanes (less than 3m wide) and for short length (say up to 100m).

The gradients adopted for the sewers are in concurrence with the CPHEEO manual. The gradients adopted for the sewers are based on flow and velocity requirements. The crown levels of incoming and outgoing sewers are kept same. Transition is made from smaller to larger diameter. Whenever required drop manholes are provided.

4.7.7. Depth of cover

Minimum depth of cover

To facilitate house sewer connections and future laterals connections to the street manholes and to provide sewer protection from external loads, the minimum depth of cover is considered as 1 m.

Maximum depth of cover

To reduce the depth of sewers in whole network and to control the deep excavation, the maximum depth of cover is limited to 8 m.

4.8. Design parameters for rising mains / pressure pipes

For Pressure pipe, Hazen William formula is adopted $V = 0.85 \times C \times R^{0.63} \times S^{0.54}$

For Rising Mains, Ductile Iron (DI) of Class K9 pipes with internally smooth cement mortar lining are proposed. The Design 'C' value for the internally smooth cement mortar lined DI pipes is considered as 120.

Minimum velocity	=	0.60 m/s at initial peak flow
		0.80 m/s at ultimate peak flow
Maximum velocity	=	2.50 m/s

4.9. Bedding for sewers

The type of bedding (Granular Bedding, Plain Cement Concrete Cradle Bedding, Reinforced Cement Concrete Cradle Bedding and Reinforced Cement Concrete Encasement) depends on the weight of soil above the pipe based on width of trench, depth at which the sewer pipe is laid and the class of superimposed vehicular load considered based on the traffic condition.

For RCC (NP3 class) pipes, the appropriate bedding shall be provided based on the bedding factor calculated considering load due to backfill, the superimposed (live) load and the three edge bearing strength of RCC pipes as per IS:458.

The bedding factor is calculated by following formula.

$$\text{Bedding Factor} = \frac{\text{Total Load (kN/m)} \times \text{Factor of Safety}}{\text{Three Edge Bearing Strength (kN/m)}}$$

Where, Total load is sum of Earth load, Vehicular load and Water load

Three Edge Bearing Strength of RCC pipe is considered as per IS: 458

Factor of safety is considered as 1.1.

Impact factor for vehicular traffic depends on cover above top of pipes. For sewers, the depth of cover is more than 900mm, hence impact factor is considered as 1.0 as per IS:783.

The type of bedding to be used, depending on the bedding factor shall be as indicated.

Bedding factor	Type of bedding	Class of bedding
Up to 1.9	Granular Bedding with Carefully Compacted Backfill (GRB)	B
For more than 1.9 and upto 2.8	Concrete Cradle Bedding with Carefully Compacted Backfill (PCCB)	A b
For more than 2.8 and up to 3.4	Reinforced concrete cradle with percentage of reinforcement 'p' equal to 0.4% with carefully compacted backfill (RCCB)	A c
For more than 3.4 and up to 4.8	Reinforced Concrete Encasement with percentage of reinforcement 'p' equal to 1% (RCE)	A d

(Note: 'p' is the ratio of the area of transverse reinforcement to the area of concrete cradle at the pipe invert above the base)

4.10. Manholes

4.10.1. Ordinary manhole

Manholes are to be provided at all junctions, change of sewer size, gradient and direction. The sizes of manholes adopted are in line with the recommendations of CPHEEO Manual for Sewerage and Sewage treatment. In general, to facilitate the house connections and cleaning and maintenance the Manhole spacing is kept at 30m to 45m depending upon the diameter of sewer. For size upto 900mm dia, the spacing of manholes shall be kept as 30m and for size of sewer above 900mm dia, the spacing of manhole is kept 45m as per discussion held on 15 March 2012 workshop at Delhi.

The clear opening at the top in case of ordinary manholes is kept as 560 mm. The manhole frame and cover is proposed of Steel Fiber Reinforced Concrete (SFRC) capable of withstanding heavy-duty loads (HD-20 for side lanes), (HD-35 for main roads) conforming to IS: 12592-2002.

The street manholes will be circular in shape with concentric cone depending on the depth and diameter of sewers. Based on the sewer diameters CPHEEO Manual for Sewerage and sewage treatment recommends the internal diameter of the manhole should not be less than internal diameter of largest sewer plus 150mm of benching on both sides. However, from practical considerations the benching width for sewer diameter greater than 450mm is kept as 300mm on both sides. The internal diameters of manholes for varying depths as recommended by CPHEEO Manual for Sewerage and sewage treatment will be as follows.

Description	Dimension
For depths above 0.90m and up to 1.65m	900mm diameter
For depths above 1.65m and up to 2.30m	1200mm diameter
For depths above 2.30m and up to 9.00m	1500mm diameter
For depths above 9.00m and up to 14.0m	1800mm diameter

It is desirable to place the first pipe joint (S/S) outside the manhole as close as practicable. This pipe shall be built inside the wall of the manhole flush with the internal periphery protected with an arch of masonry or cement concrete to prevent it from being crushed.

The inside and outside of brickwork should be plastered with cement mortar (1:3) inside finished smooth with a coat of neat cement.

Due to availability of plenty of bricks locally and less cost, Brick Masonry manholes are proposed wherein house connections / lateral sewers can be done conveniently. However, RCC manholes are also considered for sub-soil water conditions. RCC manholes are considered as square for ease in construction as the cost difference between circular and square type of RCC manholes are marginal. Precast concrete manholes are also considered for congested and narrow lanes for speedy construction for manhole depth upto 1.65m for pipes upto 400mm dia.

The type and size of manholes (depth-wise) is given below.

Type and size of manholes for proposed sewerage works

Type of manhole	Depth of manhole	Diameter of pipe	Size of manhole	Size of opening
<i>BRICK MASONRY</i>				

Type of manhole	Depth of manhole	Diameter of pipe	Size of manhole	Size of opening
<i>Rectangular</i>				
R2-Type Manhole	For depth upto 2.5 m	Upto 400 mm	1200 X 900mm	560mm dia.
<i>Circular</i>				
A-Type Manhole	For depth 1.2 m and upto 1.65m	Upto 400 mm	900 mm dia	560mm dia.
B-Type Manhole	For depth 1.66 m and upto 2.0 m	Upto 600 mm	1200 mm dia	560mm dia.
	For depth 2.01 m and upto 2.3 m			
C-Type Manhole	For depth 2.31 m and upto 3.0 m	Upto 900 mm	1500 mm dia	560mm dia.
	For depth 3.01 m and upto 4.5 m			
	For depth 4.51 m and upto 6.0 m			
	For depth 6.01 m and upto 7.5 m			
	For depth 7.51 m and upto 9.0 m			
D-Type Manhole	For depth 3.01 m and upto 4.5 m	1000 to 1200 mm	1800 mm dia	560mm dia.
	For depth 4.51 m and upto 6.0 m			
	For depth 6.01 m and upto 7.5 m			
	For depth 7.51 m and upto 9.0 m			
	For depth 9.0 m and upto 12.0 m			
<i>Scraper Manhole</i>				

Type of manhole	Depth of manhole	Diameter of pipe	Size of manhole	Size of opening
S1-Type Manhole	For depth upto 1.5 m	500 to 900mm	1500mm X1500 mm	2 nos. 900 x 600mm
	For depth 1.5 m and up to 3 m			
	For depth 3 m and up to 4.5 m			
	For depth 4.5 m and up to 6 m			
	For depth 6 m and up to 7.5 m			
	For depth 7.5 m and up to 9 m			
	For depth 9 m and up to 10.5 m			
	For depth 10.5 m and up to 12 m			
	For depth 12 m and up to 14 m			
S2-Type Manhole	For depth upto 1.5 m	1000 to 1200mm	1800mm X1500 mm	2 nos. 900 x 600mm
	For depth 1.5 m and upto 3 m			
	For depth 3 m and upto 4.5 m			
	For depth 4.5 m and upto 6 m			
	For depth 6 m and upto 7.5 m			
	For depth 7.5 m and upto 9 m			
	For depth 9 m and upto 10.5 m			

Type of manhole	Depth of manhole	Diameter of pipe	Size of manhole	Size of opening
	For depth 10.5 m and upto 12 m			
	For depth 12 m and upto 14 m			
RCC MANHOLES				
Type-A	For depth upto 1.5 m	Upto 300mm Dia.	1500mm X1500 mm	560mm dia.
	For depth 1.5 m and upto 3.0 m	Upto 450mm Dia.		
Type-B	For depth 3.0 m and upto 4.5 m	Upto 600mm Dia.	1500mm X1500 mm	560mm dia.
	For depth 4.5 m and upto 6.0 m	Upto 900mm Dia.		
Type-C	For depth 6.0 m and upto 7.5 m	1000- 1200mm Dia.	1800mm X1800 mm	560mm dia.
	For depth 7.5 m and upto 9.0 m			
Type-D	For depth 9.0 m and upto 10.5 m	Above 1200mm Dia.	2200mm X2200 mm	560mm dia
	For depth 10.5 m and upto 12.0 m			
PRECAST CONCRETE MANHOLES				
Type-E	For depth 1.2 m and upto 1.65m	Upto 400 mm	1000 mm dia	560mm dia.

4.10.2. Drop arrangement

Drop arrangement is proposed for the laterals joining the manholes of main sewer wherein level between maximum water line (peak flow level) of main line and invert level of lateral/branch sewer is greater than 600mm.

5. Interception and Diversion of Nala

Interception and diversion of Nala shall be carried out as per the CPHEEO standards.

6. Sewage pumping station

Sewage Pumping Stations are provided to lift sewage so as to discharge into another gravity sewer or inlet chamber of treatment plant. Considering the soil strata and groundwater table, the pumping stations are provided so as to limit the maximum depth of sewer to 8m. Hydraulic criteria adopted in the design of Sewage Pumping Station will be follows:-

- a) Peak Factors ranging from 2 to 3 are considered for design peak flows.
- b) Velocity in pumping main range from 0.6 m/sec (minimum) to 2.5 m/sec (maximum).
- c) Wet well volume is generally computed based on the pump capacity & no. of starts and stops per hour as given below. Also it is calculated based on 3.75 minutes detention time at peak flow as per NRCD Guidelines. However individual cases need to be studied separately.

Wet Well volume, $V=0.25 * Q / N$ (Considering design year flows)

Where Q – pumping rate in cum/hr of largest pump installed for parallel arrangement.

N- No. of starts & stops per hour considering manual start/stop also.

- d) Velocity through the screen is 0.9 m/sec at peak flow.
- e) Hazen William`s Coefficient will be considered as 120 for DI pipe.
- f) Minimum residual head is considered as 2m for pump head design.

The Pumps, Electro-Mechanical Units and other related accessories are designed considering present and ultimate design peak flows.

The selection of pumps & pumping main size is based on the following criteria besides head & discharge requirements.

- a) Submersible non clog pumps will be considered for medium/small PS (≤ 50 MLD), whereas horizontal type non-clog centrifugal pumps with positive suction pumps as appropriate are proposed for large pumping station (≥ 50 MLD). The pumps are single speed with low rpm & as far as possible, of equal capacities.
- b) The pump configurations will be selected as per NRCD/MoEF Guidelines as given in following table.

Length of Rising Main	Pumps	No. of Pumps
Where rising main is long and where head losses are the dominant factor	Peak Flow/2 pumps	3 nos. (including 1 standby)
	Non Peak Flow pumps	2 nos. (including 1 standby)
Where rising main is short and static head is dominant	Peak Flow/4 pumps	6 nos. (including 2 standby)

- c) For small capacity lift stations, submersible raw sewage pumps with 1W +1S pump configuration has been considered. The small lift stations will be underground with no superstructure type.
- d) In case the rising mains are long ,head losses are dominant factor, In case the rising mains length is short, static head is dominant factor.
- e) Depending on present & future flows (minimum, average and peak) suitable capacity & no. of pumps will be selected.
- f) For pumping station, provision is made for automatic start & stop, the system would be capable of being operated manually.
- g) A maximum of two starts & two stops per hour is considered for manual operations of the pump. A higher no. of starts & stops shall be considered for the automatic operation.
- h) Mechanically operated Stainless steel screens for SPS would be provided ahead of the wet well to prevent large size solids entering the pump.

- i) All the sluice gates in the SPS area will be made from Cast Iron –Flush bottom Rising Spindle type.
- j) Natural or forced ventilation system would be provided for deep pumping station, with dry-wet well configuration.
- k) Level indicators would be provided for SPS.
- l) Overhead travelling cranes of capacity less than 5 T shall be hand operated whereas cranes of capacity 5T and above shall be electrically operated. Also adequate loading platform shall be provided for material handling.
- m) DG set for handling average flow will be used provided in the pump station.
- n) The material for rising main is considered as Ductile Iron as per IS: 8239:2000.
- o) An electromagnetic flow meter will be provided on the rising main for measuring the sewage flow.

7. Process requirements of STP

The following main treatment processes and requirements must be provided:

- o Preliminary treatment (screenings & grit removal)
- o Secondary biological treatment
- o Effluent pumping station and outfall
- o Sludge digestion
- o Sludge thickening, dewatering & storage
- o Transportation of Screenings, Residual Grit and Digested Sludge from the Facilities and Associated Infrastructure to the Waste Disposal Site.

8. Description of process and facilities

This section outlines the major processes and Facilities that the Concessionaire is required to design, construct, and operate as per this Concession Agreement.

8.1. Influent rising main

The connection to the existing influent rising main shall be made by the Concessionaire.

8.2. *Stilling chamber*

A stilling chamber shall be provided at the inlet of STP to receive the raw Sewage from the pumping station. The stilling chamber shall reduce the turbulence of raw water entering into it. The stilling chamber should be kept clean by removing silt, sand deposited and the algae growth at the bottom and sides.

8.3. *Fine screens*

The raw Sewage from rising main shall flow to fine screen inlet channel by gravity. The mechanical fine screen shall be either bar/ drum type/perforated screen. The screens shall have clear openings not exceeding 6 mm. The screens shall be equipped with an automatic cleaning system and can be controlled by both an adjustable timed cycle and a pre-set differential head across the screen using ultrasonic level sensors. All screens shall be provided with thimble mounted isolation sluice gates both on upstream and downstream. The Concessionaire may provide a bypass channel with manual screen parallel with the automated screens.

8.4. *Grit basins with Grit washers and classifiers*

The Concessionaire shall provide Grit separators downstream of the screens. The Grit separators shall be capable of removing at least 95% of particles with a specific gravity of 2.65 g/cm³ and with a diameter of at least 0.2 mm. A Parshall Flume shall be provided downstream of Grit separators. The flow measurement shall be instantaneous.

8.5. *Primary clarifiers*

If proposed, the primary clarifiers with scum removal shall be designed as per CPHEEO manual.

8.6. *Aeration systems*

The aeration system shall be designed to maximise oxygen transfer and to adapt to the

changing oxygen demands in biological treatment systems. The aeration system shall be capable of complete and uniform mixing and suspension of mixed liquor suspended solids.

8.7. *Disinfection*

Disinfection shall be provided to comply with KPIs as required by the Concession Agreement, through chlorination systems or UV disinfection or ozonation. The Concessionaire shall ensure that disinfectants used shall not exceed the limits as per the provisions of the Environment (Protection) Rules, 1986. Such excess disinfectant levels, if any, need to be neutralized before disposal to inland surface water or land for irrigation.

8.8. *Sludge Thickeners*

The sludge thickeners may be either gravity thickeners or mechanical thickeners. All associated ancillaries such as all pumps and polymer dosing equipment shall be arranged. If mechanical thickeners are proposed, required standby arrangement shall be provided.

8.9. *Sludge digestion*

The design of the sludge digestion system shall ensure that maintenance of all equipment and components can be safely and easily accomplished from outside the digester and without draining its contents.

If anaerobic digestion is proposed, the Concessionaire shall provide gas holders and gas burners. If provided, the sludge heating system may be complete with heat exchangers, sludge re-circulation pumps, hot water pumps. The heat requirement of digesters during winter season will be met through the heat available from bio gas engine and additional requirement to be fulfilled through boiler, if required.

The Concessionaire shall ensure safety and security of operation as the result of the presence of biogas in both normal and abnormal operation.

8.10. *Dewatering system*

Digested Sludge shall be dewatered to produce a cake concentration of at least 20% dry solids

and the solids recovery shall not be less than 95%. The concessionaire will have to maintain minimum standards as per USEPA part 503 (US-EPA, 1992) guidelines which defines treated solids as Class A biosolids when they have 1,000 MPN/g of fecal coliforms, 3 MPN/4 g of Salmonella, 1 FPU/4 g of viruses and 1 helminth egg/4 g of treated sludge. The dewatering facility and associated ancillaries such as all pumps and polymer dosing equipment shall be arranged in at least two parallel streams (1 working + 1 standby), each sized to handle the average daily sludge quantities over not more than 16 hours perday.

The dewatered sludge shall be disposed off and no temporary storage is allowed at STP site.

Concessionaire will have to ensure that the dewatered sludge should have less than 38% Volatile solids for Vector Attraction Reduction. The Concessionaire shall also ensure less than 20,00,000 most probable number per gram of total dry solids (20,00,000 MPN/gTS) in sludge before disposal.

8.11. *Facilities drain sump and pump station*

A drain pump station shall be provided to collect recyclables such as filtrates from thickener/dewatering units and other miscellaneous waste flows such as sewage generated from Facilities, cleaning and wash-down flows and pump them back up to the inlet chamber of the Facilities.

8.12. *Treated Effluent pumping station*

A Treated Effluent pumping station and rising main shall be provided to discharge the effluent to the Discharge Point.

9. *Facilities within STP*

9.1. *Energy generation*

The Concessionaire shall generate heat and electrical energy from the biogas produced by the sludge digestion process. The Concessionaire shall design the energy generation system to be capable of using the maximum biogas produced by the sludge digestion process at design loadings to produce energy. The Concessionaire shall utilize electrical power generated by the energy recovery system where possible within the Facilities.

The design and specification of the units shall take into account the contaminants that will be present in the biogas from the digesters, such as hydrogen sulphide (H₂S) and ammonia (NH₃), and any harmful effects resulting from their combustion. The Concessionaire shall

provide a H₂S gas scrubbing system, to protect the engine and maintain its design life.

9.2. Gas holders

The gas holders shall as per CPHEEO manual. A flame arrestor and flow meter shall be provided on the gas line from each digester.

9.3. Biogas burner

The bio gas burner (if provided) shall be designed as per CPHEEO manual and should be provided in 2 numbers (1working /1 standby) for complete destruction of all contaminants in the gas. All gas pipework and weld on flanges shall be stainless steel 316L.

PART - B
TECHNICAL SPECIFICATIONS

Section G1: General requirements

1. Executing Agency's drawings

The drawings listed in the Tender Document are the Executing Agency's drawings and are provided by the Executing Agency as illustrative of the Specification.

All data and information furnished in the drawings by the Executing Agency is given in good faith but the Executing Agency does not accept the responsibility for the completeness and accuracy thereof. The same shall be verified by the Concessionaire promptly pointing out errors or discrepancies thereof to the Executing Agency.

2. Drawings furnished by the Executing Agency

The Concessionaire shall carefully check all drawings and / or instructions furnished by the Executing Agency before commencing any works and shall inform the Executing Agency in writing, within 14 days from the receipt of the same, of any errors or omissions discovered or of the difficulty to execute any works or part thereof in compliance with these drawings and / or the written instructions received from the Executing Agency.

3. Drawing sheet format

All drawings provided by the Concessionaire shall be on standard size sheets, in the form of black or blue lines on a white background and shall show the following particulars in a title block located in the lower right hand corner, in addition to the name of Concessionaire and equipment manufacturer, date, scale, drawing number, revision number (RO for drawings submitted initially, R1, R2. etc. for drawings submitted subsequently)

A blank space of 90 mm x 100 mm shall be provided for the Executing Agency's approval stamp and provision shall be made for details of revisions to be recorded.

All drawings submitted by the Bidder / Concessionaire shall use the English language and preferably SI units. All drawings shall be clearly and fully cross referenced to the other drawings as relevant.

4. Bidder / Contract drawings

Drawings submitted by the Bidder with his Bid shall be listed in the Bid Document. Such drawings shall show all the essential items of the Plant offered together with sufficient details to enable the general arrangement of the Plant to be determined.

The outline dimensional drawings submitted by the Concessionaire shall include the following in addition to overall dimension:

- (a) Parameters of equipment
- (b) Load details
- (c) Support details
- (d) Foundation pocket details

5. Submission and approval drawings

The following shall be the procedure for submission and approval of drawings:

- (a) The Concessionaire shall submit adequate copies of the drawings to the Executing Agency. All the drawings are to be signed by the Concessionaire or his authorised representatives.
- (b) The Executing Agency will arrange to review the drawings and, if found fit for approval will return one (1) copy to the Concessionaire, duly approved.
- (c) In case the drawings / documents are not fit for approval but worth for review, the Executing Agency will arrange to mark the comments on the drawings and return one (1) copy to the Concessionaire. In such case, the Concessionaire shall resubmit the revised drawings within two weeks and the same shall be repeated till the drawings are finally approved.
- (d) If the submitted drawings / documents is not worth for review, the Concessionaire will be informed accordingly.
- (e) After tests on completion, the Concessionaire shall submit, within 15 days of the conclusion of the tests, dealers / tracings of the “As-built Drawings” to the Executing Agency.

When the drawings are received by the Executing Agency after revision by the Concessionaire, he will only arrange to review the revision made and hence the

Concessionaire shall carefully identify all the revised details / dimensions and also describe the revision in the revision block.

No drawings, with corrections made after taking the prints will be accepted.

Approval of drawings by the Executing Agency shall not relieve the Concessionaire of his responsibility in terms of Contract

6. Operation and maintenance manuals

The operation and maintenance manuals shall be arranged to provide separate volumes for each principal section of the Works and they shall relate to a “As-built” conditions and shall include all necessary drawings and diagrams for a proper understanding of the works.

The operation and maintenance manual shall be approved in draft form initially prior to commencement of erection by the Executing Agency and shall cover all items of the Works. For this purpose, three draft copies shall be submitted to the Executing Agency. A mere collection of manufacturers’ descriptive leaflets will not be acceptable in satisfaction of this Clause. The operation & maintenance manual shall comprise both operating instructions and maintenance instructions.

The manuals shall include, but not be limited to the following information:

- (a) Descriptive overview of the whole of the works.
- (b) Descriptions of all systems installed, including mechanical, electrical, instrumentation, control systems with relevant design and operating parameters.
- (c) Descriptions of all equipment supplied including manufacturer’s leaflets, which shall be scheduled for easy reference.
- (d) Schedules and manufacturer’s catalogues for all equipment supplied, giving duties, electrical load, etc.
- (e) Schedules of all equipment suppliers (and their local agents) including names, addresses, telephone, fax and e-mail numbers.

- (f) Start-up, operation and shutdown instruction for all parts of the Works. These shall include step-by-step directions on setting the Plant to work listing all adjustments and settings necessary for the current functioning of the Plant.
- (g) Instructions on monitoring of Plant performance and sample log sheets for each Plant item, to be filled by operators on a routine basis.
- (h) “Dos” and “Don’ts” in Plant operation. Operator’s attention shall be drawn to all operations considered dangerous to operators or likely to cause damage to the Plant.
- (i) Procedures to deal with breakdown and emergencies.
- (j) Safety requirements.
- (k) Checking, testing and replacement procedures to be carried out on all Plant items on a daily, weekly and monthly basis or at longer intervals to ensure trouble free operation. Full maintenance instructions for all equipment including planned maintenance schedules or charts giving daily, weekly, monthly, quarterly, half yearly annually and overall instructions, together with recommended lubricants and spares. These shall also include details of routine maintenance work that will be within the competence of the normal maintenance staff and notification of maintenance work that will have to be done by the manufacturer, his agent or other specialist operator.
- (l) Fault locations and remedy charts to facilitate tracing the cause of malfunctions or breakdown and correcting faults.
- (m) Complete list of recommended lubricants and lubrications charts.
- (n) A “Spares Schedule”, which shall consist of a complete list of item wise spares for all Plant items with ordering references and part numbers.
- (o) A complete list of manufacturer’s instructions for operation and maintenance of all bought out equipment. The list shall be tabulated in alphabetical order, giving the name of supplier / manufacturer, identification of the Plant item, giving the model number and the literature provided including instruction leaflets and drawing numbers.

- (p) Step by step procedure for the dismantling, repair and re-assembly of all items of equipment.
- (q) Part-list and drawings or exploded diagrams for each item of Plant with construction particulars, materials of construction, mating components, clearances and tolerances, maximum wear permitted before replacements are to be done, etc.
- (r) Record drawings of all systems installed, including general arrangements, conduit and wiring trunking systems, wiring diagrams, control schematics and valve charts etc., to a reduced scale.
- (s) Certified suppliers' drawings of all equipment supplied, which shall be scheduled for easy reference.
- (t) Site test reports for all mechanical, electrical and instrumentation systems. Site test process reports for proving tests, commissioning reports, and supplier's test certificates.
- (u) Copies of performance curves.

Each volume shall be durable and permanently bound within a stiff binder of a design to be approved by the Executing Agency. They shall permit the subsequent incorporation of revisions to be necessary during the Defect Liability Period.

7. Protection and Packing for Transportation

Before any Plant is dispatched from manufacturer's works, it shall be properly prepared and packed and the Concessionaire shall give the Executing Agency at least fourteen (14) days' notice that these preparations are to commence.

Prior to dispatch, the Plant shall be adequately protected by painting or by other approved means for the whole period of transit, storage and erection, against corrosion and incidental damage, including the effects of vermin, sunlight, rain, high temperatures and humid atmosphere. The Concessionaire shall be responsible for the Plant being so packed and / or protected as to ensure that it reached the Site intact and undamaged. The Plant shall be

packed to withstand rough handling in transit and all packages shall be suitable for storage including possible delays in transit.

The Concessionaire shall be deemed to have included in the schedule of prices for all materials and packing cases necessary for the safe package, conveyance and delivery and storage of the Plant with all protective and preservation measures.

Cases containing rubber rings, bolts and other small items shall not normally weigh more than 50 kg, gross per case. No one package or bundle shall contain items of Plant intended for incorporation in more than one section of the Works. All items of Plant shall be clearly marked for identification against the packing list.

Eyebolts, lifting hooks and brackets shall be provided for lifting the boxes, crates and packages. Every crate or package shall contain a packing list in a waterproof envelope. A duplicate copy of the packing list shall be sent by post to the Executing Agency at site. Consignments imported by ocean freight shall be packed and preserved as stipulated above.

All crates, packages, etc. shall be clearly marked with a waterproof material to show the weight and where the slings should be attached, and shall also have an indelible identification mark relating them to the packing lists. Packing cases shall be non-returnable. Concessionaire shall have to clear the site including packing material.

Electrical equipment shall be enclosed in sealed airtight package with hygroscopic material, before being placed in packing cases on shock absorbent materials and secured by means of battens.

8. Delivery, Unloading and Storing at Site

The Concessionaire shall be responsible for checking all materials delivered to site and shall keep the Executing Agency's Representative fully informed of the state of deliveries. The Concessionaire shall carry out, at his cost, all instructions of Executing Agency for proper unloading, preservation, maintenance, storage and security of materials delivered to site until he fulfills all his obligations under the Contract.

The Concessionaire shall erect and maintain on the site any temporary storage facility as required and approved by the Executing Agency. If built up shed or area is provided by the

Executing Agency depending upon availability, the Concessionaire shall have to pay rent as finalised by the Executing Agency.

Multiple handling and movement of materials during storage and retrieval shall be avoided.

9. Spare Parts

Spares during pre-commissioning trials, commissioning tests / maintenance, guarantee etc. shall be provided by the Concessionaire. The spares also include the consumables such as bulbs, fuses, wires, lubricating oil, gaskets, packing seals etc. The necessary spares shall be brought by the Concessionaire prior to the pre-commissioning test so as to avoid the downtime of equipment due to non-availability of them. All the spares have to be provided as required, by Concessionaire free of cost.

All spare parts shall be new, unused and strictly interchangeable with the parts for which they are intended to be replacements and shall be treated and packed for long storage under the climatic conditions prevailing at the site. Each spare part shall be clearly marked or labelled on the outside of its packing with its description, number and purpose. When more than one spare is packed in a single case or other container, a general description of its contents shall be shown on the outside of such case or container and a detailed list enclosed. All cases, containers and other packages shall be marked and numbered in an approved manner for the purpose of identification. Spares shall be delivered to site after the completion of erection but before start of commissioning of Plant along with technical leaflets and details. Spare parts shall be indicated in the assembly drawing showing clearly the part numbers.

All cases, containers or other packages are liable to be opened for such examination as the Executing Agency may require and packing shall be designed to facilitate opening and thereafter repacking. In the event of the some specific spares offered in the Contract being withdrawn from manufacture owing to changes in design of equipment or similar reasons viz., model being obsolete etc., the Concessionaire shall inform the Executing Agency before such withdrawal, so that the Executing Agency can take timely alternative steps.

10. Tools

Tools shall be delivered to site just prior to Tests on Completion.

The specified tools shall not be used for the erection of the Plant being supplied and except that the Executing Agency may call upon the Concessionaire to demonstrate their use or effectiveness, they must be handed over to the Employer in a completely new and unused condition. Should the Concessionaire require any such tools at site for erection, he shall provide his own.

The test equipment shall include special purpose items essential to the testing or recalibration of related items of Facilities.

11. Works to be kept clear of water

The Concessionaire shall keep the Works well drained until the Executing Agency certifies that the whole of the Works is substantially complete and shall ensure that so far as is practicable, work is carried out in the dry condition. Excavated areas shall be kept well drained and free from standing water.

Notwithstanding any approval by the Executing Agency of the Concessionaire's arrangements for the exclusion of water, the Concessionaire shall be responsible for the sufficiency thereof and for keeping the Works safe at all times, particularly during any floods and for making good at his own expense any damage to the Works, including any that may be attributable to floods. Any loss of production or additional costs of any kind that may result from floods shall be at the Concessionaire's own risk.

12. Assistance for the Engineer's Staff

The Concessionaire shall provide all necessary assistance to the Executing Agency and his staff in carrying out their duties of checking the setting out, inspecting and measuring the Works. The Concessionaire shall provide staff men, office attendants and labourers, as may be needed, from time to time by the Executing Agency.

The Concessionaire shall provide for the Executing Agency and his staff such protective clothing, safety helmets and rubber boots of suitable sizes, hand lamps and the like, as may reasonably be required by them. These articles shall remain the property of the Concessionaire. No separate payment shall be made on this account.

Section G2
Materials and workmanship

Section G2: Materials and Workmanship

1. Introduction

This part of the Specification sets out the general standards of materials to be supplied and the workmanship required to be ensured by the Concessionaire. All components parts of the Works shall, unless otherwise specified, comply with the provisions of this part or be subject to the approval of the Executing Agency. Particular attention shall be paid to a neat orderly well-arranged installation carried out in a methodical competent manner.

2. Reference Specifications and Standards

Where reference is made in the Specification to a British Standard Specification (hereinafter abbreviated to 'B.S') issued by the British Standards Institution of 2, Park street, London W.I., or to an Indian Standard Specification (I.S.) issued by the Bureau of Indian Standards, (earlier known as Indian Standard Institution), Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002 or American Society for testing and materials (ASTM) issued by ASTM 1916 Race Street, Philadelphia, P.A., 19103, U.S.A. or American National Standards Institute (ANSI) issued by ANSI 1430, Broadway, New York, N.Y., 10018, U.S.A. or Japanese Industrial Standards (JIS) issued by Japanese Standards Association, 4-1-24, Akasaka, Minato-Ku, Tokyo 107, Japan or to any other equivalent Standard it shall be to the latest revision of that Standard at the Tender opening date.

The Concessionaire may propose at no extra cost to the Executing Agency, the use of any relevant authoritative internationally recognised Reference Standard, including Indian Standard (IS).

All details, materials and equipment supplied and workmanship performed shall comply with these Standards. If Bidder offers equipment to other Standards, the equipment/material should be equal or superior to those specified and full details of the difference shall be supplied.

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 recognised bodies are referred to in this Specification. Such specifications shall be defined

and referred to hereinafter as Standard Specification. In referring to the Standard Specifications the following abbreviations are used:

IS	:	Indian Standard
ANSI	:	American National Standards Institute
API	:	American Petroleum Institute
ASME	:	American Society of Mechanical Engineers
ASTM	:	American Society of Testing and Materials
AWS	:	American Welding Society
AWWA	:	American Water Works Association
ISO	:	International Organisation for Standardisation
JIS	:	Japanese Industrial Standard
DIN	:	Deutsches Institute for Normung
BS	:	British Standards
JWWA	:	Japanese Water Works Association
IEC	:	International Electro technical Commission
IEE	:	Institution of Electrical Engineers
IEEE	:	Institution of Electrical and Electronic Engineers
NEMA	:	National Electrical Manufacturer's Association
AGMA	:	American Gear Manufacturer's Association

3. Materials - General

All materials incorporated in the Works shall be the most suitable for the duty concerned and shall be new and of reputed make/approved quality, free from imperfections and selected for long life and minimum maintenance. Non-destructive tests, if called for in the Specification, shall be carried out. All submerged moving parts of the Plant, or shafts and spindles, etc. of the submerged moving parts or the faces etc. in contact with them shall be of corrosion resistant materials. All parts in direct contact with various chemicals, shall be completely resistant to corrosion, or abrasion by these chemicals, and shall maintain their properties without ageing due to the passage of time, exposure to light or any other cause.

4. Workmanship - General

Workmanship and general finish shall be of first class quality and in accordance with best workshop practice.

All similar items of the Plant and their component parts shall be interchangeable. Spare parts shall be manufactured from the same materials as the originals and shall fit all similar items. Machining fits on renewable parts shall be accurate and to specified tolerances so that replacements can be readily installed. All equipment shall operate without excessive vibration and with minimum noise. All revolving parts shall be truly balanced both statically and dynamically so that when running at normal speeds at any load upto the maximum there shall be no vibration due to lack of balance.

All parts, which can be worn or damaged by dust, shall be totally enclosed in dust proof housings. All materials incorporated in the Works shall be the most suitable for the duty concerned, free from imperfections and selected for long life and minimum maintenance. All necessary accessories required for satisfactory and safe operation of the Plant shall be supplied by the Concessionaire unless it is specifically excluded from his scope. Suitable provision by means of eyebolts or other means are to be provided to facilitate handling of all items that are too heavy or bulky for lifting and carrying by two men.

If, after installation, the operation or use of the materials or equipment furnished by the Concessionaire proves to be unsatisfactory, the Executing Agency shall have the right to operate or use such materials or equipment until correction of defects, errors or omissions, by repair or by partial or complete replacement, can be made without interfering with the Plant operations.

5. Welding

Welding shall comply with the latest revision of the BS 5135 Code.

Welders shall be qualified in accordance with the requirement of the appropriate section of BS 4871. The Executing Agency shall have the right to call for further qualifications from time to time from any welder who in the opinion of the Engineer does not produce weld in accordance with the qualifications. Each welder shall be assigned a number and letter. Each weldments shall clearly be identified as to its welder marking the welder's Code adjacent to the welds. A record chart shall be maintained for each welder showing the procedures for which he has qualified, the date of such qualification, the type of defects produced and their frequency. The Executing Agency shall disqualify the welder whose Work requires disproportionate repairs.

Inspection and quality of surveillance shall not be limited to the examination of finished welds. The techniques employed shall be based on methods which are known to produce good results and which have been verified at Site by actual demonstration.

Haphazard striking of the electrodes for establishing an arc shall not be permitted. The arc shall be struck either on the joint or on a starting tag, The starting tag shall be of the same material or a material compatible with the base metal base being welded. In case of any inadvertent strike on place other than the welding, the area affected shall be ground flushed and examined by liquid penetration method.

Generally, a stringer bead technique shall be used with a slight oscillation if necessary to avoid slag and to minimise the number of beads needed to fill exceed 3 times the wire diameter. Vertical welds shall be made in upward direction. For all pipes above 300 mm dia, welding shall be done wherever possible, by two (2) welders working simultaneously along both sides of the pipe.

The root pass shall have less than 1.5 mm internal reinforcement.

Final welds shall be suitable for appropriate fabrication of the non-destructive examination of the weld. If grinding is necessary, the weld shall be blended into the parent metal without gouging or thinning of the parent metal in any way. Uneven and excessive grinding may be a cause for rejection. Fillet weld shall preferably be convex and free from undercutting and overlap at the toe of weld. Convexity and concavity shall not exceed 1.5 mm. The leg lengths shall not exceed the specified size by more than 1.5 mm.

All attachments such as lugs, brackets and other non-pressure parts shall also be done by qualified welders in accordance with the design details and materials specifications. Temporary attachments shall be removed in a manner that will not damage the parent metal. Area of temporary attachments shall be dressed smooth and examined by ultrasonic or liquid penetration methods.

All tack welds shall be made using qualified procedure and welders, the number of size of tack welds shall be kept as small as to consist of adequate strength and joint alignments. All tack welds shall be examined visually for defects and if found defective shall be completely removed. As welding proceeds, tack welds shall be either removed completely or shall be properly prepared by grinding or filling their starting ends so that they may be

satisfactorily incorporated in the welds. Unacceptable defects shall be removed by grinding machine or chipping or gouging. Flame gouging may be permitted provided gouged surfaces are ground at least by 1.0 mm below the deepest indentation.

All weld repairs shall be carried out using the approved welding procedures and welders. Re-welded areas shall be re-examined by the methods specified for the original welds and repair procedures shall be duly qualified by the Executing Agency's Representative.

6. Pre-heating and Post-heating Treatment

Pre-heating and post heating treatment shall conform to the relevant application Codes. Pre-heating not exceeding 121 deg. C for all carbon steel construction above 25 mm thickness would be mandatory. Such pre-heating would be maintained during flame cutting, flame or arc gouging, welding and repairs and may be done by gas heating by gas torches/gas rings with neutral flame. The temperature shall be checked by temperature indicating crayons. However, such pre-heating will not be necessary for welds less than 6 mm size.

7. Electrodes

All electrodes shall be stored in their original sealed containers under dry conditions. Electrodes shall remain identified until consumed. All electrodes shall be dried before use. Drying ovens shall be provided in Work areas for drying purposes. Electrodes withdrawn from oven shall be promptly used and excess unused electrodes shall be promptly returned to oven.

8. Examination / NDT / Radiography

The various stages of examination and types shall be as stipulated in the respective fabrication Codes subject to the Executing Agency's approval.

9. Stainless Steel welding

All welding consumable such as electrodes, filler weirs, argon gas for shielding and purging shall be of high quality and the proposed brand shall be furnished for approval of the Executing Agency. Weld deposits shall have similar or higher physical properties and similar chemical composition to the members joined.

All electrodes shall be purchased in sealed containers only and stored in their packing intact. The packets opened shall be consumed as early as possible. The electrodes removed from the containers shall be kept in holding ovens at temperatures recommended by electrode manufacturer. Special care shall be taken in avoiding mixing of electrodes in the oven. The electrodes and filling wires shall be free from rust, oil, grease, earth and other foreign matter.

Argon gas with purity 99.5% shall be used for shielding and purging. The purity of gas shall be certified by the gas manufacturers.

Non-destructive examination of the welds shall be carried out to ensure quality of weld.

The electric current for welding shall be direct current, straight polarity (electrode negative). The welding current shall be kept minimum possible to ensure minimum heat affected zone in the parent material. Other side of the weld joint shall be periodically flushed with argon gas.

10. Castings

Cast iron shall be of standard grey close-grained quality. The structure of the castings shall be homogeneous and free from non-metallic inclusions and other injurious defects. All surfaces of castings which are not machined shall be smooth and shall be carefully fettled to remove all foundry irregularities.

Minor defects in depth not exceeding 12.5 percent of total metal thickness and which will not ultimately affect the strength and serviceability of the casting may be repaired by approved welding techniques. The Executing Agency shall be notified of large defects and no repair welding of such defects shall be carried out without prior approval of the Executing Agency. If the removal of metal for repair should reduce the stress resisting cross section of the casting by more than 25 percent, or to such extent that the computed stress in the remaining metal exceeds the allowable stress by more than 25 percent, then casting shall be rejected. Test coupons cast simultaneously with the main castings shall be identified to check physical, chemical analysis of casting. Major defects on casting are not acceptable. Castings repaired by welding for minor defects shall be stress-relieved after such welding. Non-destructive tests as directed by the Executing Agency will be required for any casting containing defects whose extent cannot otherwise be judged, or to determine where repair welds have been properly made.

11. Forging

All major stress-bearing forging shall be made to a Standard Specification. Forging shall be subjected to magnetic particle testing or dye penetration test at the areas of fillets and change in section. The testing shall be conducted after rough machining (10 microns). Any defect which will not machine out during the final machining, will be gouged out fully, inspected by dye penetration or magnetic particle inspection to ensure that the defect is fully removed and repaired using an approved repair procedure. Any indication, which proves to penetrate deeper than 2.5% of the finished thickness of the component, shall be reported to the Executing Agency giving the details like location, length, width and depth. For the magnetic particle inspection, the choice of wet or dry particles shall be at the Concessionaire's discretion.

All forging shall be demagnetised after test and shall be heat treated for the relief of residual stresses.

12. Design life

The Works as a whole shall be new, of sound workmanship, robustly designed for a long reliable operating life and shall be capable of 24 hours per day continuous operation for prolonged period in the climatic and working conditions prevailing at the Site, and with the minimum of maintenance. Particular attention shall be given to temperature changes, the stability of paint finish for high temperatures, the rating of engines, electrical machinery, thermal overload services, cooling systems and the choice of lubricants for possible high and prolonged operating temperatures. The Concessionaire shall be called upon to demonstrate this for any component part either by service records, or evidence of similar equipment already installed elsewhere or relevant type tests. Routine maintenance and repair shall as far as possible not require the services of highly skilled personnel. All equipment covered by this specification shall be designed to provide a minimum design service life of 20 years.

The plant shall be designed to provide easy access to and replacement of components parts, which are subject to wear, without the need to replace whole units. No parts in contact with water shall have a life from new to replacement or repair of less than five years. Where major dismantling is unavoidable to replace a part, the life of such part shall not be less than ten years.

Design features shall include the protection of Plant against damage caused by vermin, dirt, dust and dampness and to reduce risk of fire. Plant shall operate without undue vibration, and parts shall be designed to withstand the maximum stresses under the most severe condition of normal service. Materials shall have a high resistance to change in their properties due to the passage of time, exposure to light, temperature and any other cause, which may have a detrimental effect upon the performance of life of the Works.

Plant located outside lockable areas/building shall have additional features to prevent unauthorised operation.

13. Lubrication

A complete schedule of recommended oils and other lubricants shall be furnished by the Concessionaire. The number of different types of lubricants shall be kept to a minimum. The schedule and the name of the supplier of the lubricants shall be submitted to the Executing Agency.

Concessionaire shall indicate indigenously available equivalent lubricants, with complete specification, to enable the Executing Agency to arrange for regular supply.

Where lubrication is effected by means of grease, preference shall be given to a pressure system, which does not require frequent adjustment or recharging. Frequent, for this purpose, means more than once in a month and grease systems having shorter periods between greasing should be avoided. Where necessary for accessibility grease nipples shall be placed at the end of the extension piping, and, when a number of such points can be grouped conveniently, the nipples shall be brought to a battery plate mounted in a convenient position. All grease nipples shall be of the same size and type for every part of the Plant. Arrangements shall be provided to prevent bearings being overfilled with either grease or oil.

Where more than one special grease is required, a grease gun for each special type shall be supplied and permanently labelled.

Oil containers shall be supplied complete with oil level indicators of the sight glass type, or where this is not practicable, with dipsticks. The indicators shall show the level at all temperatures likely to be experienced in service. The levels shall be clearly visible in the sight glass type from the normal access floor to the particular item of Plant and they shall

be easily dismantled for cleaning. All sight glasses shall be firmly held and enclosed in metal protection in such manner that they cannot be accidentally dislodged.

All lubrication systems shall be designed so as not to cause a fire or pollution hazard and particular care shall be taken to prevent leakage of lubricants and to avoid leaking lubricants coming into contact with any electrical equipment, heated surfaces or any other potential source of fire.

14. Name Plate

Each item of the Plant shall have permanently attached to it in a conspicuous position, a nameplate and rating plate. Upon these shall be engraved or stamped, the manufacturer's name, type and serial number of Plant, details of the loading any duty at which the item of Plant has been designed to operate, and such diagrams as may be required by the Executing Agency. All indicating and operating devices shall have securely attached to them or marked upon them designations as to their function and proper manner of use.

Nameplates, rating plates and labels shall be of a non flame propagating materials, either non-hygroscopic or transparent plastic with engraved lettering of a contrasting colour. Fixing shall be by means of non-corrosive screws; drive rivets or adhesives shall not be used.

Warning labels shall be provided where necessary to warn of dangerous circumstances or substances. Inscriptions or graphic symbols shall be black on a yellow background.

Instruction labels shall be provided where safety procedures such as wearing of protective clothing are essential to protect personnel from hazardous or potentially hazardous conditions. These labels shall have inscriptions or graphic symbols in white on a blue background.

15. Nuts, Bolts, Studs and Washers

Nuts, bolts, studs and washers for incorporation in the Plant shall conform to the requirements of the appropriate standard. Nuts and bolts shall be of the best quality of specified grade, machined on the shank and under the head and nut. Bolts shall be of one piece construction and shall be of sufficient length so that only one thread shall show through the nut in the fully tightened condition.

Fitted bolts shall be a light driving fit in the reamed holes they occupy, shall have the screwed portion of such a diameter that it will not be damaged in driving and shall be marked in a conspicuous position to ensure correct assembly at Site.

Washers, locking devices & anti-vibration arrangements shall be provided where necessary. Jointing hardware for the entire Plant shall be provided with sufficient spares to cater for site losses.

Where bolts pass through structural members taper washers shall be fitted, where necessary, to ensure that no bending stress is caused in the bolt. Where there is a risk of corrosion, bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. All bolts, nuts and washers which are subject to frequent adjustment or removal in the course of maintenance and repair shall be made of nickel-bearing stainless steel.

The Concessionaire shall supply all holding down, alignment and levelling bolts complete with anchorage, nuts, washers and packaging's required to attach the Plant to its foundations, and all bedplates, frames and other structural parts necessary to spread the loads transmitted by the Plant to concrete foundations without exceeding the design stresses.

16. Allowance for Wastage

The Concessionaire shall supply reasonable excess quantities to cover wastages of those consumable, which will be normally subject to waste during erection, commissioning and setting to Work.

17. Painting - General

The Concessionaire shall be responsible for the cleaning, preparation for painting and priming or otherwise protecting, as specified, all parts of the plant at the place of manufacture prior to packing.

Parts may be cleaned but surface defects may not be filled in before testing at the manufacturer's works. Parts subject to hydraulic test shall be tested before any surface treatment. After test, all surfaces shall be thoroughly cleaned and dried out, if necessary by washing with an approved dewatering fluid prior to surface treatment. Except where the

specification provides to the contrary all painting materials shall be applied in strict accordance with the paint manufacturer's instructions.

All protective coatings shall be suitable for use in warm humid climates. All primers, under coats and finishes shall be applied by brush or airless spray, except where otherwise specified. Consecutive coats shall be in distinct but appropriate shades. All paints shall be supplied from the store to the painters, ready for application, and addition of thinners or any other material shall be prohibited.

18. Painting at Place of Manufacture

Steel and cast iron parts shall be sand blasted to near white cleaning before painting. Edges, sharp curves etc. shall be ground to a curve before sand blasting. A primer coat of zinc rich epoxy resin-based coating with atleast a 50 microns dry film thickness is to be provided. In addition, the parts are to be provided with adequate number of coats coal tar epoxy polyamine coating to dry the thickness of 150 microns including primer coating.

19. Painting at Site

Immediately on arrival at the site, all items of plant shall be examined for damage to the paint coat applied at the manufacturer's works, and any damaged portions shall be cleaned down to the bare metal, all rust removed and the paint coat made good with similar paint.

Before final painting is commenced, the Concessionaire shall submit for the approval of Executing Agency's Representative, full details of the paints he proposes to use together with colour charts for the gloss finishes. After erection, such items, which are not finish painted, shall be done so and, items that have been finish painted at the manufacturer's works shall be touched up for any damaged paintwork.

The dry paint film thickness shall be measured by Electrometer or other instruments approved by the Executing Agency. In order to obtain the dry film thickness specified, the Concessionaires shall ensure that the coverage rate given by the paint manufacturer will enable the thickness to be obtained. Painted fabricated steel work which is to be stored prior to erection shall be kept clear of the ground and shall be laid out or stacked in an orderly manner that will ensure that no water or dirt can accumulate on the surface. Suitable packagings shall be laid between the stacked materials. Where cover is provided, it shall be ventilated.

20. Noise and Vibration

The Concessionaire shall provide a quiet installation. All items of Plant and equipment shall be carefully chosen with a view to minimising sound levels.

The Concessionaire shall provide and fix all material for the prevention of transmission of noise and vibration through the structure. Where appropriate Plant shall be mounted on resilient mountings in such a manner that the Plant foundations are isolated from the floor or structure. In addition, all rotating Plant shall be statically and dynamically balanced. Mechanical vibration shall be eliminated by the use of anti-vibration mountings and flexible connections to ensure an isolation efficiency of 95% from the building structure.

21. Galvanising

Wherever galvanising has been specified, the hot dip process shall be used. The galvanised coating shall be of uniform thickness. Weight of zinc coatings for various applications shall not be less than those indicated below:

(a) Fabricated steel

Thickness less than 2 mm	
but not less than 1.2 mm	340 gms/sq.m
Thickness 2 mm and above	460 gms/sq.m

(b) Fasteners

Up to nominal size M10	270 gms/sq.m
Over M10	300 gms/sq.m

Galvanising shall be carried out after all drilling, punching, cutting, bending and welding operations have been carried out. Burrs shall be removed before galvanizing. Any site modification of galvanised parts should be covered well by zinc rich primer and aluminium paint.

22. Support for pipework & Valves

All necessary supports, saddles, slings, fixing bolts and foundation bolts shall be supplied to support the pipe work. Valve and other facilities mounted in the pipe work shall be supported independent of the pipes to which they connect.

Section G3

General Civil Specifications

Section G3: General civil specifications

Sl. No.	Sub-Section	Title
1.	C1	Earthwork in grading, excavation and backfilling
2.	C2	Technical specifications for properties, storage and handling of common building materials.
3.	C3	Technical specifications for Cast-in-situ concrete & allied works
4.	C4	Technical specifications for masonry & allied works
5.	C5	Technical specifications for plastering & allied works
6.	C6	Technical specifications for flooring and other allied works
7.	C7	Technical specifications for roof water proofing insulation and allied works
8.	C8	Technical specifications for painting, white washing etc.
9.	C9	Technical specifications for fabrication and erection of structural steel works
		Annexure B - Inspection, testing and quality checklist along with addendum.
10.	C10	Technical specifications for Glass and Glazing
11.	C11	Technical specifications for MS doors, windows, ventilators and louvers
12.	C12	Technical specifications for rolling steel shutters / grills
13.	WS1	Technical specifications for laying of pipes and fittings / specials
14.	WS2	Technical specifications for laying and jointing of cast iron pipes and fittings (Cast iron).

Sub-section - C1
**Technical specification for excavation and
backfilling**

Sub Section - C1

Technical specification for excavation and backfilling

Contents

<u>Clause no.</u>	<u>Description</u>	<u>Page nos.</u>
1.1	Scope	51
1.2	General requirements.....	51
1.3	Codes and standards.....	52
1.4	Excavation	53
1.5	Filling.....	55
1.6	Sampling testing and quality control	58

Sub Section - C1: Technical specification for excavation and backfilling

1.1 Scope

This section of the specification covers the technical requirements for excavation and filling for industrial plots in & around structures, buildings, pipes, foundations, trenches, pits, drains, channels, cable ducts, underground facilities & similar works. It also covers filling areas and plinths with selected materials, conveyance and disposal of surplus soils and/or stacking them properly as directed by the Engineer.

The Concessionaire shall be fully responsible for getting necessary permission from government authorities to excavate soil from the sources mentioned in the tender and should pay necessary seignorage charges to government authorities as per rules.

The Concessionaire shall be fully responsible for proper setting out of works, profiling in excavation, stacking, etc., taking adequate safety measures etc. The Concessionaire shall carry out all works meant within the intent of this specification even if not explicitly mentioned herein. All work shall be executed to the satisfaction of the Engineer.

Existing trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, drains, sewers, or other surface or subsurface systems/drains/facilities within or adjacent to the works being carried out which are not to be disturbed, shall be protected from damage by the Concessionaire shall provide and install suitable safeguards approved by the Engineer for this purpose.

During excavation, the Concessionaire shall take all necessary precautions against soil erosion, water & environmental pollution and where required to undertake additional works to achieve this objective. Before start of operations, the Concessionaire shall submit to the Engineer for approval, his work plan and the procedure he intends to follow for disposal of waste materials etc. and the schedule for carrying out temporary and permanent control works. However, the approval of the Engineer to such plans and procedures shall not absolve the Concessionaire of his responsibility for safe and sound work.

1.2 General requirements

The Concessionaire shall make his own surveying arrangements for locating the coordinates and positions of all work and establishing the reduced levels (RL's) at these locations based on two reference grid lines and one benchmark, which will be furnished by the Executing Agency. The Concessionaire has to provide at site all the required survey instruments, along with qualified surveyors, to the satisfaction of the Engineer so that the work can be carried out accurately and according to the specification and drawings.

The Concessionaire shall furnish all skilled and unskilled labour, plant, tools, tackle, equipment, men, materials required for complete execution of the work in accordance with the drawings and as described herein and/or as directed by the Engineer.

The Concessionaire shall control the grade in the vicinity of all excavations so that the surface of the ground will be properly sloped or dyed to prevent surface water from running into the excavated areas during construction.

All materials obtained from excavation shall remain Executing Agency's property. All salvaged materials of archeological importance or of value (in the opinion of the Engineer) shall be segregated from the other materials and both stacked separately and in regular manner at locations indicated by the Engineer.

Excavation shall include removal of trees including roots & organic remains, vegetation, grass, bushes, shrubs, plants, poles, fences, etc. that are in the area to be excavated as well as beyond the excavation line so as to ensure safety of the excavated side slopes, and of men and equipment operating in the area. Before start of excavation work, joint measurements of ground level shall be taken after cleaning all grass, vegetation, etc.

Excavation shall include the removal of all materials required to execute the work properly and shall be made with sufficient clearance as decided by the Engineer to permit the placing and setting of forms, inspection and completion of all works to the satisfaction of the Engineer for which the excavation was done.

Wherever reference is made to 'drawings' in this specification it shall mean the latest issue of the approved drawings.

1.3 Codes and standards

All standards, specifications, acts, and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.

In case of conflict between this specification and those (IS standards, codes etc.) referred to herein (in para 3.3) the former shall prevail.

Some of the relevant Indian standards, Acts and Codes are referred to here below:

- IS:383 - Specification for coarse and fine aggregates from natural sources for concrete.
- IS:2720 - (Part - II, IV to VIII, Methods of tests for soils - determination of water XIV, XXI, XXIII, XXIV content etc. XXVII to XXIX, XL)
- IS:3764 - Safety code for excavation work
- IS:4081 - Safety code for blasting and related drilling operations
- IS:4701 - Code of Practice for earth work on canals
- IS:9759 - Guide lines for Dewatering during construction.
- IS:10379 - Code of practice for field control of moisture and compaction of soils for embankment and sub-grade.
- IS:3812 - Pulverized fuel ash - specification part 2 for use as admixture in cement mortar and concrete

1.4 Excavation

Excavation in all types of soils, soft and disintegrated rock (ordinary rock), and hard rock shall be done up to the required level. Excavation shall also include breaking of existing concrete RCC, Masonry work, tar and bitumen surfaces, and paving works etc. In case blasting is required, the same shall be subject to the approval of Engineer. Sides and bottoms of excavation shall be cut sharp and true to line and level. Undercutting shall not be permitted. When machines are used for excavation, the last 300 mm before reaching the required level shall be excavated manually or by such equipment that soil at the required final level will be left in its natural condition. Suitability of strata (at the bottom of excavations) for laying the foundation thereon shall be determined by the Engineer.

Excavation for foundations shall be to the bottom of lean concrete and as shown on drawings or as directed by the Engineer. The bottom of all excavations shall be trimmed to required levels and when excavation is carried below such levels, by error, it shall be brought back to specified level by filling with concrete of nominal mix 1:3:6/1:4:8 (cement

& Fly ash (20% replacement ratio of cement with fly ash): coarse sand : 20 mm down aggregates) as directed by the Engineer.

The Concessionaire shall ascertain for himself the nature of materials to be excavated and the difficulties, if any, likely to be encountered in executing this work. Cofferdams, Sheet piling, shoring, bracing, maintaining suitable slopes, draining etc. shall be provided and installed by the Concessionaire, to the satisfaction of the Engineer.

All excavation for installation of underground facilities, such as piping, sewer lines, drain lines, etc. shall be open cuts. For deep and huge excavations and in other excavations, if required by the Engineer, the Concessionaire shall submit for Project Engineer's approval showing the methodology to be adopted for excavation in order to maintain the stability of side slopes, means for ensuring safety of existing facilities nearby, dewatering as required etc. However, the Concessionaire shall be fully responsible for the scheme irrespective of any approvals granted. Benching shall be provided for deeper excavation wherever required.

When excavation requires bracing, sheet piling or shoring etc., the Concessionaire shall submit drawings to the Engineer, showing arrangements and details of proposed installation. The Concessionaire shall also furnish all supporting calculations as called for and shall not proceed until he has received written approval from the Engineer. However, the responsibility for adequacy of such bracing, sheet piling, shoring etc. will rest with the Concessionaire, irrespective of any approval of the Engineer. All precautions shall be taken while excavations near existing structures are to be carried out till the backfilling is completed.

The Concessionaire shall have to constantly pump out any water collected in excavated pits and other areas due to rain water, ground water, springs etc. and maintain dry working conditions at all times until the excavation, placement of reinforcement, sheet piling, concreting, backfilling is completed. The Concessionaire shall remove all slush/muck from the excavated areas to keep the work area dry. Sludge pumps, if required, shall be employed by the Concessionaire for this purpose.

The Concessionaire shall remove all materials arising from excavations from the vicinity of the work either for direct filling, stacking and subsequent filling or for ultimate disposal as directed by the Engineer. In no case shall the excavated soil be stacked within a distance

of 1.5m from the edge of excavation or one third the depth of excavation whichever is more. Material to be used for filling shall be kept separately as directed by the Engineer.

1.5 Filling

1.5.1 Materials

- a) Materials to be used for filling purposes shall be stone, sand or other inorganic materials and they shall be clean and free from shingle, salts, organic, large roots and excessive amount of sod. Lumps concrete or any other foreign substances which could harm or impair the strength of the substructure in any manner. All clods shall be suitably broken to small pieces. When the material is mostly rock boulders, these shall be broken into pieces not larger than 150 mm size. Sand used for filling shall be clean, medium grained and free from impurities. Fines less than 5 microns shall not be more than 20%. In any case, the materials to be used for filling purposes shall have the prior written approval of the Engineer.
- b) If excavated materials are to be used for filling, then the Concessionaire shall select the materials from the stockpile, load and transport this material and execute the filling. This shall include excavation of earth which may become hard due to laying in stack yard for a long period of time.
- c) In case the materials have to be brought from pits/quarries, then it shall be the Concessionaire's responsibility for identification of such quarry areas, obtaining approval for their use from concerned authorities, excavation/quarrying, loading and carriage of such material, unloading and filling at specified locations. The Concessionaire shall pay any fees, royalties etc. that may have to be paid for utilization of borrow areas.

1.5.2 Filling procedure

- a) After completion of foundation, footings, walls and other construction below the elevation of the final grades, and prior to filling, all temporary shoring, timber, etc. shall be sequentially removed and the excavation cleaned of all trash, debris and perishable materials. Filling shall begin only with the written approval of the Engineer. Also, areas identified for filling shall be cleared of all soft pockets,

vegetation, bushes, slush etc. In case of plinth and similar filling the ground shall be dressed and consolidated by ramming and light rolling.

- b) Fill materials shall not be dropped directly upon or against any structure or facility where there is danger of displacement or damage. Filling shall be started after the concrete / masonry has fully set and shall be carried out in such manner so as not to cause any undue lateral thrust on any part of the structure.
- c) All space between foundation (concrete or masonry) and the sides of excavation shall be filled to the original surface after making allowance for settlement. Fill shall be placed in horizontal layers not exceeding 200 mm loose thickness. Each layer shall be watered and compacted with proper moisture content and with such equipment as may be required to obtain a compaction/density as specified. Trucks or heavy equipment for depositing or compacting fill shall not be used within 1.5 metres of building walls, piers or other facilities which may be damaged by their weight or operations. The methods of compaction shall be subject to the approval of the Engineer. Pushing of earth for filling shall not be adopted under any circumstances.
- d) Fill adjacent to pipes shall be free of stones, concrete, etc. and shall be hand placed and compacted uniformly on both sides of the pipe and where practicable up to a minimum depth of 300 mm over the top of pipes. While tamping around the pipes, care should be taken to avoid unequal pressure.
- e) Filling shall be accurately finished to line, slope, cross section and grade as shown on the drawings. Finished surface shall be free of irregularities and depressions and shall be within 20 mm of the specified level.
- f) Where filling with stone from excavated materials is required, as per design and functional requirements, it shall be from broken pieces of boulders. At first a 75mm thick cushion of selected earth shall be laid over which the 200 mm thick graded stones shall be laid in loose layers of 200 mm and then the interstices filled with properly graded fine materials consisting of selected earth brought from borrow areas. Each layer shall be watered and compacted to the required density as per design and functional requirements before the next layer is laid. However, no cushion shall be required where filling is over non-rocky surface.

- g) Where clean stone fill is required as per design and functional requirements it shall consist of clean selected stone metal of 40 mm nominal size. It shall be laid in layers not exceeding 150 mm (loose) and lightly tamped before the next layer is laid. No compaction shall be required for this type of stone filling.

1.5.3 Compaction

- a) Where compaction of 90% Standard Proctor Density is called for, such compaction shall be by mechanical means but the Concessionaire may be permitted to adopt manual means only if the Engineer finds that the desired compaction is achievable in the field.
- b) Where compaction to 95% Standard Proctor Density is called for, it shall be by mechanical means only. Where access is possible, compaction shall be 12 tonne rollers smooth wheeled, sheep foot or wobbly wheeled and directed by the Engineer. A smaller weight roller may be permitted by the Engineer in special cases, but in any case not less than 10 passes of the roller will be accepted for each layer. Each layer shall be wetted or the material dried by aeration to a moisture content of 3-5% above the Optimum Moisture Content to be determined by Concessionaire. Each layer shall be watered, rammed and compacted to the density as specified in the Schedule of Quantities.
- c) For compacting each sand layer, water shall be sprayed over it to flood it and it shall be kept flooded for 24 hours to ensure maximum compaction. Vibro-compactors shall also be used if necessary to obtain the required degree of compaction. Any temporary works required to contain sand under flooded condition shall also be undertaken. The surface of the consolidated sand shall be dressed to required levels or slope.
- d) After the compacted fill has reached the desired level, the surface shall be flooded with water for 24 hours, allowed to dry and then rammed and consolidated to avoid any settlement, at a later date. The compacted surface shall be properly shaped, trimmed and consolidated to an even gradient or level. All soft spots shall be excavated, filled and consolidated.
- e) The degree of compaction of compacted fill in place will be subject to tests in accordance with relevant Indian Standards as desired by the Engineer. As the work progress, the Concessionaire shall provide the necessary facilities to make such tests.

If any test indicates that the compaction achieved is less than the required as per design and functional requirements degree of compaction, the Engineer may require all fill placed subsequent to the last successfully test to be removed and re-compacted by the Concessionaire. Compaction procedure shall be amended as necessary to obtain satisfactory results.

- f) When semi-compacted fill is required as per design and functional requirements by the Engineer, the Concessionaire shall fill up such areas with available earth from stockpiles or borrow pits or directly from excavation without special compaction except that obtained by moving trucks, etc.

1.6 Sampling testing and quality control

1.6.1 General

- a) The Concessionaire shall carry out all sampling and testing in accordance with the relevant Indian Standards and/or International Standards and shall conduct such tests as are called for by the Engineer. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Engineer. Tests shall be done in the field and at a laboratory approved by the Engineer and the Concessionaire shall submit to the Engineer, the test results in triplicate within three days after completion of a test. The Engineer may, at his discretion, waive some of the stipulations given below, for small and unimportant operations.
- b) Work found unsuitable for acceptance shall be removed and replaced by the Concessionaire. The work shall be redone as per specification requirement and to the satisfaction of the Engineer.
- c) Only as a very special case and that too in non-critical areas, the Engineer may accept filling work which is marginally unacceptable as per the criteria laid down. For such accepted work, payment shall be made at a reduced rate prorated to the compaction obtained against that stipulated.

1.6.2 Quality assurance programme

The Concessionaire shall submit and finalize a detailed field Quality Assurance Programme within 30 days from the date of award of the Contract according to the requirements of the specification. This shall include setting up of a testing laboratory, arrangement of testing apparatus / equipment, deployment of qualified/experienced manpower, preparation of format for record, Field Quality Plan, etc. On finalized field quality plan, the Executing Agency shall identify customer hold prints beyond which work shall not proceed without written approval from the Engineer. Frequency of sampling and testing including the methods for conducting the tests are given in Table - 1. The testing frequencies set forth are the desirable minimum and the Engineer shall have the full authority to carry out or call for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications.

1.6.3 Acceptance criteria

Following acceptance criteria shall be followed.

- a) All individual samples collected and tested should pass without any deviation when only one set of sample is tested.
- b) For re-test of any sample two additional samples shall be collected and tested, and both should pass without any deviation.
- c) Where a large number of samples are tested for a particular test than 9 samples out of every 10 consecutive samples tested shall meet the specification requirement.
- d) Tolerance on finished levels for important filling areas at approved intervals shall be + 20 mm. However, for an unimportant area, tolerance upto + 57 mm shall be acceptable at the discretion of the Engineer. However, these tolerances shall be applicable for localized areas only.

Table 1: Frequency of sampling and testing

Sl. No.	Nature of test/ characteristics	Methods of test	No. of samples & frequency of test	Remarks
I.	Suitability of fill materials			
(a)	Grain size analysis	IS:2720 (Part-IV)	One in every 2000 Cum. for each type and each source of fill	Test for and sand

Sl. No.	Nature of test/ characteristics	Methods of test	No. of samples & frequency of test	Remarks
			material subject to a minimum of	
(b)	Liquid limit and plastic limit	IS:2720 (Part-V)	two samples	Test for soil
(c)	Shrinkage limit	IS:2720 (Part-VI)	One in every 5000 cum. for each type	The frequency of Test shall be
(d)	Free swell index	IS:2720 (Part-XL)	And each source of fill materials.	increased depending on type of soil
(e)	Chemical Analysis	IS:2720		
	i. Organic matter	Part XXII	One in every 5000 Cum for each type and each source of	Test for sand and soil.
	ii. Calcium carbonate	Part XXIII	Fill materials.	
	iii. pH	Part XXVI		
	iv. Total soluble sulphate	Part XXVII		
II.	Standard proctor test	IS:2720 (Part VII)	One in every 2000 cum. for each type and each source of fill materials	Test for soil for determining optimum moisture content, Dry Density etc.
III.	Moisture content of fill before compaction.	IS:2720 (Part II)	-do-	Test for soil
IV.	Degree of compaction of fill		(i) For foundation filling, one for every ten foundations for each	Test for soil
(a)	Dry density by core cutter method	IS:2720 (Part XXIX)	Compacted layer. However, each layer for location of important and heavily loaded	
	or			

Sl. No.	Nature of test/ characteristics	Methods of test	No. of samples & frequency of test	Remarks
	Dry density in place by sand displacement method	IS:2720 (Part XXVIII)	Foundations resting on fill shall be tested.	
			(ii) For area filling one for every 1000 Sqm. Area for each compacted layer.	
(b)	Relative density index	IS:2720 (Part XIV)	-do- (i) & (ii)	Test for sand
(c)	Dry density by proctor needle penetration	Standard Practice	Random checks to be carried out for each compacted layer in addition to tests mentioned under IV (a) above.	Test for soil

Sub section - C2

**Technical specification for properties, storage and
handling of common building materials**

Sub Section - C2

Technical specification for properties, storage and handling of common building materials

Contents

<u>Clause no.</u>	<u>Description</u>	<u>Page nos.</u>
2.1	Scope	64
2.2	General requirements.....	64
2.3	Codes and standards.....	65
2.4	Burnt clay Bricks	67
2.5	Fly Ash Bricks.....	68
2.6	Stones.....	69
2.7	Lime	69
2.8	Cement and fly ash.....	70
2.9	Water.....	71
2.10	Aggregates	71
2.11	Sand	72
2.12	Reinforcement steel, structural steel (including embedded steel) and wire mesh	72
2.13	Storage and handling of materials	75
2.14	Testing	78

Sub Section - C2: Technical specification for properties, storage and handling of common building materials

2.1 Scope

The scope of this section of the specification is to specify the properties, storage and handling of common building materials namely, coarse aggregates, cement, water, sand masonry units, reinforcement and structural steel.

Properties of the materials in general have been discussed. Specific requirements of the materials have been stipulated separately under specification for relevant items of work.

2.2 General requirements

The work shall include, providing of all necessary plants and equipment, providing adequate engineering supervision and technical personnel, skilled and unskilled labour etc. as required to carry out the entire work as directed by the Engineer to his complete satisfaction.

All materials proposed for use in the work shall conform to the requirements laid down in this section, and also subject to the approval of the Engineer. After specific materials have been accepted, the source of supply of such materials shall not be changed without prior approval of the Engineer.

Approval of any material by the Engineer shall not relieve the Concessionaire of his responsibility, for the requisite quality and performance of the material used.

Any material considered to be sub-standard, or not upto satisfaction of the Engineer, shall not be used by the Concessionaire and shall be removed from the site immediately.

Representative samples shall be procured by the Concessionaire and submitted to the Engineer, for approval before bulk procurement. The representative samples shall be retained by the Engineer for future comparison and reference.

2.3 Codes and standards

In the event that state, city or other local governmental bodies have requirements more stringent than those set forth in this specification, the former shall govern.

All applicable standards, acts, specifications, codes of practice, hand books, referred to herein shall be the latest editions, including all official amendments and revisions. In case of discrepancy between this specification and those referred to herein, this specification shall govern.

Any special materials used, but not covered here, shall conform to relevant Indian Standards, if any, or as specified by the Engineer for any special purpose.

Some of the applicable Indian standards, codes are referred to here below:

- | | |
|---------|---|
| IS:226 | Specification for structural steel (standard quality). |
| IS:269 | Specification for ordinary Portland cement, 33 grade. |
| IS:383 | Specification for coarse and fine aggregates from natural sources for concrete. |
| IS:432 | Specification for mild steel and medium tensile steel bars and (Parts 1 & 2) hard-drawn steel wires for concrete reinforcement. |
| IS:455 | Specification for Portland slag cement. |
| IS:712 | Specification for building limes. |
| IS:1077 | Specification for common burnt clay building bricks. |
| IS:1077 | Specification for Burnt clay bricks/Fly ash bricks. |
| IS:1127 | Recommendations for dimensions and workmanship of natural building stones for masonry work. |
| IS:1129 | Recommendation for dressing of natural building stones. |

IS:1489	Specification for Portland pozzolana cement (Part-I) Fly ash based (Part-II) Calcined clay based
IS:1542	Specification of sand for plaster.
IS:1566	Specification hard-drawn steel wire fabric for concrete reinforcement.
IS:1597	Code of Practice for construction of stone masonry, rubble stone masonry.
IS:1786	Specification for high strength deformed bars for concrete reinforcement.
IS:2062	Specification for hot rolled medium and high tensile structural steel.
IS:2116	Specification for sand for masonry mortars.
IS:2386	Testing of aggregates for concrete. (Part I to VIII)
IS:3495	Methods of test of Burnt clay bricks/Fly ash bricks (Part-I to IV)
IS:4031	Methods of physical tests for hydraulic cement.
IS:4032	Methods of chemical analysis of hydraulic cement.
IS:4082	Recommendations on stacking and storage of construction materials at site.
IS:7969	Safety code for handling and storage of building materials.
IS:8112	High strength ordinary portland cement.
IS:8500	Medium and high strength structural steel.
IS:12269	43/53 grade ordinary Portland cement.
IS:12330	Sulphate resisting Portland cement.

IS:12600 Portland cement, low heat.

IS:12894 Fly Ash Lime Bricks - specification.

IS: 3812-2 Specification for pulverized fuel ash for use as admixture in cement mortar and concrete

2.4 Burnt clay Bricks

Burnt clay bricks, for general masonry work, shall conform to IS:1077 and for face brick work, shall conform to IS:2691. Fly ash lime bricks shall conform to IS:12894.

Bricks for general masonry work shall be table moulded/machine made, well burnt without being vitrified, of uniform size, shape, having sharp edges and cherry red colour. These shall be free from cracks, flaws or nodules of free lime and shall emit clear ringing sound (metallic sound) when struck. These shall not show any signs of efflorescence either when dry or subsequent to soaking in water. Fractured surface shall show uniform texture free from girts, lumps, holes etc.

Unless otherwise specified, minimum compressive strength shall correspond to class designation 75 as per IS: 107 with a minimum crushing strength of 75 kg/sq.cm. for general masonry work. However, for non-load bearing walls, bricks pavements, etc. bricks of class designation 50 shall only be used, wherever specified or shown on the drawings. Water absorption after 24 hours immersion shall not exceed 20% by weight for common bricks and 15% for face bricks.

On the basis of finish and dimensional tolerance, the bricks shall be classified as sub class A and B. Dimensional tolerance shall not exceed 3% and 8% of the size, of common bricks for sub-class A & B respectively and 3% for face bricks. All bricks shall have rectangular faces and sharp straight edges. Maximum permissible chip page for the face bricks shall be 6mm at the edges and 10mm for corners. The face bricks shall show no efflorescence after soaking in water and drying in the shade.

The size of the bricks used shall be either modular size as per IS:1077 or locally available conventional size as approved by the Engineer.

Each brick shall have the manufacturer's identification mark clearly marked on the frog. The colour and texture of face bricks shall be limited to the range of samples submitted. Any brick not found upto the satisfaction of the Engineer shall be removed immediately from site by the Concessionaire.

2.5 Fly Ash Bricks

Fly ash bricks (cement bonded) shall be locally made. Bricks shall have smooth rectangular faces with sharp and square corners. Bricks shall be hand or machine moulded and shall be made from the admixture of suitable good quality of fly ash, sand and cement as per the composition mentioned below:

o	Fly ash	:	50-60%
o	Sand	:	32-40%
o	Cement	:	8-12%

The fly ash bricks will be as per latest relevant IS code. The bricks will be of dimension as per standard clay brick, suitable for making 230 mm thick full brick wall, 115 mm thick half brick wall and 75 mm thick minor partition walls, as applicable, as per drawing/specification/BOQ. A maximum tolerance of (+/-) 2 mm shall be allowed as the manufacturing tolerance. The bricks shall have frog of 100 mm in length 40 mm in width and 10 to 20 mm deep of one of its flat sides.

The bricks when tested in accordance with the procedure laid down in IS 3495 (part 2): 1992 after immersion in cold water for 24 hrs. Water absorption shall be within 13-15% by weight. Similarly, the porosity of the fly ash bricks shall be within 12-20%. The bricks shall have a minimum crushing strength of 80 Kg/Sqcm.

Fly ash bricks, for general masonry work, shall conform to IS:2212-1991

Unless otherwise specified, minimum compressive strength shall correspond to class designation 80 as per IS: 107 with a minimum crushing strength of 80 kg/sq.cm. For general masonry work. However, for non-load bearing walls, bricks pavements, etc. bricks of class designation 50 shall only be used, wherever specified or shown on the drawings. Water absorption after 24 hours immersion shall not exceed 20% by weight for common bricks and 15% for face bricks.

On the basis of finish and dimensional tolerance, the bricks shall be classified as sub class A and B. Dimensional tolerance shall not exceed 3% and 8% of the size, of common bricks for sub-class A & B respectively. All bricks shall have rectangular faces and sharp straight edges. Maximum permissible chip page for the face bricks shall be 6 mm at the edges and 10 mm for corners. The face bricks shall show no efflorescence after soaking in water and drying in the shade.

The size of the bricks used shall be either modular size as per IS:1077 or locally available conventional size as approved by the Engineer.

Each brick shall have the manufacturer's identification mark clearly marked on the frog. The colour and texture of face bricks shall be limited to the range of samples submitted. Any brick not found upto the satisfaction of the Engineer shall be removed immediately from site by the Concessionaire.

2.6 Stones

All stones shall be from approved quarries. These shall be hard, tough, and durable, compact grained, uniform the texture and colour and free from decay, flaws, veins, cracks and sand holes. The surface of a freshly broken stone shall be bright, clean and sharp and shall show uniformity of texture, without loose grains and free from any dull, chalky or earthy appearance. Stone with round surface shall not be used.

Stones showing mottled colours shall not be used for face work. A stone shall not absorb more than 5% of its weight of water after 24 hours immersion. The type of stone shall be as specified or shown on drawings and/or as instructed by the Engineer. Stones used for masonry work shall conform to IS:1597 (Part – I) No soft stone shall be used for masonry or for filling purpose.

Any stone not found up to the satisfaction of Engineer shall be removed immediately from site by the Concessionaire.

2.7 Lime

Lime shall be stone lime and it shall conform to IS:712. Hydrated lime shall be mixed with water to form a putty. This shall be stored with reasonable care to prevent evaporation of water for at least 24 hours before use. Quick lime shall be slaked with enough water to

make a cream and then stored with reasonable care to prevent evaporation of water for at least seven days before use. Type of lime to be used for different purposes such as concreting, plastering, white washing etc. shall be according to the satisfaction made hereunder:

- Class – A** Eminently hydraulic lime used for structural purposes.
- Class – B** Semi-hydraulic lime used for masonry mortars, lime concrete and plaster undercoat
- Class – C** Fat lime used for finishing coat in plastering, white washing, composite mortars, etc. and with addition of pozzolanic materials for masonry mortar.
- Class – D** Magnesium/dolomite lime used for finishing coat in plastering, whitewashing, etc.
- Class – E** Kankar lime used for masonry mortar.
- Class – F** Siliceous dolomite lime used for undercoat and finishing coat of plaster

2.8 Cement and fly ash

Cement shall be ordinary Portland cement, 43/53 grade conforming to IS 8112/12269. The Engineer may permit the use of Portland pozzolana cement conforming to IS:1489 or Portland slag cement conforming to IS:455 or sulphate resistant cement conforming to IS 12330 as per the specific site condition. However, any lower grade of OPC, PPC and PSC should never be mixed with higher grade cement.

Fly ash is generated by burning of coal in coal fired power plants. It has the characteristic of pozzolonic additive to cement. Continuous research studies by various engineering research laboratories revealed its varied usefulness as an additive for enhancing the various qualities of concrete including its workability, strength and durability if handled and cared properly. Partial replacement of cement with fly ash in concrete save much of the energy required for production of OPC and also facilitates the economical disposal of millions of tons of fly ash.

At present most of the fly ash blended cements commercially produced in India has 18 to 25% fly ash by weight and addition of fly ash to this extent has a beneficial effect on the workability and economy of concrete. It has been found that in order to improve the other qualities of concrete like resistance of sulfate attack and thermal cracking, larger percentage of fly ash is to be used in concrete.

Indian standard specification No. 3812-2003, Specification for Pulverized Fuel Ash, Part 2: For Use as Admixture in Cement Mortar and Concrete [CED 2: Cement and Concrete] covers the extraction and the physical and chemical requirements of pulverized fuel ash for use as admixture in cement mortar and concrete. Fly ash confirming to this standard shall be used in place of cement.

The chemical, physical requirements and testing of fly ash shall be in accordance with the IS 3812-2003

2.9 Water

Water used for cement concrete, mortar, plaster, grout, curing, washing of coarse aggregate, soaking of bricks, etc. shall be clean and free from injurious amount of oil, acids, alkalis, organic matters or other harmful substances in such amounts that may impair the strength or durability of the structure. Potable water shall generally be considered satisfactory for all masonry and concrete works, including curing. The Concessionaire shall carry out necessary tests in advance to prove the suitability of the water proposed to be used. As a guide, the following concentrations represent the maximum permissible values:

- a. To neutralize 200 ml sample of water, it should not require more than 2ml of 0.1 normal NaOH.
- b. To neutralize 200 ml sample of water, it should not require more than 10ml of 0.1 normal HCL.
- c. Percentage of solids shall not exceed the following :

1.	Organic	0.02
2.	Inorganic	0.30
3.	Sulphates	0.05
4.	Chlorides	0.10
5.	Suspended matter	0.20

2.10 Aggregates

Aggregates mean both coarse and fine inert materials used in the preparation of concrete. Aggregates shall consist of natural sands, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, hard, strong, durable against weathering, of limited porosity and free from such quantities of deleterious

materials as may cause corrosion of reinforcement or may impair the strength and / or durability of the concrete. Total percentage of all deleterious materials, including coal, lignite, clay lumps, and materials finer than 75 microns, soft fragments and shale but excluding mica shall not exceed 5%. However, for crushed fine aggregate, total percentage of coal and lignite and clay lumps, shall be limited to 2%. Both coarse and fine aggregates shall conform to IS:383 for concrete, shotcreting etc. unless otherwise mentioned.

Sample of aggregates for mix design and determination of their suitability shall be sent to the laboratory well in advance in scheduled placing of concrete. Sampling, testing, and interpretation of test results shall be subject to the approval of the Engineer. Aggregates shall be properly graded.

2.11 Sand

Sand shall be hard, durable, clean and free from adherent coatings of organic matter and shall not contain clay balls or pellets. The sand shall be free from impurities such as iron pyrites, alkalis, salts, coal, mica, shale, or other laminated materials, in such forms or quantities as to affect adversely the hardening, strength, durability or appearance on mortar, plaster, etc. or to cause corrosion of any metal in contact with such mortar, plaster etc. In no case, the cumulative percentage of Impurities in sand shall be more than 5% by weight. All sand shall be properly graded. Unless otherwise directed by the Engineer, sand for masonry mortars shall conform to IS:2116 and sand for plaster shall conform to IS:1542. Sand, when used as fine aggregate, in concrete, shall conform to IS:383. For filling, medium grained sand (having fines less than 75 microns not exceeding 20%) shall be used.

2.12 Reinforcement steel, structural steel (including embedded steel) and wire mesh

Billet: (Primary steel)

A semi-finished product obtained by forging or rolling, usually square and not exceeding 125 x 125 mm in cross section with rounded corners and is intended for further processing into suitable finished product by forging or re-rolling.

Steel shall be manufactured by open hearth, electric, duplex, basic oxygen or a combination of these processes. In case any other process is employed by the manufacturer, prior approval of the purchaser should be obtained.

The ladle analysis of the material when analyzed in accordance with the various parts of IS: 228, shall be confirmed with IS: 8056-1976- Table 1 (Chemical composition).

Constituent	Percent
Carbon	0.45 to 0.80
Silicon	0.15 to 0.35
Manganese	0.40 to 1.00
Sulphur, Max	0.050
Phosphorus, Max	0.050

In case of continuous cast billets, the billet analysis shall be taken as ladle analysis.

Permissible variation in case of product analysis from the limits specified in IS: 8056-1976 clause-6.1 shall be as follows:

Constituent	Variation Over the Specified Maximum or Under the Minimum Limits in %
Carbon	0.03
Silicon	0.03
Manganese	0.04
Sulphur, Max	0.005
Phosphorus, Max	0.005

Note: Variations shall not be applicable both over and under the specified limits in several determinations in a heat.

Sampling

At least one ladle sample analysis shall be taken per cast.

If required, the samples for product analysis shall be prepared by forging or rolling down to 30-mm round section.

In case of wire rods the test piece size shall be the size of wire rods.

Drilling shall be taken from the sample representing two-thirds, half and one-third of height from bottom of the billet separately.

In case of continuous cast billets and billets produced from ingots of masses 3 tonnes and more, the sample may be taken from anywhere from the billets.

Freedom from defects

The billets and continuous cast billets shall be free from harmful defects, such as pipe, laminations, segregation, inclusions and cracks.

Subject to agreement between the purchaser and the manufacturer, the billets and continuous cast billets may be supplied with suitable surface dressing.

billets shall either be supplied free from harmful segregation, piping, cracks, inclusions, and blow-hole by appropriate top and bottom discard and dressing or supplied with suitable surface dressing only, without top and bottom discard if agreed to between the purchaser and the manufacturer, to ensure the requirements of freedom from defects specified in the relevant product specifications.

If agreed to between the purchaser and the manufacturer the following tests may be carried out from the samples prepared under IS: 8056-1976

Dimensions

The size and tolerance of billets shall be subject to agreement between the purchaser and the manufacturer. However, the nominal sizes of billets generally supplied as per guidance given in IS: 8056-1976

The preferred sizes of billets shall be 50, 63, 71, 80, 90, 100 and 125 mm.

The sizes other than those specified may be supplied by agreement between the purchaser and the manufacturer.

A tolerance of the billets shall be confirmed with IS: 8056-1976

The ends of ingots and billets shall be painted with a suitable colour code conforming to IS: 2049-1963.

Each ingot and billet shall be legibly stamped or painted with the cast number, grade and the name or trade-mark of the manufacturer.

The material may also be marked with the IS1 Certification Mark.

All steel for reinforcement shall be clean and free from loose mill scales, dust, loose rust, oil, grease, paint or other harmful matters, which may affect its bond with concrete. Mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement shall conform to grade-1 of IS:432 (Part-1). High strength deformed steel bars shall conform to grade Fe 415 of IS:1786. All steel bars shall be of tested quality. Actual grade and type steel, to be used, shall be as specified or shown on drawings.

Structural steel (including embedded steel) shall be straight, sound, free from twists, cracks, flaws, laminations and all other defects. Structural steel shall be of tested quality conforming to IS:226, IS:2062 or IS:8500. These shall be free from lamination defects. Grade and type of steel to be used shall be as specified.

Hard drawn steel wire fabric shall conform to IS:1566. Wire fabric shall be electrically cross welded.

2.13 Storage and handling of materials

Generally, all materials shall be stacked and stored by the Concessionaire as described in IS:4082 unless otherwise mentioned and in a manner affording convenient access for identification and inspection at all times. The storage area and arrangements shall be subject to the approval of the Engineer. Any material rendered unserviceable during the Concessionaire's custody, shall be replaced or repaired by the Concessionaire as determined by the Engineer.

All materials shall be as stored as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work. Any material, which has deteriorated or has been damaged or is otherwise considered defective by the Engineer, shall not be used and shall be removed and the cost thereof, shall be realized from the

Concessionaire's dues. The Concessionaire shall maintain up-to-date accounts of receipts, issue and balance (stock wise) of all materials.

Bricks shall not be dumped at site. These shall be stacked on dry firm ground in regular tiers even as they are unloaded to minimize breakage and defacement of bricks. Bricks of different class, selected for various categories of use in the work, shall be stacked separately. Each stack shall contain equal number of bricks, preferably not more than 3000.

Dressed stone for all facing, paving etc. shall be stored with special care to avoid defacement of faces and edges or damp and rust stains.

Lime shall be stored in weather-proof sheds. Lime which has been damaged by rain, moisture or air slaking, shall not be used. If the lime is supplied as hydrated lime, it shall be stored in the same manner as cement.

2.13.1 Cement and fly ash

- a. Consignments of cement shall be stored as received and shall be consumed in the order of their delivery. Cement held in storage for more than ninety days shall invariably be tested, and only if test results are satisfactory, the Engineer may consider permitting its use.
- b. Different consignments of different types of cement, i.e. OPC, PPC, PSC shall be stacked separately with clear identifiable stack number.
- c. The cement shall be stored in dry, leak proof and weather proof are closed sheds. Storage under tarpaulins shall not be permitted. The cement bags shall be stored well away from the walls and insulated from the floor, using
- d. Planks etc. to avoid contact with moisture. The cement shall be stacked in easily countable stacks and in a place of easy access so as to facilitate proper inspection and removal on a first in first out basis. Not more than 15 bags shall be stacked in any tier to prevent lumping up under pressure. However, in stacks more than 8 bags high, the cement bags shall be arranged alternately lengthwise and crosswise so as to tie the stacks together and minimize the danger of toppling over. The cement bags shall be gently kept to avoid leakage of cement from the bags. Substandard or partially set cement shall be immediately removed from the site as soon as it is detected.

- e. The Concessionaire shall make his own arrangements for the storage of adequate quantity of cement. Cement in bulk may be stored in bins or silos which will provide adequate protection against dampness, contamination, etc. The bins or silos, shall be cleaned periodically.
- f. Pulverized fuel ash (Fly ash) shall be stored in accordance with the recommendation given in IS 4082. Additionally, during bulk storage, the fly ash should be suitably covered to avoid getting airborne.
- g. Supplies of pulverized fuel ash (Fly ash) may be made in bulk in suitable quantities or in bags (jute, jute-laminated, multiple paper or polyethylene lined) bearing the net mass (may be 15 kg, 30 kg, 300 kg, 600 kg as agreed by the Concessionaire)
- h. Pulverized fuel ash in bulk storage for more than 6 months or in bags for more than-3 months after completion of tests, may be re-tested before use and standard. May be rejected, if it fails to conform to any requirements of this standard.
- i. Pulverized fuel ash may be rejected if it does not comply with any of the requirements stipulated in IS 3812 Part 2 of 2003

2.13.2 Coarse and fine aggregates/sand

- a. Coarse and fine aggregates shall be stacked separately. Contamination with foreign materials and earth during storage and while heaping the materials shall be avoided. Coarse aggregates shall be stacked in layers not exceeding 120 cm in height such that corning and segregation do not occur. Each layer shall cover the entire area of the stock pile before succeeding layers are placed. Segregated aggregates from stock-pile shall be rejected.
- b. Aggregates shall be stored on brick soling or an equivalent platform so that they do not come in contact with dirt, clay, grass or any other injurious substance, at any stage. For lifting aggregates from stock piles, rakers shall be used. Aggregates of different sizes shall be kept in separate and easily measurable stacks. If so desired by the Engineer, aggregates from different source shall be stacked separately with proper care to prevent intermixing.

2.13.3 Reinforcement and Structural Steel (including steel required for embedment)

- a. Reinforcement and structural steel (including steel required for embedment) shall be stored consignment wise and size wise, off the ground by at least 150mm and protected by the suitable cover, or as desired by the Engineer. The steel shall be protected from rusting, oil grese and distortions. The reinforcing steel shall be coated with cement wash before stacking to prevent scale and rust, in areas having accelerating corrosion effect like marine atmosphere. The stacks shall be easily measurable. Steel needed for immediate use only shall be removed from storage. Fabricated steel shall be carefully stored to prevent damage, distortion, corrosion and deterioration.
- b. Reinforcement shall be stored according to the diameter, grade and length in such a place as to permit easy approach for inspection and identification.
- c. The area shall be such that water does not accumulate and reinforcement does not get distorted or corroded. It shall not be stacked directly over ground or near any harmful materials. It shall be cleaned of excessive rust before use.
- d. Steel plates of different specifications shall be stacked separately. Steel of IS:2062 and IS:8500 quality shall be given a grade wise, distinctive identification mark. Passage and space between the stacks shall be sufficient for rigging operations.

2.14 Testing

All materials provided by the Concessionaire shall be tested for conformity of the specification and the test results shall be submitted to the Engineer for acceptance. In addition to above, the Concessionaire shall carry out the relevant tests at site as specified under different items of work.

Sub-section - C3
Technical specification for cast-in-situ concrete AND
allied works

Sub Section - C3

Technical specification for cast-in-situ concrete and allied works

Contents

Clause no.	Description	Page nos.
3.1	Common requirement.....	81
3.2	Cast-in-situ concrete	86
3.3	Reinforcement	108
3.4	Formwork and staging.....	113
3.5	Embedded parts.....	119
3.6	Foundation bolt assembly	120
3.7	Shotcreting.....	122
3.8	Grouting	124
3.9	Encasement of steel structures / elements	127
3.10	Joints in concrete	128
3.11	Waterproofing / damp proofing of underground concrete structures	135
3.12	Dismantling / demolishing work - RCC and PCC	140
3.13	Cement additives / admixtures in concrete	141
3.14	Slab on grade	146

Sub Section - C3: Technical specification for cast-in-situ concrete and allied works

3.1 Common requirement

3.1.1 Scope

The work shall include providing of materials, all necessary plant and equipment, providing adequate engineering supervision and technical personnel, skilled and unskilled labour, etc. as required to carry out the entire work as indicated on the drawings and/or described herein subsequently and/or as directed by the Engineer.

The Concessionaire shall carry out all works meant within the intent of this specification even if not explicitly mentioned herein. All works shall be executed to the satisfaction of the Engineer.

This specification is divided into 13 sections. The Section - 1 deals with common requirements and the other 12 sections deal with specifications for 12 different items/activities. The stipulations contained in Section-1, '**Common Requirements**' shall form a part of the specifications of 12 different items/activities described in section 2 to 13.

All these eight sections are as follows:

Section - 1	Common requirement
Section - 2	Cast-in-Situ Concrete
Section - 3	Reinforcement
Section - 4	Formwork and staging
Section - 5	Embedded parts
Section - 6	Foundation bolt assembly
Section - 7	Shotcreting
Section - 8	Grouting
Section - 9	Encasement of steel structures/elements
Section - 10	Joints in Concrete
Section - 11	Water proofing / damp proofing of underground concrete structures.
Section - 12	Dismantling / Demolishing works - RCC and PCC.
Section - 13	Cement Additives/Admixtures in concrete.

3.1.2 General

Any approval, instructions, permission, checking, review, etc. whatsoever by the Engineer, shall not relieve the Concessionaire of his responsibility and obligation regarding adequacy, correctness, completeness, safety strength, quality, workmanship, etc.

The Concessionaire shall make his own surveying arrangements for locating the coordinates and positions of all work and establishing the reduced levels (RLs) at these locations, based on two reference grid lines and one bench mark, which will be furnished by the Executing Agency. The Concessionaire has to provide at site, faction of the Engineer so that the work can be carried out accurately and according to the specifications and drawings.

3.1.3 Codes and standards

All applicable standards, specifications, etc. and codes of practice shall generally be the latest editions, including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the Concessionaire.

All work shall be carried out as per the stipulations contained in various sections of these specifications and the latest Indian Standards, Acts, Codes and best practices.

In case of conflict between the stipulations contained in various sections of these specifications and stipulations of Indian Standards, Codes, etc. the requirements of stipulations contained in various sections of these specifications, shall prevail over that of Indian Standards, Codes, etc.

Some of the applicable Indian Standards, Codes, etc. are referred to here below:

- IS:73 - Specification for paving bitumen
- IS:2062 - Specification for structural steel
- IS:269 - Specification for Ordinary Portland cement, 33 grade.
- IS:280 - Specification of mild steel wire for general engineering purposes
- IS:383 - Specification for coarse and fine aggregates from natural sources for concrete.
- IS:432 - Specification for mild steel and medium tensile steel (parts I & II) bars and hard drawn steel wire for concrete reinforcement.

- IS:455 - Specification for Portland slag cement
- IS:456 - Code of practice for plain and reinforced concrete.
- IS:457 - Code of general construction of plain & reinforced concrete for dams & other massive structures.
- IS:516 - Method of test for strength of concrete
- IS:650 - Specification for standard sand for testing of cement
- IS:702 - Specification for industrial bitumen
- IS:816 - Code of practice for use of metal arc welding for general construction in mild steel.
- IS:1199 - Method of sampling and analysis of concrete
- IS:1200 - Method of measurement of building (Part-II and civil engineering works. V, VIII, XVIII)
- IS:1367 - Technical supply conditions for threaded steel fasteners.
- IS:1489 - Specification for Portland-pozzolana cement (Part-I) Fly ash based (Part-II) Calcined clay based
- IS:1566 - Specification for Hard-drawn steel wire fabric for concrete reinforcement.
- IS:1609 - Code of practice for laying damp proof treatment using bitumen felts.
- S:1786 - Specification for high strength deformed steel bars and wires for concrete reinforcement
- IS:1791 - General requirements for batch type concrete mixers.
- IS:1838 - (Part 1) Specification for preformed fillers for expansion joints in concrete pavements and structures (non extruding and resilient type)
- IS:2204 - Code of practice for construction of reinforced concrete shell roof.
- IS:2210 - Criteria for the design of reinforced concrete shell structures and folded plates.
- IS:2386 - Methods of test of aggregates for (Parts concrete I to VIII)
- IS:2438 - Specification for roller pan mixer
- IS:2502 - Code of practice for bending and fixing of bars for concrete reinforcement
- IS:2505 - General requirements for concrete vibrators, immersion type.
- IS:2506 - General requirements for concrete vibrators, screed board type.
- IS:2514 - Specification for concrete vibrating tables.
- I:2571 - Code of practice for laying in-situ cement-concrete flooring.
- IS:2645 - Specification for Integral cement water proofing compounds.
- IS:2722 - Specification for portable swing weigh batchers for concrete. (Single and double bucket type)
- IS:2750 - Specification for Steel scaffoldings

- IS:2751 - Code of practice for welding of mild steel plain and deformed bars for reinforced concrete structures.
- IS:3025 - Methods of sampling and test waste water.
- IS:3067 - Code of practice for general design details and preparatory work for damp proofing & water proofing of buildings.
- IS:3150 - Specification for hexagonal wire netting for general purposes.
- IS:3366 - Specification for Pan vibrators.
- IS:3370 - Code of practice for concrete (Part I structures for the storage of to IV) liquids.)
- IS:3384 - Specification for bitumen primer for use in water proofing & damp proofing.
- IS:3414 - Code of practice for design and installation of joints in buildings.
- IS:3550 - Methods of test for routine control for water used in industry
- IS:3558 - Code of practice for use of immersion vibrators for consolidating concrete.
- IS:3696 - Safety code for scaffolds (Part I ladders & II)
- IS:3812-2 - Specification for pulverized fuel ash for use as admixture in cement mortar and concrete
- IS:4014 - Code of practice for steel tubular scaffolding (Parts I & II)
- IS:4031 - Methods for physical tests for hydraulic cement.
- IS:4130 - Safety Code for demolition of buildings.
- IS:4326 - Code of practice for earthquake resistant design and construction of buildings.
- IS:4461 - Code of practice for joints in surface hydro-electric power stations.
- IS:4656 - Specification for form vibrators for concrete.
- IS:4925 - Specification for batching and mixing plant.
- IS:4990 - Specification for plywood for concrete shuttering work.
- IS:4995 - Criteria for design of reinforced concrete bins for the storage of granular and powdery materials. (Parts I & II)
- IS:5121 - Safety code for piling and other deep foundations.
- IS:5256 - Code or practice for sealing joints in concrete lining on canals.
- IS:5525 - Recommendations for detailing of reinforcement in reinforced concrete work.
- IS:5624 - Specification for foundation bolts.
- IS:6461 - Glossary of terms relating to cement concrete.
- IS:6494 - Code of practice for water proofing of underground water reservoirs and swimming pools.
- IS:6509 - Code of practice for installation of joints in concrete pavements.

- IS:7193 - Specification for glass fiber base coal-tar pitch and bitumen felts.
- IS:7293 - Safety code for working with construction machinery.
- IS:7861 - Code of practice for extreme weather concreting (Parts I&II)
- IS:9012 - Recommended practice for Shotcreting.
- IS:9103 - Specification for admixtures for concrete.
- IS:9417 - Recommendations for welding cold-worked steel bars for reinforced concrete construction.
- IS:959 - Recommendations for metal-arc welding of carbon and carbon manganese steels.
- IS:10262 - Recommended guidelines for concrete mix design.
- IS:11384 - Code of practice for composite construction in structural steel and concrete.
- IS:12118 - Specification for two-parts poly sulphide.
- IS:12200 - Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams.
- IS:12269 - 43/53 Grade ordinary Portland cement.
- IS:12600 - Portland cement, low heat.
- SP:23 - Handbook of concrete mixes
- SP:24 - Explanatory Handbook on IS:456-1978
- SP:34 - Handbook on concrete reinforcement and detailing

3.1.4 Sampling, testing and quality assurance

Facilities required for sampling materials, concrete, reinforcement, formwork, etc. in the field and in the laboratory shall be provided by the Concessionaire. The Concessionaire shall carry out all sampling and testing in accordance with the relevant Indian Standards and/or International Standards and this specification. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Engineer. Tests shall be done in the field in the presence of the Engineer or his authorized representative and at a laboratory, approved by the Engineer, and the Concessionaire shall submit to the Engineer the test results in triplicate within three days after completion of any test.

The Concessionaire shall maintain records of all inspection and testing, which shall be made available to the Engineer. The Engineer at his discretion, may waive some of the stipulations for small and unimportant concreting operations and other works.

Work found unsuitable for acceptance shall be removed and replaced by the Concessionaire. The work shall be redone as per specification requirements and to the satisfaction of the Engineer at no extra cost to the Executing Agency.

Quality assurance programme

- a) The Concessionaire shall submit and finalize a detailed field Quality Assurance Programme within 30 days from the date of award of the contract, before commencement of work at site, according to the requirements of the specification. This shall include setting up of a testing laboratory, arrangement of testing apparatus / equipment, deployment of qualified/experienced manpower, preparation of format for record, field quality plan, etc. On finalized field quality plan, the Executing Agency shall identify, customer hold points, beyond which work shall not proceed without written approval from the Engineer. The testing apparatus/equipment installed in the field laboratory shall be calibrated /corrected by the authorized persons as frequently as possible to give accurate testing results.
- b) Frequency of sampling and testing, etc. and Acceptance Criteria are given in respective sections. However, the testing frequencies set forth are the desirable minimum and the Engineer shall have the full authority to carry out or call for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications.

3.2 Cast-in-situ concrete

3.2.1 Scope

This section of the specification deals with plain or reinforced cement concrete for general use and in structures and covers the requirements for concrete, materials, their properties, storage, handling, grading, mix design, strength and quality, pouring at all levels, testing, casting, protecting, curing, finishing, etc.

3.2.2 General requirement

The provision of IS:456 shall be followed as general guidance, along with all other relevant Indian Standards, unless otherwise specifically mentioned.

Before starting a concrete pour, the Concessionaire shall obtain the approval of the Engineer on a 'Pour Card' maintained for this purpose. He shall obtain complete instructions about the materials and proportions, water cement ratio, etc. to be used, slump/workability, number of test cubes/samples to be taken, type of finishing to be done, any admixture to be added, any limitation on size of pour and location for interruption of a pour in case of premature stopping of pour, etc.

The mixers and weigh-batchers, shall be maintained in clean and serviceable condition. Accuracy of all equipment shall be periodically checked. All concrete shall be mixed in mechanically operated batch mixers complying with IS:1791 and these shall be of approved make, with suitable provision for correctly controlling the water delivered to the drum. Weigh batchers shall conform to IS:2722 and shall be capable of controlling the weights to within one percent of the desired value.

The Concessionaire's procedures for casting massive concrete sections (as noted on the drawings or as identified by the Engineer) shall take account of the release of the heat of hydration, drying shrinkage behavior. The procedures shall be such that cracking or loss of strength of the concrete from these effects is prevented. At least one week before commencing the construction of any massive concrete section, the Concessionaire shall submit, for approval of the Engineer, detailed proposals for placing the concrete together with supporting calculations to demonstrate the suitability of the methods.

3.2.3 Materials

In general, all the materials used in the manufacture of concrete shall be in accordance with the Technical specification for properties, storage and handling of common building materials, (vide module C2) which shall be deemed to form a part of this specification.

The Engineer shall have the right to inspect the sources of materials, method of procurement and storage of materials, method of procurement and storage of materials, quality control procedures, etc.

➤ Cement

The cement used shall be the Ordinary Portland cement conforming to IS:269 or Portland Pozzolana cement conforming to IS:1489 or Portland slag cement conforming to IS:455 or any other type of cement, specified in IS:456 with the prior approval of the Engineer.

However, any special type of cement such as High strength cement or sulphate resisting cement, may be used under special circumstances.

➤ **Aggregates**

- a) For reinforced concrete work, aggregates conforming to IS:383 & IS:2386 having a maximum size of 20 mm shall be used. For certain reinforced concrete works, aggregates having a maximum size other than 20 mm size shall also be used as called for in the drawings. However, for lean concrete provided as mud mat below structural concrete, maximum size upto 40 mm shall be used.
- b) Aggregates (coarse or fine) with a specific gravity below 2.6 shall not be used without special permission of the Engineer. Machine-made sand will be acceptable provided the constituent (rock/gravel) is sound, hard, dense and is acceptable to the Engineer. Sand, natural gravel and crushed rock shall be prepared for use by such screening or washing, or both, as necessary to remove all objectionable foreign matter.
- c) **Type of aggregates:** Petro graphic examination shall be carried out to ascertain the structure and rock type of aggregate including presence of strained quartz and other reactive minerals. Moreover, in case the coarse aggregate sample is of composite nature, the proportions (by weight) of different rock types in the composite sample and petrographic evaluation of each rock should also be ascertained. While determining different rock type is in the composite sample, special emphasis should be given on identification of known reactive rocks like chalcedony, opal etc. and procedure laid down in IS:2430 for sampling of aggregates may be followed. The sample should not contain weathered rock and reduced to required quantity by quartering and coning.

The results of petro graphic test shall be submitted to the Engineer. The Engineer shall review the results on consultation with some specialist agencies, if required, to determine potential activity of the aggregate (siliceous minerals) which may lead to reaction of silica in aggregate with the alkalis of cement. In additional, potential of some aggregate like lime stone to residual expansion due to repeated temperature cycle is also to be reviewed. Further, the Concessionaire shall submit the results of Alkali aggregates reactivity carried out as per IS:2386 (Pt. VII).

In case of any apprehension about the properties of the aggregate, the Engineer shall ask the Concessionaire to send samples of coarse and fine aggregate to any of the established research laboratory including National Council for, Cement and Building Materials (NCB), Ballabgarh for further testing. However, the Executing Agency shall fix the agency and bear the cost of such testing.

In case, it is established from the tests that the aggregates contain reactive silica which would react with alkalis of the cement, the Concessionaire shall be asked to change the source of supply of the aggregate and take additional measures as suggested. In case aggregates indicate residual expansion, under repeated temperature cycle test, the material shall not be used for concreting of equipment foundations, which are likely to be subjected under repeated temperature cycle. The Concessionaire shall use different type of aggregate as approved by the Engineer.

➤ **Admixtures**

Admixtures in concrete for promoting workability, improving strength, entraining air for similar purposes may be used only after the written permission from the Engineer is obtained. These shall be free from injurious amount of chloride, etc. Addition of admixtures should not reduce the specified strength or durability of concrete and should not have detrimental effect on reinforcement. The admixtures shall conform to IS:9103 and shall be of proven make and from a reputed manufacturer. Calcium chloride as accelerating admixture is not permitted to be used other than in mass concrete works. The Concessionaire shall produce latest test results carried out at approved Government Test Houses for the approval of the Engineer, before use details of admixtures have been covered under Section - 13.

3.2.4 Water

Water used for mixing and curing shall be clean and free from injurious amounts of oils, acids, alkalis, sugar, organic materials or other substances that may be deleterious to concrete or steel. Potable water is generally considered satisfactory for mixing concrete. The maximum permissible values of impurities shall be as given in Clause no. 4.3 of IS:456-1978.

In case of doubt regarding development of strength, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time tests specified in IS:456.

Average 28 days compressive strength of atleast three 150 mm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water. The cubes shall be prepared, cured and tested in accordance with IS:456.

The initial setting time of a concrete test block made with the appropriate cement and the water proposed to be used shall not be less than 30 minutes and shall not differ by ± 30 minutes from the initial setting time of control test block prepared with the same cement and distilled water. The test shall be carried out as per IS:4031.

Where concrete, made from water, proposed to be used does not satisfy the above requirements and/or contains an excess of acid, alkali, sugar, salt or other deleterious, substances, then the Engineer may refuse to permit its use. Sea water shall not be used for curing besides mixing in concrete.

3.2.5 Grades of concrete

All concrete shall be “design mix concrete” as defined in IS:456, unless an nominal mix concrete such as 1:2:4, 1:3:6, 1:4:8 or 1:5:10 proportion is specified. The proportion referred to is by weight (mass). The grades for ‘design mix’ concrete shall be designated M-15, M-20, etc. as specified in IS:456. (20% replacement ratio of cement with fly ash shall be considered):

➤ Nominal mix concrete

- a) Nominal mix concrete shall be used only for plain Cement concrete works and where shown on drawings or specifically allowed by the Engineer. Such concrete shall not require preparation of trial mixes and all such concrete shall be mixed in a mechanical mixer. Proportions for nominal mix concrete shall be according to Table-3 of IS:456-1978. In addition, standard proportion by volume shall be used wherever specified.
- b) In proportioning concrete, the cement & fly ash shall be measured by (mass) weight. The quantities of fine and coarse aggregates may be determined by volume (for

corresponding weight) but preferably by weight. If fine aggregates are moist, the amount of surface water shall be determined. Also an allowance shall be made for bulking in case of volume batching, in accordance with IS:2386 (Part-III). Allowance shall also be made for surface water present in the aggregates, when computing the water requirement. All the above data shall be maintained properly, to the satisfaction of the Engineer.

- c) The recommended maximum water cement ratios are specified in **Table 1**.

Table 1: Recommended water - Cement ratio

Nominal mix concrete	Quantity of water per 50 Kg. of cement (max.)
1:5:10	60 litres
1:4:8	45 litres
1:3:6	34 litres
1:2:4	32 litres

- d) Nominal mix concrete 1:5:10 shall correspond to grade M5, 1:4:8 shall correspond to grade M7.5, 1:3:6 to grade M10 and 1:2:4 to grade M15 of IS:456.
- e) If Nominal mix concrete made in accordance with specified proportions does not yield the specified strength of the corresponding grade and fails to satisfy the requirements of “acceptance criteria for concrete” as specified in IS:456. Such concrete shall be treated in the following manner:
- i) In case the Engineer is satisfied that lower strength of concrete is attributed to material and workmanship of the Concessionaire, then such concrete shall be replaced by concrete of specified strength. The Engineer may however, also accept such lower strength concrete but such lower strength concrete shall be classified as belonging to the appropriate lower grade proportion.
 - ii) In case the Engineer is satisfied that lower strength of concrete is not attributable to the Concessionaire, he may direct in writing to increase the cement content to obtain specified strength. Such extra cement shall also be considered for reconciliation purposes. The use of richer mix shall be continued until the Engineer instructs otherwise.
- f) Nominal mix proportion shall not be classified as higher grade proportion either on the ground that the test strengths are higher than the minimum specified or in the

case where the Engineer directs use of additional cement over the quantity specified for the particular mix proportion to achieve the minimum specified strength.

➤ **Design mix concrete**

- a) Design mix concrete shall be used on all concrete works, except where specified otherwise or specially permitted by the Engineer. The mix shall be designed for all grades of concrete (except those specified under Nominal Mix Concrete (20% replacement ratio of cement with fly ash):) such as to obtain for works cubes, the required workability and the characteristic strength not less than the appropriate values given in Table 2. Using Standard Deviation specified in IS:10262 corresponding to good quality control, the Minimum value of target strength of design mix of various grades of concrete shall be as per Table 2.

However, the Engineer may allow to change the target strength values based on adequate numbers of works test results.

Table 2: Grades of concrete
Compressive strength of a 15 cm cube at 28 days (N/Sq.mm)

Grade designation of concrete	Preliminary test strength (target of trial mix)	Characteristic strength on strength works cubes
M 15	20.8	15
M 20	27.6	20
M 25	33.7	25
M 30	39.9	30
M 35	45.4	35

- b) In proportioning concrete, the quantity of cement, fly ash and aggregates shall be determined by mass. However, only in some exceptional cases including concreting in some isolated areas, the Engineer may allow the quantity of aggregates to be determined by an equivalent volume basis after the relationship between weight and volume is well established by trials and the same shall be verified frequently. Water shall be either measured by volume in calibrated tanks or weighed. All measuring equipment at site, shall be maintained in a clean and serviceable condition, and their accuracy shall be periodically checked.

- c) To keep the water-cement ratio to the designed value, allowance shall be made for the moisture contents in both fine and coarse aggregates and determination of the same in accordance with IS:2386 Part (III) shall be made as frequently as directed by the Engineer.

In some of the structures, water-cement ratio shall be restricted even below 0.45. To increase the workability, plasticizer may have to be used in such cases. Trial mix shall be carried out accordingly.

- d) With the permission of the Engineer, for any of the above mentioned grades of concrete, if the water quantity has to be increased, proportionately cement quantity shall also be increased, to keep the ratio of water to cement same as adopted in Preliminary tests for the corresponding grade of concrete. The extra cement required on account of this shall also be considered for reconciliation purposes.

➤ **Mix design**

- a) IS:10262 shall be followed as general guidance for mix design. Preliminary tests/trial mix, as specified or as required by the Engineer, shall be carried out sufficiently ahead of the actual commencement of the work with different grades of concrete made from representative samples of aggregates and cement & fly ash expected to be used on the works. These tests are to be conducted to arrive at the grading of aggregates, water cement ratio, workability and the quantity of cement required to give Preliminary (target) compressive strengths as specified in Table - 2.
- b) Minimum cement contents, from durability consideration, or different exposures and sulphate attack shall be as given in Table - 19 and 20 of IS:456. In case, higher value is obtained from trial mix from strength consideration, same shall be considered.
- c) At least four trial mixes are to be made and minimum. Six test cubes taken for each trial mix noting the slump for each type of mix. The cubes shall then be properly cured and three cubes for each mix shall be tested in a laboratory (approved by the Engineer) at 7 days and others at 28 days and others at 28 days for obtaining the compressive strength. The test reports shall be submitted to the Engineer. The design mix particulars shall indicate, with the help of graphs and curves etc. the extent of variation in the grading of aggregates which can be allowed. While designing mixes, over wet mixes shall be avoided. For chimney, natural draft cooling tower, etc. where

assessment of early strength is required, the concrete cubes shall also be tested for early age strength at 1 day and 3 days for establishing the values.

- d) The Concessionaire shall submit the test reports of mix design to the Engineer for his view, indicating design criteria, analysis and proportioning of materials, etc. On the basis of the above test reports, a mix proportion by mass and the water cement ratio, shall be determined by the Concessionaire such that concrete prepared with this mix yield the desired characteristic strength and shall have suitable workability. The mix design to be adopted on the works shall be subject to the approval of the Engineer. The proportions, once decided for different grades of concrete, shall be adhered to, during all concreting operations as long as the quality of the materials does not change. If, however, at any time, the quality of materials being used has changed from those for Preliminary mix design, or there is a change either in the required strength of concrete, or water cement ratio or workability, the Concessionaire shall have to make similar trial mixes and Preliminary tests to ascertain the revised mix proportions and water cement ratio to be used for obtaining the desired strength and consistency.

- e) In the situations, like casting of piles, where the compaction of concrete is not possible by vibration, the method of compacting concrete cubes of Preliminary / trial mixes and work tests shall be in the same manner as the method of compacting concrete at site is proposed.

➤ **Workability of concrete**

- a) The workability of concrete shall be checked at frequent intervals. The workability of concrete measured in accordance with IS:1199 for every sample taken for testing shall be recorded with the corresponding cube test result.

- b) The degree of workability necessary to allow the concrete to be well compacted and to be worked into the corners of formwork and round the reinforcement to give the required surface finish shall depend on the type and nature of the structure and shall be based on experience and tests. The suggested ranges of values of workability for concrete for some placing conditions, measured in accordance with IS:1199 as stipulated under Clause No. 6.0 of IS:456, are given below in Table - 3, for guidance only. In addition, in some special cases like casting of pile, very high degree of workability (up to 180 mm slump) shall be used.

Table 3: Limits of workability

Placing	Degree of workability	Value of workability
Concreting of shallow sections with vibration factor	Very low	20-10 seconds, Vee-bee time or 0.75-0.80 compacting.
Concreting of lightly reinforced section with vibration	Low	10-5 seconds, Vee-bee time or 0.80-0.85 compacting factor.
Concreting of lightly reinforced section without vibration, or heavily reinforced sections with vibration	Medium	5-2 seconds, Vee-bee time or 0.85-0.92 compacting factor or 25-75mm, slump for 20 mm aggregate (for smaller aggregate the values will be lower).
Concreting of heavily reinforced sections without vibration	High	Above 0.92 compacting factor or 75-125 mm slump for 20 mm aggregate (for smaller aggregate the values will be lower)

Note: Notwithstanding the values given above, the slump to be maintained for work in progress shall be as per directions of the Engineer.

➤ **Mixing of concrete**

- a) Concrete shall be mixed in a mechanical mixer conforming to IS:1791. However, mixing shall preferably be done at a single central batching plant, conforming to IS:4925, situated within the area allocated for the Concessionaire's particular use as shown on the drawing or as directed by the Engineer. The plant shall have a mechanically operated mixer of an approved size and type, capable of ensuring a uniform distribution of the materials throughout the mass and the mass is uniform in colour and consistency.
- b) Water shall not be added into the drum of the mixer, until all the cement and aggregates constituting the batch are already in the drum and dry mixed for at least one minute and are uniformly distributed. Water shall then be added and mixing of each batch shall be continued until there is a uniform distribution of the materials and the mass but in no case shall mixing be done for less than two minutes and for atleast 40 revolutions after all the water and materials are in the drum. When absorbent aggregates are used or when the mix is very dry, the mixing time shall be extended as directed by the Engineer. Mixers shall not be loaded above their rated capacity as this prevents thorough mixing.
- c) The entire contents of the drum shall be discharged before the ingredients for the next batch are fed into the drum. No partly set or remixed or excessively wet concrete shall be used and it shall be immediately removed from site. Each time if the work stops for more than 30 minutes, the mixer shall be thoroughly cleaned and when the next mixing commences, the first batch shall have 10% additional cement.
- d) In exceptional circumstances and/or work in remote areas, hand mixing may be allowed by the Engineer, subject to adding 10% extra cement which shall be considered for reconciliation purposes. The mixing shall be carried out on watertight platform and mixing shall be continued till a uniform colour and consistency of the mix is achieved.

➤ **Concrete conveying**

- a) Concrete shall be handled and conveyed as rapidly as practicable, from the place of mixing to the place of final laying, by approved means, before the initial setting of the cement starts. Concrete shall be conveyed in such a way that there is no

segregation or loss of any of the ingredients and maintaining the required workability. If segregation does occur during transport, the concrete shall be remixed.

During very hot or cold weather, if directed by the Engineer, concrete shall be transported in deep containers, which will reduce the rate of water loss by evaporation in hot weather and heat loss in cold weather, at no extra cost to the Executing Agency.

- b) Conveying equipment for concrete shall be mortar tight, well maintained and thoroughly cleaned before commencement of concrete mixing. Such equipment shall be kept free from set concrete. Chutes shall not be used for transport of concrete without the written permission of the Engineer. The chute in case permitted to be used shall be of such size and design as to ensure practically continuous flow. Slope of the chute shall be so adjusted that the concrete flow without the use of an excessive quantity of water and without segregation of its ingredients. The delivery end of the chute shall be as close as possible to the point of deposit.
- c) Concrete may be conveyed and placed by mechanically operated equipment, e.g. pumps or pneumatic placers only with the written permission of the Engineer, who shall also review the entire scheme for which comprehensive details shall be furnished by the Concessionaire.

➤ **Concrete placing**

- a) Concrete shall be placed and compacted in its final position before the cement reaches the initial set and normally concrete shall be compacted in its final position within minutes of leaving the mixer.
- b) Where direct placement is not possible, the Concessionaire shall provide suitable arrangements such as chutes, tremie, elephant trunks, etc. to confine the movement of concrete as directed by the Engineer. Concrete shall not be dropped from a height or handled in a manner which may cause segregation.
- c) If concrete is placed by pumping, the consistency shall be the minimum necessary for such conveyance of concrete. Before commencement of regular pumping, the pipeline shall be lubricated by cement mortar (1:2), and once pumping commences, stoppages shall be avoided.

- d) Concrete shall not be placed in foundations on soft areas or where there is standing water or debris. Such soft areas shall be removed and filled with 1:4:8/1:3:6 nominal mix concrete, as directed by the Engineer.

For rock surfaces, it shall be ensured that the rock is not unsound. On sloping rock faces, rough steps or benches shall be formed and concrete shall not be placed on a sloping rock surface. Prior to pouring concrete, the rock surface shall be cleaned with a high pressure water and air jet and kept wet for three hours. Also, before placing concrete, water shall be removed from depressions, the rock surface shall be dried and a 10mm thick cement sand mortar (1:6) layer shall be placed and worked into all crevices, cracks, depression, etc.

- e) The placing of concrete shall be a continuous operation with no interruption in excess of 30 minutes between the placing of continuous portions of concrete. Concrete shall be placed in continuous horizontal layers of 150 mm or higher thickness as directed by the Engineer and thoroughly compacted before placing next layer. The thickness of each layer shall be such that it will be deposited before the previous layer has stiffened. When placing concrete through reinforcing steel, care shall be taken to prevent segregation of the coarse aggregates.
- f) Approval by the Engineer of any of the materials and/or work as required herein shall not relieve the Concessionaire of his obligation to produce finished concrete in accordance with the drawings and specifications. Slots, openings, holes, pockets, etc. shall be provided in the concrete as directed by the Engineer.
- g) Slabs, beams and similar members shall normally be poured in one operation. In special circumstances, with the approval of the Engineer, these can be poured in horizontal layers, but it must be ensured that the under layer is not already hardened. Bleeding of under layer, if any, shall be effectively removed. Molding, throating, drip course, etc. shall be poured as shown on the drawings or as desired by the Engineer.
- h) After the concrete has been placed, it shall be spaded and thoroughly compacted by approved mechanical vibrators to a maximum subsidence without segregation and thoroughly worked around reinforcement or other embedded fixtures into the correct form and shape. Hand tamping in some cases may be allowed subject to the approval of the Engineer. Care must be taken to ensure that the inserts, fixtures, reinforcement and formwork are not displaced or disturbed during placing of concrete.

- i) Whenever vibration has to be applied externally, the design of formwork and the disposition of vibrators shall receive special consideration to ensure efficient compaction and to avoid surface blemishes. Surface vibrators and form attached vibrator shall not be permitted under normal conditions. Their use shall require written approval of the Engineer.
- j) Vibrators shall penetrate both the layer poured and the under layer to ensure good bond homogeneity and to prevent the formation of cold joints. Immersion vibrators shall not be allowed to come in contact with steel reinforcement after start of initial set. Also, they shall not be allowed to come in contact with forms or finished surfaces.
- k) Immersion vibrators shall have a 'no load' frequency, amplitude and acceleration as per IS:2505 depending upon the size of the vibrator. Immersion vibrators shall be operated by experienced men. These vibrators shall be immersed not more than 450 mm apart and withdrawn when air bubbles cease to come to the surface. Such vibrators shall in no case be used to push concrete inside the forms and vibrators shall be withdrawn slowly.
- l) No concrete shall be placed in wet weather or on a water covered surface. If there have been any signs of washing of cement or sand, the concrete shall be entirely removed immediately. Suitable precautions shall be taken in advance to guard against possible rains before leaving the fresh concrete unattended.
- m) Mass concrete shall be poured in lifts not exceeding 1.0 m in height unless otherwise indicated on drawings or as directed by the Engineer. Horizontal lift shall not be more than 150 cm in thickness, according to provision of IS:457.
- n) Formwork and reinforcement shall be approved in writing by the Engineer before concrete is placed. Concrete shall be placed only after all preparations for casting have been approved by the Engineer and approval given to proceed with the casting in writing on pour card to be maintained by the Concessionaire for this purpose and to be submitted alongwith the Concessionaire's bills.
- o) Concrete, when deposited, shall have a temperature of not less than 5 degrees Centigrade and not more than 40 degree Centigrade. When depositing concrete in very hot weather, precautions shall be taken so that the temperature of wet concrete

does not exceed 40 degrees Centigrade while placing. This shall be achieved by stacking aggregates under the shade and keeping them moist, starting curing before concrete dries out, etc. However, before mixing / placing concrete, when the above temperature conditions vary on either side, approval of the Engineer shall be obtained for the method of execution.

➤ **Protection and curing of concrete**

- a) Newly place concrete shall be protected by approved means from rain, sun and wind. Concrete placed below ground level, shall be protected from falling earth, during and after placing. Concrete placed in ground containing any deleterious substances, shall be kept free from contact with such ground or with water draining from such ground, during placing of concrete and for a period of atleast three days or as otherwise instructed by the Engineer.
- b) The ground water around newly poured concrete shall be kept down to an approved level by pumping or other approved means of drainage. Adequate steps shall be taken to prevent floatation or flooding. Steps, as approved by the Engineer, shall be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion, mixing with earth or other deleterious materials, etc. that may impair the strength and durability of the concrete.
- c) As soon as the concrete had hardened sufficiently for the surface not to be marked, it shall be kept in a damp or wet condition by pounding or by covering with a layer of sacking, canvas, hessian or similar materials and kept continuously wet for atleast seven days after final setting. This period may be extended, at the discretion of the Engineer, upto fourteen days. Curing of horizontal surfaces exposed to drying winds shall begin immediately after the concrete has hardened. Concrete slabs and floors shall be cured for the periods mentioned above by flooding with water of minimum 25mm depth.
- d) Approved curing compounds may be used in lieu of moist curing with the permission of the Engineer. However, such permission may be granted only in specific cases. Such compounds shall be applied to all exposed surfaces of the concrete, as soon as possible after the concrete has set.

- e) Quantity of water applied shall be such as to prevent erosion of freshly placed concrete.

➤ **Construction joints**

- a) When work has to be interrupted, the concrete shall be rebated and/or keyed at the joint to such shape and size as may be required by the Engineer or as shown on the drawings. All vertical construction joints shall be made with stop boards, which are rigidly fixed and slotted to allow for the passage of the reinforcing steel. In the case of water retaining structures, basements, tunnels, etc. water stop of approved material shall be provided, if so specified on the drawings or as directed by the Engineer.
- b) Construction joints shall be located as shown or described on the drawings. Where it is not described, the joints shall be in accordance with the following guidelines.
 - i) In a column, the joints shall be formed about 75 mm below the lowest soffit of the beams framing into it, including haunches, if any. In flat slab construction, the joint shall be 75 mm below the soffit of the column capital.
 - ii) Concrete in a beam shall be placed throughout without a joint. If unavoidable, the joint shall be vertical and within the middle-third of the span. When a beam intersects a girder, the joints in the girder shall be given an offset equal to a distance twice the width of the beam and additional reinforcement provided for shear. The joints shall be vertical throughout the full thickness of the concrete member with suitable shear key wherever shown on the drawing.
 - iii) A joint in a suspended floor slab shall be vertical at one quarter points of the span and at right angle of the principal reinforcement.
 - iv) Construction joints in equipment foundations shall not be provided without specific concurrence of the Engineer.
 - v) Vertical construction joints in water retaining structures shall not be permitted unless shown on the drawings.

However, if the Concessionaire desires any adjustments in the location of construction joints (to suit site conditions) from those shown on drawings or from those explained above, he shall obtain prior approval from the Engineer.

- c) Before fresh concrete is placed, the cement skin of the partially hardened concrete which was poured earlier shall be thoroughly removed and the surface made rough and aggregate exposed, by wire brushing, hacking, water jetting, air jetting or any other method as directed by the Engineer. The rough surface shall be thoroughly wetted for about ½ hour and shall be dried and coated with 10 to 15 mm thick layer of 1:1 freshly mixed cement and sand slurry. Special care shall be taken to see that the first layer of concrete placed after a construction joint is thoroughly rammed against the existing layer.
- d) In forming a joint, concrete shall not be allowed to slope away to a thin edge. The locations of construction joints shall be planned by the Concessionaire well in advance of pouring and they will have to be approved by the Engineer. The Concessionaire's proposals shall include atleast the location of construction joints, the sequence of pouring, formwork details and their stripping times.
- e) Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes. Care being taken to avoid dislodgement of particles of aggregates. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry. On this surface, a layer of concrete not exceeding 150 mm in thickness shall first be placed shall be well rammed against old work, particular attention being to corners and close spots. Work thereafter, shall proceed in the normal way.
- f) For multiple lift work a suitable gap shall be maintained between setting of the earlier placed concrete and the commencement of concrete pour. After depositing concrete in columns, piers or walls time gap of minimum 4 hours, preferably 24 hours shall be maintained before depositing concrete in beams, girders or slabs, supported there in order to avoid cracking due to settlement.

➤ **Work in extreme weather conditions**

During hot weather (atmospheric temperature above 40 degree centigrade) or cold weather (atmospheric temp at 5 degree centigrade and below) the concreting shall be done as per the procedures and precautions set out in IS:7868 (Parts I and II).

➤ **Cleaning and finishing of concrete**

- a) All concrete surfaces shall have an even and clean finish free from honeycombs, air bubbles, fins or other blemishes unmarred, reasonable smooth. The formwork joint marks on concrete work exposed to view shall be rubbed with carborandum stone and defects patched up with paste of cement sand mortar (1:2) and cured. The finish shall be made to the satisfaction of the Engineer. Concrete surfaces to be subsequently plastered or where brickwork is to be built against them, shall be adequately hacked as soon as the form is stripped off so that proper bond can develop.
- b) Immediately after removal of forms, the concrete shall be inspected and defective areas as pointed out by the Engineer shall be removed partially or entirely as directed. Holes, left by form bolts, etc. shall be filled-up and made good with cement sand mortar of approved mix. All superficial defects such as honeycombing, rough patches, etc. shall be similarly made good. If the defective area is at a vulnerable location, e.g. at the ends of beams & columns etc then it may be necessary to cut out the member completely or in part and reconstruct as directed by the Engineer. If epoxies have to be used, the same shall be subject to the approval of the Engineer. Poured concrete affected by faulty formwork shall be removed totally and replaced. If so directed, the Concessionaire shall have to resort to grouting / shotcreting.
- c) A smooth finish shall be obtained with the use of forms having smooth and even surfaces and edges. Panels and form linings shall be of uniform size and be as large as practicable and installed with closed joints. Upon removal of forms, the joint marks shall be smoothed off and all blemishes, projections etc. removed leaving the surfaces reasonably smooth and unmarred.
- d) Where integral cement concrete finish is called for, the surface shall be compacted and then floated and treated with a straight edge and any high and low spots eliminated. The work shall be carried out as per IS:2571

3.2.6 Sampling, testing and quality assurance including construction tolerances

➤ **General**

- a) Concrete cubes for works tests shall be cured under laboratory conditions, except when in the opinion of the Engineer, extreme weather conditions prevail at which time, these may require curing under job conditions.
- b) For the purposes of statistical analysis, any substandard cube result, which in the opinion of the Engineer, is due to improper sampling, molding or testing shall be discarded and a dummy result shall be substituted. The value of a dummy result shall be equivalent to the average value of the cubes from the same grade of concrete tested immediately before and after the discarded result. The number of such substandard cubes shall not exceed 5%.
- c) If the 'strength' of the laboratory controlled cubes, for any portion of the concrete work, falls below the compressive strength specified, the Engineer shall have the right to order a change in the proportions or the water content for the remaining portion of the surface.
- d) If the 'strength' of the works cured test cubes falls below the specified strength, the Engineer shall have the right to require provisions for temperature and moisture control during the period of curing as necessary to secure the required strength, and may require retest in accordance with the standard method of securing, preparing and testing specimens from hardened concrete for compressive and flexural strengths, or load tests to be made on the portion of the building so affected. All such tests shall be made at the Concessionaire's expense.
- e) Unacceptable concrete work shall be dismantled by the Concessionaire and replaced by fresh work, meeting the specification requirements. In the course of dismantling, if any damage is done to the embedded items or adjacent structures, the same shall be made good, by the Concessionaire, to the satisfaction of the Engineer, at no extra cost to the Executing Agency.
- f) Only as a very special case and that too in non-critical areas, the Engineer may accept concrete work which is marginally unacceptable as per the criteria laid down in IS:456. For such accepted work, payment shall be made at a reduced rate prorate to the concrete cube strength obtained, against that stipulated.
- g) Before placing concrete, the inside of forms shall be checked to ensure that they are clean and thoroughly wetted or adequately treated. So as to prevent absorption of water from the concrete.

- h) Ultrasonic tests on the foundations of major equipment to ascertain the quality and grade of concreting shall be carried out. The Executing Agency shall arrange for the specialized agency for conducting the test at his cost. The Concessionaire shall provide all the necessary facilities and arrangement for conducting the test at site in terms of access, scaffolding etc. In case of any defects, the Concessionaire shall rectify the same as directed by the Engineer.
- i) Rebound hammer test shall be carried out for ascertaining the quality of concrete work, as directed by the Engineer.
- j) Test shall be conducted for the water tightness of the liquid retaining structures as per IS:3370 and IS:6494. The details and sequence of tests shall be as given hereunder:
 - i) All arrangements, including supply of water for testing purposes, shall be kept ready when the tank is nearing completion.
 - ii) Water supply to the tank shall be in stages of 300 to 450 mm height in order to check the water tightness of the tank and location of leakage of various levels.
 - iii) The permissible drop in level in 24 hours shall be 6 mm in case of covered reservoir/tank and 12 mm in the case of open reservoir/tank.
 - iv) The leakage points shall be marked and separately treated after dewatering.
 - v) The reservoir / tank shall be retested for water tightness after rectification.
 - vi) For basement type structures like cable vault, track-hopper, tunnel, neutralizing pit, etc. the Concessionaire shall examine the water tightness against ingress of sub-soil water.

➤ **Sampling of concrete**

Samples from fresh concrete shall be taken according to IS:1199 and tested as per IS:516.

- a) Normally only compressive test shall be performed but the Engineer may require other tests to be performed in accordance with IS:516.

b) **i) Trial Mixes:**

Atleast four trial mixes shall be made with; min. 6 test cubes for each mix.

ii) Works Tests:

The min. frequency of sampling of concrete of each grade shall be according to clause 14.2.2 of IS:456-1978. However, after getting continuous satisfactory results and in the case of voluminous concrete works, the Engineer, may at his discretion reduce the frequency of sampling as follows.

For each grade of concrete, and for each 8 hours (shift) of work or part thereof, atleast one sample consisting of six specimens shall be taken from each 150 cum. of concrete or part thereof, 3 specimens shall be tested at 7 days and remaining 3 shall be tested at 28 days. However, in all cases, the 28 days compressive strength shall alone be the criterion for acceptance or rejection.

- c) To control the consistency of concrete from every mixing, slump tests and compaction factor tests in accordance with IS:1199 shall be carried out by the Concessionaire every two hours or as directed by the Engineer. Slumps corresponding to the test specimens shall be recorded for reference.
- d) The strength of sample shall be the average of the strength of three specimens. The individual variation should not be more than $\pm 15\%$ of the average.

➤ **Unless otherwise specified, the tolerance in construction shall be as follows:**

The dimensions of concrete as cast when compared with those on the drawings shall be within the tolerance given below:

Description of item / structural element	Permissible deviation in mm	
Faces of concrete in foundations and structural members against which backfillis placed.	+25	-10
Location of footing (for RCC framed structures only).	+25	-25

Eccentricity of footing	2% of footing width of direction of misplacement but limiting to 50mm	
Top surface of slabs and of concrete to receive base plates to be grouted.	+5	-5
Alignment of beams, lintels, columns, walls, slabs and similar structural elements	+5	-5
Deviation from specified dimensions of cross-sections of columns and beams	+12	-6
Alignment of holding down bolts without sleeves.	+1.5	-1.5
Alignment of holding down bolts with sleeves.	+5	-5
Level of holding down bolt assemblies.	+10	-10
Embedded parts (in any direction).	+5	-5
Centres of packets or holes with greatest lateral dimension not exceeding 150 mm. Variation in steps:	+10	-10
Riser	+1.5	-1.5
Tread	+3.0	-3.0
Plumb	3mm for every metre subject to a maximum of 10mm.	

➤ **Acceptance criteria**

The acceptance criteria of concrete shall be in accordance with Clause no.15 of IS:456-1978. However, in exceptional circumstances, the Engineer may, at his discretion, accept a concrete of lower strength than that specified at reduced rates. The concrete shall be deemed to comply with the strength requirements if:

- a) Every sample has a test strength not less than the characteristic value or
- b) The strength of one or more samples, though less than the characteristic value, in each case is not less than the greater of :
 - i) The characteristic strength minus 1.35 times the Standard Deviation and
 - ii) 0.80 times the characteristic strength; average strength of all the samples, is not less than the characteristic strength + [1.65 - 1.65/ square root of (No. of samples)] times the standard deviation.

➤ **Load test**

If any work is found unacceptable whereupon the Engineer requires its removal and reconstruction, the Concessionaire may request that it should be load tested in accordance with the provision of Clause no. 16.50 of IS:456-1978 as given below:

- a) The test load shall be 125 percent of the maximum superimposed load for which the structure or element was designed. This load shall not be applied earlier than 28 days after the effective hardening of concrete. This test load shall be maintained for 24 hours and during the entire duration of the test, struts, strong enough to take the whole superimposed, dead and other loads shall be placed in position, leaving a small gap under the members.
- b) The maximum deflection shall be measured after the test load is in position for 24 hours. Thereafter, the test load shall be removed.
- c) If 24 hours after the removal of the load, the structure does not show a recovery of atleast 75 percent of the maximum deflection, registered as in (b) above, the test shall be repeated after a lapse of 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not atleast 80% of the maximum deflection during the second test.
- d) If the maximum deflection in mm, shown during 24 hours under load, is less than $40 l^2 / D$, where l is the effective span in metres and D is overall depth of the section in mm, it is not necessary for the recovery to be measured and the recovery position of the above mentioned clause 10.5 (c) will not apply.

3.3 Reinforcement

3.3.1 Scope

This section of the specification deals with reinforcement for all reinforced concrete works and covers the requirement of materials, their properties, storage, handling, furnishing of bar bending schedules and the cleaning, bending, binding and placing of reinforcement with suitable cover blocks. This shall also include the supply of reinforcement, wherever required.

3.3.2 General requirements

The Concessionaire shall prepare and furnish to the Engineer, bar bending schedules for all RCC works for his review and approval. No work shall commence without the approval of bar bending schedule by the Engineer, in writing.

The Concessionaire shall have to obtain prior written approval from the Engineer, if he desires any adjustments in diameter or spacing of reinforcement. However, the Concessionaire shall modify the bar bending schedule, when a particular type and size of reinforcement would not be available, with the approval of the Engineer.

3.3.3 Materials

All steel for reinforced concrete works shall be in accordance with Technical Specification for Properties, Storage and Handling of common Building Materials, (vide module C2) which shall be deemed to form the part of this Specification.

All bars shall be thoroughly cleaned before being fabricated. Pitted and defective bars shall not be used.

3.3.4 Bending and placing

➤ Bending

- a) Reinforcing bars supplied bent or in coils, shall be straightened before these are cut to size. Straightening of bars shall be done in cold and without damaging the bars. This is to be considered as a part of reinforcement bending and fabrication work.
- b) Unless otherwise specified, reinforcing steel shall be bent in accordance with procedure specified in IS:2502 and/or as approved by the Engineer. Bends and shapes shall comply strictly with the dimensions shown on the approved bar bending schedules and they shall be rechecked by the Concessionaire before bending and he shall be entirely responsible for their correctness. Bars correctly bent, shall only be used. Unless specified otherwise or directed by the Engineer, the detailing of reinforcement shall be in accordance with IS:5525 and SP:34.

- c) No reinforcement shall be bent, when in position in the work without approval of the Engineer, whether or not it is partially embedded in concrete. Where the reinforcement bars are bent aside, at construction taken to ensure that, at no time, the radius of the bend is less than 4 times the bar diameters for plain mild steel or 6 times the bar diameters for deformed bars. Care shall also be taken while bending back bars, to ensure that the concrete around the bar is not damaged.
- d) Welding of bars to obtain continually shall not be allowed, particularly for cold twisted bars, unless specifically approved by the Engineer. If welding is approved, the work shall be carried out as per IS:2751 and IS:9417, according to the best practice and as directed by the Engineer.

➤ **Placing in position**

- a) All reinforcement shall be accurately fixed and maintained in position as shown on the drawings by such approved means as steel chairs, and/or concrete spacer blocks as per IS:2502. Bars intended to be in contact at crossing points by two numbers annealed steel wire of 0.9 mm to 1.6 mm size conforming to IS:280 in such a manner that they do not slip over each at the time of fixing & concreting. The tying of bars shall be in crisscross manner.
- b) Binders shall tightly embrace the bars with which these are intended to be in contact and shall be securely held. The vertical distance between successive layers of bars shall be maintained by provision of spacer bars. These shall be so spaced that the main bars do not sag perceptively between adjacent spacers.

Bundled bars shall be provided wherever shown on the drawing to facilitate concreting. Location of laps and development lengths, shall be as indicated on the drawings.

- c) The placing of reinforcement shall be completed well in advance of concrete pouring. Just prior to concrete pouring, the reinforcement shall be checked by the Engineer, for accuracy of placement and cleanliness. Necessary corrections, as directed by the Engineer shall be carried out. Care shall be taken to ensure that projecting ends of ties and other embedded metal do not encroach into the concrete cover. Where concrete blocks are used for ensuring the cover and positioning of reinforcement, these shall be made of mortar 1:2 (1 cement : 2 sand) by volume and cured for at least seven days. The sizes and locations of the concrete blocks shall be approved by the

Engineer. The 28 days crushing strength of cover blocks shall be atleast equal to the specified strength of concrete in which the blocks will be embedded.

- d) Laps and anchorage length of reinforcing bars shall be in accordance with IS:456, unless otherwise specified. If the bars in a lap are not of the same diameter, the smaller diameter will guide the lap length. Laps shall be staggered as far as practicable and as directed by the Engineer and not more than 50% of bars shall be lapped at a particular section. Mechanical connections, for splicing reinforcement bars in congested locations may be used by the Concessionaire, only if approved by the Engineer. Reinforcement bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site.
- e)

3.3.5 Cover to reinforcement

- a) Unless shown otherwise on the drawings, minimum clear concrete cover for reinforcement (exclusive of plaster or other finishes) shall be as follows:
- At each end of a reinforcing bar, not less than 25 mm, nor less than twice the bar diameter.
 - For a longitudinal reinforcing bar in a column, 40 mm or bar diameter whichever is more. 25 mm cover may be adopted for columns of minimum dimension 200 mm or under and with longitudinal reinforcement diameter not exceeding 12 mm.
 - For longitudinal reinforcing bars in a beam, not less than 25 mm or less than the bar diameter.
 - For reinforcement in slabs and walls; not exposed to weather or ground not less than 15 mm nor less than the bar diameter.
 - For bottom reinforcement in footings: 75 mm, if concrete is laid against the ground or 40 mm if laid on a layer of lean concrete.
 - For retaining walls, grade beams, top and sides of footings and similar surfaces exposed to weather or ground; 50 mm for bars larger than 16 mm and 40 mm for bars upto 16 mm.
 - For concrete members exposed to the action of harmful chemicals, acids, alkalis, atmosphere, sulphurous smoke, seawater etc., the cover shall be as shown on the drawings.
 - For liquid retaining structures; 40 mm or diameter of main bars, whichever is larger. This shall be increased to 50 mm in case of seawater or corrosive environment.
- b) Clean distance between reinforcing bars shall be in accordance with IS:456 or as shown on drawings.

3.3.6 Sampling, testing and quality assurance

➤ General

Sample bent bars shall be checked to ensure that they conform to the bar bending schedules. Reinforcement in position shall be checked for proper positioning, and rigidity, cover,

spacing of bars, placement of chairs and spacers, etc. Also it shall be checked that all bars at crossings are properly tied.

➤ **Tolerance**

Tolerance in construction, unless otherwise specified or as approved by the Engineer shall be as follows:

Description of item / structural element	Permissible deviation in mm (Max.)	
Placing of reinforcement		
For effective depth 200 mm or less	+10	-5
For effective depth more than 200 mm	+15	-10
Cover to reinforcement	-5	
Cutting of reinforcement		
When minimum length specified	+75	-
When maximum length specified	-	-50
When maximum or minimum length not specified	+75	-25

3.4 Formwork and staging

3.4.1 Scope

This section of the specification deals with the requirements for the supply, erection, dismantling of formwork and staging required for cast-in-situ concrete works including for making pockets / block outs.

3.4.2 General conditions

The Concessionaire shall supply, fabricate, erect, and dismantle (after use) all staging that is required for all activities covered under the specifications. He shall prepare the scheme and submit along with the supporting calculations for approval of the Engineer.

3.4.3 Materials

Formwork shall compose of steel, best quality wood or non-absorbent type plywood. Timber shall be free from significant knots and shall be of medium grain as far as possible and hard woods shall be used as caps and wedges under or over posts. Timber shall be well

seasoned, free from sap, shakes, worm holes, warps or other surface defects and shall have smooth finish.

Staging, unless specified otherwise, shall generally be of mild steel tubes, steel beams and channels etc. or strong sal ballies 150 mm in diameter or above. Bamboos, small diameter ballies etc., shall not be used unless approved by the Engineer in specific cases.

3.4.4 Classification of formwork

a) Ordinary

This shall be used in places where ordinary surface finish is required and shall compose of steel and/or approved good quality seasoned wood. Plywood shuttering can also be used by the Concessionaire.

b) Plywood

This shall be used in exposed surfaces as shown on drawings or as directed by the Engineer where a specially good finish is required. Such surfaces shall be formed using approved brand of heavy quality water resistant plywood to produce a perfectly leveled, uniform and smooth surface. Reuse of such forms may be permitted only after inspection and approval by the Engineer, for each such reuse.

c) Formwork for shell roofs

For this item, the detailed design of formwork shall be submitted by the Concessionaire to the Engineer, well in advance, for his approval. Units of shell forms may be used repeatedly but prior approval shall be required for each repetition. Extra care shall be taken to keep correct levels and profiles.

3.4.5 Quality of formwork and staging

Formwork shall consist of all materials required for forming the boxing to pour concrete, including steel / wood / plywood forms, ties, anchors, hangers, inserts, etc. Formwork shall be so constructed that vertical and horizontal adjustments can be made as required. The design and engineering of formwork including staging as well as its erection and dismantling shall be the responsibility of the Concessionaire.

The staging shall be true and rigid and thoroughly braced in both directions as well as cross braced, strutted and propped such that it will not deform unduly under weight of concrete and other loads due to men, equipment, etc. Vertical member or props should not be supported on an unpropped lower suspended floor or beam unless it is ensured by the Concessionaire that the lower floor or beam can safely carry the loads. No propping shall take place until the Engineer's approval has been given to the Concessionaire's scheme submitted along with supporting calculations.

The forms and staging shall be sufficiently strong to carry without under deformation, the dead weight of the concrete as liquid as well as anticipated working loads. Where the concrete is vibrated, the formwork shall be strong enough to withstand the effects of vibration, without appreciable deflection, bulging, distortion or loosening of its components. The joints in the formwork shall be sufficiently tight to prevent any leakage of mortar. The formwork shall be such as to ensure a smooth uniform surface free from honeycombs, air bubbles, bulges, fins and other blemishes. Any blemish or defect found on the surface of the concrete, must be brought to the notice of the Engineer immediately and rectified as directed by him.

To achieve the desired rigidity, ample studs, braces, bolts, spacer blocks, wires, clamps, ties, straps, shores, etc. Shall be used to hold the form in proper position without undue distortion. These shall be approved by the Engineer but they must in no way impair the strength of concrete or leave stains or marks on the finished surface. Where there are chances of these fixtures being embedded, only mild steel or concrete of adequate strength shall be used. Bolts passing completely through liquid and or earth retaining walls / slabs, basement walls etc. For the purpose of securing and aligning the formwork, shall not be permitted.

For exposed interior and exterior concrete surfaces of beams and columns, plywood or other approved forms thoroughly cleaned and tied together with approved corrosion resistant devices shall be used. Rigid care shall be exercised ensuring that all column forms are plumb and true and thoroughly cross-braced to keep them so.

Beveled strips 25x25 mm shall be provided to form angles and in corners of columns and beam boxes for chamfering of corners if shown on drawings or directed by the Engineer. Temporary openings for cleaning, inspection and for pouring concrete shall be provided at the base of vertical forms and at other places, where these are necessary and as may be

directed by the Engineer. The temporary openings shall be so formed that they can be conveniently closed rigidly when required and must not leave any mark on the concrete.

If it is so desired by the Engineer, the Concessionaire shall prepare, before commencement of the actual work, designs and drawings for formwork and staging and get them approved by the Engineer. Formwork shall be so designed and positioned that it can be removed without damage to concrete.

The Concessionaire shall maintain necessary camber in centering for all floor slabs and beams in all spanning directions, so as to offset the deflection and assume correct shape. The camber shall have the crown of not less than 8 mm for every 5 metres span unless otherwise shown on the drawings. For cantilever, camber at free end shall be 1 in 100.

The Concessionaire shall provide the shuttering for complete stretch of work upto expansion joints for the structures like shell, folded plate etc. and/or as directed by the Engineer.

3.4.6 Cleaning and treatment of forms

All forms shall be thoroughly cleaned of old concrete, wood shavings, saw dust, dirt and dust sticking to them before these are fixed in position. All rubbish, loose concrete, chippings, shavings, saw dust etc. shall be scrupulously removed from the interior of the forms before concrete is poured. Wire brushes, brooms, compressed air jet and/or water jet etc. shall be kept handy for cleaning, if directed by the Engineer.

Before formwork is placed in position, the form surfaces that will be in contact with concrete shall be treated with approved non-staining oil or composition, which is insoluble in water and not injurious to concrete. Care shall be taken that the oil or composition does not come in contact with reinforcing steel or stain the concrete surfaces. Burnt oil shall not be allowed to be used specially where the concrete surface will require finishing and/or plaster.

3.4.7 Removal of forms

The Concessionaire shall begin the removal of formwork only after the approval of the Engineer. He shall place on record the dates on which the concrete is placed in different parts of the work and the dates of the removal of formwork therefrom. This record shall be

checked and countersigned by the Engineer. The Concessionaire shall be responsible for the safe removal of formwork but the Engineer may delay the time of removal if he considers it necessary. Any work showing signs of damage through premature removal of formwork, shall be entirely removed and reconstructed by the Concessionaire at no extra cost to the Executing Agency.

The formwork shall be so designed and erected that the forms for slabs and the sides of beams, columns and walls may be removed first, leaving the beam bottoms and their supports in position. Re-propping of beams shall not be done except with the approval of the Engineer. Formwork for columns and walls at each stage of concreting shall be erected only upto the particular lift of construction. Wedges, spacer bolts, clamps or other suitable means shall be provided to allow accurate adjustment of the formwork and to allow it to be removed gradually without jerking the concrete.

Forms of various types of structural components shall, under normal circumstances, not be removed before the minimum periods specified in Cl. 10.3 of IS:456-1978, which shall also be subject to the approval of the Engineer. However, in any case formwork shall not be struck until the concrete has reached strength, atleast twice that of the stress to which the concrete may be subjected to at the time of removal of forms.

In normal circumstances and where ordinary Portland cement is used, forms may generally be removed after the expiry of the following periods, according to clause no. 10.3 of IS:456-1978.

i.	Walls, columns and vertical faces of all structural members as directed by the Engineer.	1 to 2 days
ii.	Slabs (Props left under)	3 days
iii.	Beam soffits (props left under)	7 days
iv.	Removal of props under slabs	
	Spanning up to 4.5 m	7 days
	Spanning up to 4.5 m	14 days
v.	Removal of props under beams	
	Spanning up to 6 m	14 days
	Spanning over 6 m	21 days
vi.	Cantilever slabs	14 days

The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slab, beam or arch as the case may be together with any live load likely to occur during curing or further construction.

Where the shape of the element is such that the formwork has reentrant angles, the formwork shall be removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.

In case of cantilever slabs, the removal of forms shall begin from the outer edge and proceed towards the support, where as in the case of slabs supported on two/four sides, the removal of forms shall begin from centre to supports.

The formwork shall be so made as to produce a finished concrete, true to shape, lines, plumb and to dimensions as shown on the drawings. The Engineer may call for finished work at any time to set standards of workmanship. Once approved, these will become the accepted Sample.

In case PPC/PSC is used instead of OPC, the removal of shuttering/support shall be after 50% more time from that being applied for OPC, unless otherwise permitted by the Engineer. For concrete temperature above 40 °C, stripping time shall be increased.

In case of special structures, such as shells, folded plates, etc., the sequence of removal of forms shall be as per drawings or as directed by the Engineer.

3.4.8 Reuse of forms

Before reuse, all forms shall be thoroughly scraped, cleaned, all nails and adhering substances removed, holes and leaks satisfactorily plugged, joints examined and where necessary repaired and inside surfaces treated as specified herein before. Formwork shall not be used/re-used, if declared unfit or unserviceable by the Engineer.

3.4.9 Testing and quality assurance (including dimension tolerance)

➤ General

Staging shall be checked for its soundness as a whole and for adequacy of the joints and its foundations. All joints shall be either vertical or horizontal and shall be such as to avoid loss of liquid through the formwork.

➤ **Dimensional tolerance for formwork**

Levels and heights	± 6 mm
Plumb	3 mm for every metre subject to a maximum of 10mm.
Unevenness of any surfaces	± 3 mm
Length or breadth	± 12 mm
Diagonals	± 15 mm

In case of inclined surfaces like track hopper wall, folded plates etc., the deviation in the alignment of inclined surfaces, shall not exceed 3 mm with reference to the theoretical alignment, for a length of 1000 mm measured vertically, subject to a maximum of 10 mm. In addition to above, requirement of clause no. 10.3 shall be complied with, which shall be the final acceptance criteria of concrete work.

3.5 Embedded parts

3.5.1 Scope

This section of specification deals with the supply, fabrication (where called for) and/or erection of embedded steel parts and PVC pipes

3.5.2 General requirements

Embedded steel parts shall be furnished by the Executing Agency for transportation & erection by the Concessionaire or supplied, fabricated and erected by the Concessionaire as stipulated. If supplied by the Executing Agency, these parts shall be furnished anywhere within the project area and the Concessionaire shall transport the same to the work site.

- a) Embedded steel parts supplied, fabricated and erected by the Concessionaire shall include items such as, but not limited to, foundation grillages, anchor bolts, pipe sleeves, equipment mounting plates, steel pieces properly welded with necessary lugs as shown on the drawings, auxiliary framing for equipment supports, pesty plugs for door and window frames, dowel bars for concrete work, miscellaneous frames, etc.
- b) Embedded steel parts supplied, fabricated/erected by the Concessionaire shall also include items such as, but not limited to plate inserts, edge protection angles, rolled sections with or without properly welded lugs.
- c) Cold work deformed steel bars shall not be used for lugs.

3.5.3 Materials

The materials shall be in accordance with the relevant clauses of Technical Specification for 'Properties, Storage and Handling of Common Building Materials (vide module C2), which shall be deemed to form a part of this specification. Mild steel pipes shall conform to IS:1161. Unless otherwise specified, medium class pipes shall be provided/ PVC pipes shall conform to IS:4985. Minimum pressure rating shall be 2 Kgf/cm².

3.5.4 Fabrication, erection etc.

The Concessionaire shall fabricate, transport to site and erect accurately in position all embedded steel parts either by welding, bolting or any other means as approved by the Engineer. Exposed surfaces of embedded parts other than holding down bolts, unless otherwise stated, are to be painted with two coats of approved anticorrosive paint (as per IS:2074) and/or bituminous paint as directed. The threads of holding down bolts shall be greased and protected with waterproof tape.

During erection, the Concessionaire shall provide necessary strong temporary bracings and supports to ensure proper installation of the embedded parts which shall be erected at the true locations as shown on the drawings and these shall be in plumb and level (unless otherwise shown on drawings). The Concessionaire shall furnish the Engineer with fabrication and assembly drawings prepared for embedded steel parts showing the erection procedure, for major items, wherever necessary.

Fabrication & erection shall be carried out as per IS:800. Welding rods & site / field welding shall conform to IS:816 and IS:9595. IS:7634 (Part - III) shall be followed for PVC pipe works.

3.6 Foundation bolt assembly

3.6.1 Scope

This section of the specification deals with the requirements of supply, fabrication and erection of foundation bolt assembly etc.

3.6.2 General requirements

Supply, fabrication, erection and installation of Foundation bolt assembly shall comprise of foundations bolts, stiffener plates, washers, nuts, lock nuts, pipe sleeves etc.

3.6.3 Materials

Foundation bolts shall generally conform to IS:5624. Mild steel bars used for the fabrication of bolt assembly shall conform to grade-I of IS:432, IS:226, IS:2062 or any other material including high carbon/high tensile steel as specified.

Hexagonal nuts and lock nuts shall conform to IS:1363 & IS:1364 upto M 36 dia and IS:3138 and M 42 to M 150 dia.

Flat plain washers shall be of mild steel and punched/machined type conforming to IS:5369.

Steel pipe sleeves shall conform, to Medium class of IS:1161.

3.6.4 Fabrication, erection, etc

The fabrication and erection of bolt assemblies shall include threading, cutting, grinding, drilling, welding, etc., complete. All bolts, bolts assemblies, etc. shall be fabricated by the Concessionaire to the correct dimensions and shapes as shown on drawings, supplied by the Engineer. The bolts shall have coarse pitch screw thread in the diameter range, 8 to 64 and 6 mm pitch screw for diameter > 64 mm as per IS: 4218.

For fabrication of any particular size of bolt indicated on the drawing, the diameter of the threaded portion of the bolt shall be considered as the diameter of the bolt.

Every bolt shall be provided with steel washer, under the nut. The washer shall be flat and min. outside circle have a diameter 2.50 times that of the bolt and of suitable thickness. All nuts shall be of steel with well formed hexagonal heads unless specified otherwise, forged from solid metal and shall be dipped in hot boiled linseed oil as soon as these are made. The nuts shall fit good on the bolts.

During erection, the Concessionaire shall provide necessary template, temporary bracings, supports, etc. to ensure proper positioning of the assemblies and holding them firmly until they are cast / grouted and the grouted has set. All materials shall be erected in plump and

in level (unless otherwise specified) and at true locations as shown on the drawings. Threads shall be protected by using PVC taps.

Fabrication & erection shall be carried out as per IS:800. Welding shall conform to IS:816 and 9595.

3.7 Shotcreting

3.7.1 Scope

This section of the specification deals with the requirements of furnishing and placement of shotcreting.

3.7.2 General requirements

Generally, shotcreting shall be done in accordance with IS:9012.

Reinforcement for shotcreting shall be as detailed below, unless specified otherwise.

- a) Reinforcement in one direction consisting of 6 mm M.S. bars at 750 mm c/c shall be connected to the lugs of fastening of the wire fabric. This shall be used in case of 50 mm or above thick shotcreting.
- b) Wire fabric conforming to IS:1566 shall be used as reinforcement and shall consist of wire, 3 mm diameter, spaced 50 mm both ways and shall be electrically cross welded. Wire fabric shall be securely tied to 6 mm bars for 50 mm (min) thickness. Adjacent sheet of wire fabric shall be lapped at least 100 mm tied.
- c) Clear cover to reinforcement mesh shall not be less than 15 mm.

This work shall be executed only by experienced operators, approved by the Engineer.

Minimum thickness shotcreting shall be 50 mm. for abrasion resistant and 25 mm for ordinary surface protection work.

3.7.3 Materials

Generally, the materials shall be in accordance with the relevant clauses of Technical Specification for properties. Storage and Handling of common Building Material, which shall be deemed to form a part of this Specification.

- a) Fine aggregates shall consist of natural sand or crushed stone from a known source and shall be strong, hard, coarse, sharp chemically inert, clean and free from any coating. It shall be free from clay, coal or coal residue, organic or any other impurities that may impair the strength or durability of the concrete and shall conform to IS:383.
- b) Fine aggregate (sand) shall be well graded and particles shall range in size within the following limits. The Engineer, may approve the use of any other grading as per the requirements of IS:9012.

IS sieve designation	Percentage passing by weight
10 mm	100
4.75 mm	90 – 100
2.36 mm	60 – 95
1.18 mm	45 – 80
600 microns	35 – 60
300 microns	8 – 30
150 microns	0 – 10

- c) The fineness modules shall be preferably between 2.5 & 3.3. Any other value can be used, with prior approval of the Engineer.

Water shall be clean & free deleterious matter and shall have same properties, stipulated for use in concrete work.

Set accelerating and water-proofing shotcreting admixtures of approved make shall be used wherever required.

3.7.4 Application

After the placement of reinforcement and/or welded mesh and not more than six hours prior to the application of shotcrete, the surface shall be thoroughly cleaned of all loose material and dirt. The Concessionaire shall properly prepare the surfaces, reinforcement and/or welded mesh to receive the shotcrete. Cleaned surfaces shall be wetted not more than one hour prior to shotcreting.

The mix as placed on surface shall one part cement to three parts approved sand by volume. Cement and sand shall be dry mixed; no water shall be added after mixing and before using in the gun. The quantity of water when added, shall be only that which is sufficient to hydrate the cement. For average atmospheric conditions, the water cement ratio for shotcrete in place shall be between 0.35 and 0.5. Suitable admixture shall be used wherever required.

A uniform pressure of not less than 2.5 Kg/cm² at the nozzle shall be maintained. Necessary adjustments shall be made to ensure this pressure, taking into account the length of hose and height of the place to be shotcreted.

The application shall proceed in an upward direction. Beams, stiffener and intermediate walls, if any, shall be wrapped with wire fabric and completely covered with shotcreting. All rebound shall be removed from the area of application as the work progresses and such rebound material shall not be reused.

3.7.5 Curing

As soon as the freshly shotcreted surface shows the first dry patches, a fine spray of water shall be applied to keep it moist. After the surface has hardened, it shall be kept continuously moist for minimum seven days. If there is extreme heat, especially when accompanied by hot winds, the shotcreted surface, immediately upon completion, shall be covered with burlap or similar covering, which must be kept continuously moist for 14 days after shotcreting. The temperature of the lining shall not be permitted to exceed 38 Degrees Centigrade during placing and curing.

3.8 Grouting

3.8.1 Scope

This section of the specification deals with the requirements of furnishing and placement of grout in block outs and foundation bolt holes and underpinning of base plates. In case special type of grouting is required for the machine base plate, the Concessionaire shall submit the details of the same and get it approved from the Engineer.

3.8.2 General requirements

The space between the top surface of the foundation and the underside of the base plate shall be filled with appropriate grout.

Crushing strength of grout shall be one grade higher than the foundation concrete. Minimum crushing strength shall be 25N/sq.mm. Unless otherwise specified.

The contact area between the grout and base plate shall not be less than 80%.

3.8.3 Materials

Cement shall be Ordinary Portland Cement slag cement or Pozzolana Portland Cement conforming to IS:269, 455 and 1489 respectively.

Sand shall be clean and well graded conforming to IS 383. For flow able grout, sand conforming to Zone - 4 grade shall be used. Coarse aggregate wherever used shall also conform to IS:383.

Clean potable water as recommended for concrete mix shall be used.

➤ Admixtures

- a) Non-shrink admixtures of approved make shall be used.
- b) Plasticizer conforming to IS:9103 shall be used to increase the workability, wherever required.

3.8.4 Mixing and placing

➤ Type of mix

There shall generally be following three types grout mix::

- i) Ready mixed non-shrink cementations grout
- ii) Cement-Sand Grout: The proportion of cement to sand shall generally be 1:2, unless otherwise specified.
- iii) Cement Aggregate Grout: The approximate proportions of cement, sand and coarse aggregate shall be 1:1:25:2, with a maximum size of aggregate as 10 mm. This mix shall generally be used for grout thickness above 40 mm for dry pack application.

➤ **Mixing**

Depending upon the case of placement and method of application, there shall be following three grout consistencies.

- a) **Fluid Mix:** Water cement ratio shall be 0.6 (max.) may be added to increase workability, wherever required. This grout mix shall be suitable for application with low pressure grouting equipment or self flowing and suitable for grouting of pockets/block outs, etc.
- b) **Plastic Mix:** Water-Cement ratio shall be about 0.5. This grout mix shall be suitable for application with trowel or rod.
- c) **Stiff Mix:** Water-cement ratio shall generally be 0.4. This grout mix shall be suitable for dry-pack application. The consistency should allow pressurizing into firm hardball without cracking.

➤ **Placing**

The block outs, bolts holes etc. Which have to be grouted, shall be cleaned thoroughly by use of compressed air just prior to taking up the grouting operations.

Cement, sand, aggregate, and non-shrink admixture of approved quality and proven make shall be first blended thoroughly in the required proportion as per manufacturer's specifications. Grout shall then be prepared by mixing this admixture with water. Any grout which has been mixed for a period longer than half an hour shall not be used on the work.

Immediately after preparation, a grout of suitable mix shall be poured into the block outs, pockets and bolt holes either from the sides or through the holes provided for this purpose in the base plate, by using special equipment for pressure grouting. It shall be ensured by Roding and by tapping of bolts that the block out is completely filled without leaving any voids. The pouring shall cease as soon as each hole is filled and any excess grout found on the surface of the concrete foundation shall be completely removed and the surface dried.

The space between the top surface of the foundation concrete and the underside of the base plate shall be filled with appropriate grout type. Grouting, once commenced, shall be done continuously. Grout shall be worked from one end to the other (to prevent air entrapment) and until the grout oozes out through the grout holes provided in the base plates.

In case of stiff mix, the space between the top surface of foundation concrete and the underside of the base plate shall be dry packed by firmly pressing or ramming into place against fixed supports.

When it is clear that the centre of base has been properly filled, the grout outside the base plate shall be briefly rammed to ensure compaction below the edges. Shims provided for the alignment of plant bases shall be positioned at the edges of the base to permit subsequent removal, which shall take place not less than 7 days after the grouting has been executed. The resulting cavities shall be made good with the same grade of grout as has been used for grouting under the rest of the base plate.

➤ **Curing**

The work shall be cured for a period of atleast 7 days commencing 24 hours after the completion of the grouting. The curing shall be done by covering the surfaces with wet gunny bags and flooding.

3.9 Encasement of steel structures / elements

3.9.1 Scope

This section of specification deals with the requirement for encasement of steel work in concrete with necessary formwork, placing, finishing and curing, complete as per drawings and specifications.

3.9.2 General requirements

All concrete work, reinforcement, formwork & staging work shall be done as per stipulations of section 2, 3 and 4 of this specification.

The reinforcement to be provided for encasement of steel elements shall be mild steel bars or in the form of wire netting. Such reinforcement shall be kept 20 mm away from the steel member and held securely to it.

The minimum grade of concrete to be used for encasing shall be M-20 unless specified. The aggregate to be used in concrete shall be 12.5 mm maximum size unless specified otherwise. In case of box type steel sections, encasement shall be done with cement, sand mortar (1:4) with thickness of 50mm over 0.9 mm size wire netting conforming to IS:3150, or as shown on the drawings.

In the case of encasement of beams with concrete, if the gap between the edge of the shuttering and flange is hardly sufficient for placing the concrete, the workability of the concrete shall be increased suitably by increasing the water-cement ratio.

Minimum cover for concrete encasement shall be 50 mm

3.9.3 Materials

The materials shall be in accordance with the relevant clauses of Technical Specification for Properties, Storage and handling of common Building Materials which shall be deemed to form the part of this specification.

3.9.4 Wire netting

Hexagonal wire netting shall be 0.9 mm dia and 19 mm aperture size, conforming to IS:3150.

3.10 Joints in concrete

3.10.1 Scope

This section of the specification deals with the requirement of furnishing and installing of joints including joint filler materials, water bars, resilient pads type vibration damping material in an around the side of concrete works etc.

3.10.2 General requirements

Details of joints shall be as approved by Engineer or as per approved drawings. Where necessary or / and specified, joints shall be made water tight by use of water stops.

3.10.3 Classification of joints

From the point of view of utility, the joints as provided may be classified as below:

a) Construction joints

Construction joints are produced by placing fresh concrete against surface of hardened concrete. Construction joints are generally, but not necessarily, vertical or horizontal. Requirements of construction joints shall be as per clause specified elsewhere.

b) Contraction joints

These are provided to eliminate tensile stresses due to shrinkage and are commonly used where temperature variations are small and where there is no likelihood of expansion, such as spaces below water and earth levels and unexposed to atmosphere. At contraction joints, the reinforcement is discontinued and bond is not allowed to develop between the joint faces, thereby introducing a structural discontinuity. A contraction joint also serves as a construction joint so far as break in the pouring of concrete is concerned.

c) Expansion joints

These are provided either to completely eliminate or to significantly reduce comprehensive stresses in concrete that would otherwise result from thermal expansion and might crush, buckle or crack part of the structure. Expansion joints serve the purpose of contraction and also construction joints.

d) Control joints

At places where cracking is inevitable, places of weakness are introduced by the provision of control joints so that the cracking takes place along these joints instead of allowing it to develop in a haphazard manner.

e) **Separation joints**

The places where the expansion of the structure is not expected but they are required to be kept structurally separate so that stresses, vibrations, etc. are not transferred, a separation joint should be provided. Like expansion joint, a gap is provided in separation joint also, but this is not expected to be used by the expansion of members. In case, no gap is required, the separation joint can be obtained by using an approved alkathene sheet stuck on the surface against which concrete shall be placed.

f) **Settlement joints**

Structures, which are likely to settle with respect to the adjacent structures, shall be separated by a settlement joint so that the adverse effects of differential settlement are obviated. It is like an expansion joint but with a different sealing arrangement.

3.10.4 Materials

➤ **Joint filler**

a) **Bitumen board:**

The bitumen impregnated fiber board; a preformed material shall be used as joint filler which shall fill space between the concrete surfaces at the joints. The minimum thickness of board shall be 12 mm and the material shall conform to IS:1838.

b) **Expanded polystyrene :**

The expanded polystyrene slab shall be of fire retarding grade (type-2) conforming to IS:4671 Density of material shall not be less than 25 kg/cum.

➤ **Water stops**

- a) Water stops shall be provided at the joints as a continuous diaphragm to contain the filler material and/or to exclude passage of water or any other material into or out of the structure.
- b) The water stops shall be either metallic like Copper, or non-metallic like P.V.C. the material is to be procured from reputed manufacturers having proven records of satisfactory supply of Water Stops of similar make and shape of other jobs. Only PVC water stop shall be used, unless, otherwise, specifically approved by the Engineer.

c) **Non-metallic Water Stop :**

These will be normally in PVC and can be of shape having any combination of the following features:

- i) Plain
- ii) Central Bulb
- iii) Dumb-bell or flattened ends
- iv) Ribbed and Corrugated Wings
- v) V-shaped
- vi) Kicker type (Externally placed)

Water bars shall generally meet the stipulations of IS:12200. The minimum thickness of PVC Water Stops shall be 5 mm and the minimum width 225 mm, unless otherwise specified in the schedule of items. However, for some non-critical areas 150 mm wide and 5 mm thick water stop can be used. The actual size and the shape will be as shown on drawings and/or as directed by the Engineer. The material should be of good quality Polyvinyl Chloride, highly resistant to tearing, abrasion and corrosion as well as to chemicals likely to come in contact with during use. The performance requirements shall generally be as follows:

Sp. Gr	:	1.3 to 1.4
Shore hardness	:	60A to 80A
Tensile strength	:	116kgf / cm ² min.
Max. Safe continuous temp.	:	70 degree C.
Ultimate elongation	:	Not less than 300%
Tear resistance	:	45kgf / cm ² min.

Stiffness in flexure	:	25kgf / cm ² min.
Accelerated extraction		
i) Tensile strength	:	110kgf / cm ²
ii) Ultimate elongation	:	250%
iii) Water absorption in 7 days	:	5% (max.)
Effect of Alkali	:	7 days
1. Weight increase	:	0.25% max.
2. Weight decrease	:	0.10% max.
3. Hardness change	:	± 5 %
Effect of Alkali	:	28 days
a) Weight increase	:	0.40% max.
b) Weight decrease	:	0.30% max.
c) Dimension change	:	±1%

➤ **Sealing compound**

a) **Bitumen sealing compound:**

The bitumen sealing compound shall be from approved manufacturer and shall conform to the requirements of IS:1834. For joints in concrete lining on canals/reservoirs, sealing compound conforming to IS:5256 shall be used.

b) **Polysulphide sealing compound:**

This shall be two-part polysulphide sealant and shall be from approved manufacturer, conforming to IS:12118. Materials shall consist of polysulphide polymer and a curing agent. Gun grade material shall be used unless otherwise specified. The application of the sealant shall be strictly followed as per manufacturer's guidelines.

➤ **Metal cover strips**

Metal cover strips shall be made from aluminium or mild steel sections as shown on drawings. The min. thickness of aluminium strips shall be 3 mm and that of mild steel 6

mm. Aluminium alloy strip shall be corrosion resistant grade 31000 as per IS:737. Mild Steel shall conform to IS:226 or IS:2062.

➤ **Resilient pads**

- i) The vibration damping material shall be resilient rubber pads made up of natural or synthetic rubber and shall have the following physical properties
 - a) Shore 'A' durometer hardness : 50 (+) / (-) 5
 - b) Min. elongation : 450%
 - c) Ultimate min. tensile strength : 145 kg/sq.cm
 - d) Rubber pads shall not absorb more than 10% of weight of water in a 7 days test.
- ii) The minimum thickness of the resilient pads shall be 12 mm.

3.10.5 Installation

➤ **Bitumen board / Expand polystyrene**

The bitumen impregnated fiber board may be secured to vertical concrete by nails in the first placed concrete. The joint filler shall be coated on both faces with coal-tar pitch conforming to IS:216 or bitumen grade conforming to IS:73 or IS:702.

- i) Water stops shall not have any longitudinal joints and shall be procured and installed in largest practicable lengths having a minimum number of transverse joints. The jointing procedure shall be as per the manufacturer's recommendations and shall be reviewed and approved by the Engineer. Suitable field splicing kit including heater shall be used for this purpose. The edges shall be neatly crimped and bent to ensure proper bond with the concrete.
- ii) As Non-metallic Water Stops can be easily handled in very large lengths unlike metal strips, transverse joints will be allowed only under unavoidable circumstances and with the specific approval of the Engineer. The method of forming these joints, laps etc. shall be as specified by the Manufacturer and/or approved by the Engineer, taking particular care to match the centre and the edges accurately.

- iii) Particular care shall be taken for the correct positioning of the water stops to prevent any faulty installation, which may result in joint leakage.

Adequate provisions shall be made to support the water stops during the progress of work and to ensure their proper embedment in the concrete. The symmetrical halves of the water stops shall be equally divided between the concrete pours adjacent to the joints.

Max. Density and imperviousness of the concrete shall be ensured by thoroughly working in the vicinity of joints. However, particular care should be exercised in use of vibrators in the proximity of joints to avoid dislodging of the water stops.

- iv) **Splices**

Splices in the continuity of intersections of runs of water stops shall be jointed as per manufacturer's stipulations depending on the type of water stops used. In case of a cross section, overlapping must not be done but, instead factory made cross joint should be used. It is essential that the material is not damaged during the splicing operation and that the continuity of the entire water stops across the section be maintained.

- v) **Inspection**

All water stops installations shall be subject to inspection and approval by the Engineer, before concreting operations, encasing water stops, are performed.

➤ **Sealing compound**

When directed, the gap in joints shall be thoroughly cleaned and sealing compound laid as per manufacturer's specification and approved drawings. Primer shall be applied wherever required. For reservoir/canal lining, procedure as stipulated under clause 9.0 of IS:5256-1969 shall be followed.

➤ **Metal cover strips**

The metal cover strips shall be pinned (using stainless steel) at one end and slotted at the other end. Exposed surface of mild steel shall be painted with two coats of approved anti-

corrosive paint (as per IS:2074) and/or bituminous paint. Welding of aluminium shall be in accordance with IS:2812.

3.10.6 Resilient pads:

The resilient pads shall be installed around the foundation or at other locations as shown on the drawings. The pads shall be installed in position by sticking the same to the foundations by using approved glue.

3.11 Waterproofing / damp proofing of underground concrete structures

3.11.1 Scope

This section of specification deals with the retirements of all works for completing water proofing / damp proofing of underground concrete structure. This shall include water retaining and basement type structures.

3.11.2 General requirements

As a general guidance, the provisions of IS: 6494 shall be followed unless otherwise mentioned.

The Concessionaire shall do the proper concreting so that concrete is water tight in itself without any waterproofing treatment. The waterproofing treatment shall be provided in exceptional cases, as additional precaution, as shown on the drawings or directed by the Engineer.

The work of waterproofing / damp proofing of underground concrete structures by course of bitumen felt, blown bitumen or any other operations shall be entrusted by the Concessionaire to one of the well known expert agencies approved by the Engineer.

Actual type of waterproofing treatment to be provided for particular structure, shall be as shown on the drawings or directed by the Engineer.

3.11.3 Bitumen felt treatment

➤ Materials

- a) The materials shall be in accordance with the relevant clauses of Technical specification for properties, Storage and Handling of Common building materials
- b) The bitumen felt shall conform to IS: 1322 and the workmanship to IS:1609 and IS: 3067. The bitumen felt shall be hessian based. Bitumen primer shall conform to IS: 3384. The bonding materials shall consist of blown type bitumen conforming to IS: 702 or residual bitumen conforming to IS:73 or a mixture of the two, to withstand local conditions of prevailing temperature gradient of surface. The Concessionaire shall satisfy the Engineer that the bonding materials proposed to be used are suitable for the particular job.

➤ **Installation**

- a) Waterproofing / Damp proofing for horizontal surfaces, unless specified otherwise with two layers of felt on which subsequently concrete shall be placed, shall be provided with the following treatments :
 - i) A minimum of 12mm thick plaster 1:4 (1 cement : 4 sand) with waterproofing admixture / additives over PCC
 - ii) One coat of bitumen primer @ 0.4 kg/Sqm min.
 - iii) One layer of hot applied bitumen @ 1.5kg/sq.m. min.
 - iv) One layer of self-finished felt (type - 3, grade II as per IS: 1322).
 - v) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
 - vi) One layer of self-finished felt (type - 3, grade - II as per IS: 1322).
 - vii) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
 - viii) A minimum of 12mm thick plaster 1:4 (1 cement: 4 sand).
- b) Water proofing / Damp proofing for other surfaces (including vertical) unless specified otherwise, with two layers of felt shall be provided with following treatments:
 - i) One coat of bitumen primer @ 0.4 kg/Sqm min.
 - ii) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
 - iii) One layer of self-finished felt (type - 3, grade - II as per IS: 1322).
 - iv) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
 - v) One layer of self-finished felt (type - 3, grade II as per IS: 1322).
 - vi) One layer of hot applied bitumen @ 1.5 kg/Sqm min.
 - vii) A minimum 25mm thick plaster 1:4 (1cement: 4 stand).

- viii) Half brick masonry work in cement mortar 1:4 (1 cement: 4 sand) using bricks of class designation 75, unless otherwise specified.

3.11.4 Miscellaneous treatment

➤ **Plastering treatment**

After the side walls are constructed and allowed to undergo the specified curing, the surface of the walls and the flooring should be made rough with a hacking tool, washed clean with water and wire brushed so as to remove all the loose material, and a waterproof cement plaster 1:3 mix, with suitable proportion of an integral waterproofing compound shall be applied in two coats, the first coat being 12mm thick and the next 10mm thick. The second coat shall be applied after allowing a time interval of at least 24 hrs for the first coat to harden. Hexagonal galvanized netting of 0.90mm dia, 19 mm aperture size shall be used in the plastering. The netting shall be fixed with the help of MS Screws, fixed with the help of fibrous plugs provided before application of first layer of plaster.

➤ **Hot applied bitumen treatment**

The external concrete of plastered surface shall be carefully cleaned, cured and allowed to dry for some time before the application of a coat of hot bitumen of the industrial grade 85/25 conforming to IS : 702 against ground water seepage. Rate of application of bitumen shall not be less than 1.7 kg/Sqm and it should be heated to about 120 C before application. Anti-stripping compound shall be added. Anti-stripping and adhesion improving agent shall be 100% mixable in bitumen. The stripping and adhesion improving agent shall be 100% mixable in bitumen. The stripping value tested as per IS: 6241 should be nil when recommended quantity of anti-stripping compound is mixed. Nominal mix proportion of the compound shall be 1 percent by weight of bitumen. However, actual mix proportion shall be as per manufacturer's recommendation.

➤ **Polymer modified cementitious coating treatment**

a) Materials

- i) Modified liquid polymer blend shall be a dispersion containing 100% acrylic based polymer solids.
- ii) Portland cement based dry powder
- iii) Clean, fine specially prepared quartz sand approximately 0.6 mm size.

b) Mixing

The liquid polymer shall be stirred well and cement base powder shall then be added slowly to make a slurry mix. For preparation of brush topping mix, quartz sand shall be added slowly and mixed well till a homogenous mixture is obtained. The mix shall be used within half an hour of the preparation. Addition of quartz sand may not be necessary, in case dry power contains the same.

c) Properties of the coating

- i) It must adhere to the wet surface
- ii) It should develop adequate bond strength with the concrete surface, not less than 2 N / Sqm
- iii) Co-efficient of permeability shall be about 5 x 10 Cms
- iv) Water absorption after continuous soaking shall not be more than 1%.
- v) The materials shall be permeable under water vapor.
- vi) The material shall be resistant to acids and alkalis' present in the soil and underground water with normal pH value between 4 and 14.
- vii) The co-efficient of thermal expansion of the material shall be close to that of concrete.

d) Application

The concrete surface shall be cleaned and made free from grease, oils or loosely adhered particles. The surface shall be damp without any free water.

- i) For slurry mix: a minimum of 2 coats shall be applied on the surface. The first coat being applied when the surface is still damp and left to harden for 4 to 6 hours. After 4 to 6 hours of the application of second coat, it shall be finished by rubbing down with a soft dry sponge. The coverage shall not be less than 1.1kg/sq.m in the 2 coats. A lap of 75mm shall be provided at the joints.

The coating shall be air dried for 4 to 6 hours and, thereafter, cured for 7 days after the application of last coat.

- ii) For brush topping mix: This shall be applied in two coats. A primary coat of slurry mix can also be first applied on the surface as first coat. After the coating has dried up, a coat of brush topping mix shall be applied over it with a push broom or any other similar brush. It shall be left in broom finished condition. The nominal thickness shall be 1.5mm and minimum thickness shall be 1.0mm. A lap of 75mm shall be provided at the joints. It shall be ensured that no pinhole exists and re-brushing shall be done to cover the pinholes if any.

The coating shall be air dried for 4 to 6 hours and thereafter cured for 7 days after application of last coat.

3.11.5 Chemical injection treatment

Wherever shown on the drawing or directed by the Engineer, min 12mm dia (N.B.) threaded nozzle of suitable length, shall be provided over the surface and along the construction joint line in a grid pattern at a spacing not exceeding 1.5m c/c before concreting operation. Adequate precaution shall be taken to keep the nozzles plugged at both ends to prevent them from getting closed by concrete.

For fixing of any nozzle in set concrete suitable size hole shall be drilled, preferably by using percussive hammer drill electrically operated, in grid pattern and grouting nozzle shall be fixed in these holes.

After the nozzles are fully set, neat cement slurry admixed with water-soluble non-shrink polymer/monomer based chemical shall be injected through the network of nozzles with low pressure grout pumps at a pressure of about 2.0 kg/sq.cm. Water cement ratio of the slurry shall not be more than 1:2. The resultant solution shall not have viscosity greater than 1:2 centipoises. Plasticizing agent shall be added wherever required. The grouting shall be started at very low pressure and increased gradually to a required pressure. The grouting shall continue till the hole refuses to take any further grout, even at an increased pressure. Applied pressure shall not be more than the designed strength of the concrete. After completion of grouting operation, the nozzles shall be sealed properly to the satisfaction of the Engineer.

3.12 Dismantling / demolishing work - RCC and PCC

3.12.1 Scope

This section of specification deals with the requirements of dismantling / demolishing RCC and / or PCC work.

3.12.2 General requirements

The dismantling implies, carefully taking up or down and removing without damage, this shall consist of dismantling one or more parts of a structure. This includes chipping work, making holes/ opening etc in concrete members according to the required shape, size and profile at all elevations.

The term demolition implies, taking up or down or breaking up of a structure / member in part or full as specified or shown on drawings or as directed by the Engineer.

In a structure / member, both dismantling and demolishing work may be involved. In such case, the portion of work treated as demolishing shall be as shown on the drawing or as decided by the Engineer.

All materials obtained from the demolition/dismantling work shall be the property of the Executing Agency, unless otherwise specified.

All serviceable materials obtained, shall be separated out and stacked properly upto a lead of 500 metres or shall be returned to NTPC stores and all unserviceable materials, rubbish etc shall be disposed off as directed by the Engineer upto a lead of 2 Kms.

The dismantling / demolishing operations shall be carried out in proper sequence so that the serviceable material can be salvaged, without being damaged during the process of work.

Necessary propping, shoring and under pinning shall be provided for the safety of the adjoining work or property which is to be left intact, before dismantling / demolishing work

3.12.3 Safety

All demolition work shall be carried out in conformity with the local safety regulations, extreme caution being exercised to avoid damage to the work and the equipment, which are to be left intact. Necessary precautions shall be taken to keep the dust nuisance down. Safety requirements in IS: 4130 shall also be followed.

As and where necessary, the dismantled / demolished materials shall be lowered to the ground and not thrown and then properly stacked as directed by the Engineer. Wherever required, temporary enclosures shall be erected to minimize the dust or moisture infiltration.

3.13 Cement additives / admixtures in concrete

3.13.1 Scope

This section of specification deals with the requirements of furnishing, placing and mixing cement additives / admixtures, in all kinds of cement concrete, (plain or reinforced) for all kinds of structures at all levels.

3.13.2 General requirements

The Concessionaire shall furnish all labour and equipment to place and mix waterproofing cement additive and cement plasticizer in concrete of any grade and cement mortar. Thereafter he shall carry out the work as specified earlier in relevant clauses of this specification for concrete and hence complete the work as indicated on the drawing and as per the specification listed hereunder.

Waterproofing additive and other types of admixtures shall be as far as possible, free from aggressive chemical like chloride, sulphide etc., which can cause corrosion of steel reinforcement in RCC.

The Concessionaire shall have the services of the manufacturer's supervisor, at no extra cost to the Executing Agency, to supervise the work, if directed by the Engineer.

Admixtures in concrete for promoting workability, improving strength, entraining air or for similar purposes may be used only after the written permission from the Engineer, is obtained. Addition to admixtures shall not reduce the specified strength or durability of concrete in any case. The admixtures shall conform to IS: 9103 and shall be of proven

make and from a reputed manufacturer. Calcium chloride shall not be permitted to be used other than in mass (plain) concrete works.

3.13.3 Materials

Waterproof cement additive shall conform to IS: 2645 and shall be of proven make and from a reputed manufacturer.

Admixtures in concrete shall conform to IS: 9103 and shall be of proven make and from a reputed manufacturer. In addition, for plasticizer cum waterproofing compound materials shall meet the permeability requirements as per IS: 2645. Similarly, for plasticizer cum retarder admixture material shall satisfy the setting time requirements of retarder and other properties of plasticizer as per IS: 9103.

3.13.4 Mixing

Admixtures / waterproofing additive shall be used at the rate specified by the manufacturer or as indicated on the drawings and shall be mixed with water, as required by the Engineer. Samples of concrete in which admixture and / or waterproofing cement additive is added shall be tested for water proofness, workability, compressive strength, water absorption, density, setting time, etc., the results shall conform to relevant IS specifications.

Table - 4: Frequency of sampling and testing

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
1.	Coarse aggregates			
a)	Particle size & shape	IS:2386(Pt.1)	One per 100 cum. or part thereof or change of source whichever is earliest	Result to be as per the requirement of design mix, subject to variations within the limits specified in relevant Indian Standards.
b)	Moisture content	IS:2386(Pt.3)	Once for each stack of 100 cum. or part thereof except during monsoon when this has to be done every	Accordingly water content of the concrete shall be adjusted.

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
			day before starting of the work.	
c)	Specific gravity, density, voids, absorption.	IS:2386(Pt.3)	Once in 12 weeks or change of source whichever is earlier	These tests shall be carried out while establishing design mix and results to be intimated.
d)	Mechanical properties, crushing value, abrasion value and impact value.	IS:2386(Pt.4)	Once per source	Acceptance norms shall be as per IS:383
e)	Soundness	IS:2386 (Pt.5)	Once per source	Acceptance norms shall be as per IS:383.
f)	Reaction with alkali.	IS:2386 (Pt.7)	Once per source	These tests shall be carried out while establishing design mix and result to be intimated. Acceptance shall be as per IS:2386 (Pt.7).
g)	Flakiness and petro-graphic examinations	IS:2386	This is to be done once and should be repeated in case the source is changed.	These tests shall be carried out while establishing design mix and results to be intimated.
h)	Deleterious materials	IS:2386 (Pt.2)	Once per source	Results should be within the limit as specified in relevant Indian Standards and in this Specification.
2.	Fine aggregates / sand			
a)	Particle size and shape.	IS:2386 (Pt.1)	One per 100 cum. or part thereof or change of source, whichever is earlier.	Should be as per the requirement of design mix, subject to variation within the limit as

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
				specified in relevant IS Codes.
b)	Specific gravity, density, voids, adsorption and bulking.	IS:2386 (Pt.3)	Once in 12 weeks or change of source whichever is earlier	These tests will be carried out while establishing design mix and results to be intimated.
c)	Bulk age, moisture content (Routine test)	IS:2386 (Pt.3)	To be done every day before start of work.	Volume of sand and weight of water shall be adjusted as per bulk age and moisture content.
d)	Silt, clay deleterious materials, organic impurities.	IS:2386 (Pt.2)	Once per source and to be repeated, if source is changed.	Volume of sand and weight of water shall be adjusted as per bulk age & moisture content.
e)	Soundness and Petrographic examination.	IS:2386 (Pt. 5 & 8)	Once per source.	Acceptance norms shall be as per IS:383.
f)	Mortar making properties.	IS:2386 (Pt.6)	-do-	Acceptance norms shall be as per IS:383.
g)	Reaction with alkali.	IS:2386(Pt.7)	Once per source	Acceptance norms shall be as per IS:383 and IS:2386 (Pt.7).
3.	Cement			
a)	Setting time	IS:4031	One sample of each received from stores.	Acceptance norms shall be as per relevant Indian Standard
b)	Compressive Strength	IS:4031	-do-	-do-
4.	Water			
	Harmful substances, pH value, initial setting time, compressive strength.	IS:3025, IS:4031 & IS:516	Once a month for each source	Acceptance norms shall be as per Cl.4.3 of IS:456-1978.

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
5.	Concrete			
a)	Workability (Slump and compaction factor)	IS:1199	One sample every two hours from every mixing plant.	Acceptance value shall be as per Cl. 6.1 of IS:456-1978.
b)	Crushing Strength	IS:516	i) As per Cl.14.2.2 of IS:456-1978 for initial period ii) One sample of six cubes per 150 cum or part thereof for mass concrete for subsequent period.	Acceptance criteria shall be as per Cl.15 of IS:456-1978. A minimum of 3 (Part-7) specimens shall be tested for 28 days strength.
c)	Water-cement ratio	IS:119	At random at the time of batching	According to mix design
d)	Cement Content	IS:1199	-do-	-do-
e)	Finished dimensions	Physical measurement	All structures	Acceptance as per Specification
6.	Form work a) Staging (Durability strength & soundness of staging, joints, adequacy of its foundation and specific level)	Visual	Each member	Any staging intended for use shall be approved by the Engineer for its durability and strength
				After erection of staging, nominated representatives of Engineer shall check the soundness of the staging as a whole, its joints,

Sl. No.	Nature of test/ characteristics	Method of test	No. of samples & frequency of test	Remarks
				adequacy of its foundation and the specific levels.
	b) Shuttering			
	i) Materials	Visual	Random	Formwork materials shall be strictly as per specifications and approved of the Engineer. Materials for formwork shall be unwrapped, thoroughly clean and without broken or damaged edges either due to repetitive use or otherwise. Oiling of formwork before concreting shall be resorted to.
	ii) Joints	Visual	Random	Joints shall be leak proof to avoid loss of liquid
	iii) Dimensions and plumb	Physical measurement	Each member and before every lift.	Tolerance as per Specification
7	Reinforcement			
	a) Placement	Visual	each	The bar bending schedule with the necessary hooks, laps, covers, spacers and chairs shall be 100% checked for all concreting works before start of the work.
	b) Cutting tolerance	Physical measurement	Random	Tolerance shall be as per specification.

3.14 Slab on grade

3.14.1 Scope

This section of specification deals with carrying out the work of “slab on grade”. In all medium duty industrial floors

3.14.2 General requirements

The Concessionaire shall furnish all material/ labour and equipment. The specifications covered under section C-3, sub section 1 to 13 for cast in situ concrete and allied works shall generally be applicable unless otherwise specified here under.

The work includes right from preparation of sub grade to completing and curing slab on grade in all respects to the satisfaction of the Engineer.

3.14.3 Materials

- (a) Materials for filling shall be crushed stone dust, sand or other inorganic materials and they shall be clean and free from shingle, salts, organic matters, roots and excessive amount of sod, concrete or any other foreign substances which could harm or impair the strength of the substructure in any manner.
- (b) Stones for Granular sub base shall be broken stones to gauge not exceeding 63 mm and shall be free from dust, organic matters etc.
- (c) Maximum size of 40 mm stone aggregate shall be used for concrete.
- (d) Cement shall be ordinary Portland cement conforming to IS:269,Grade 43
- (e) Admixtures in concrete for improving workability, strength etc may be used only after the written permission from the Engineer.
- (f) Water shall be clean, free from injurious matters. Potable water is generally considered satisfactory.
- (g) Reinforcing steel bars shall conform to grade 1 of IS:432 (part 1)
- (h) Polysulphide sealant shall conform to IS 12118 Gun Grade.
- (i) Concrete curing compound shall be CONCURE WB of M/s. Fosroc Chemicals (India) Ltd., or equivalent.

3.14.4 Laying of slab on grade

- i) Uneven (but fairly level) sub grade shall be dressed, leveled by necessary Excavation / Scraping / Filling, watered, rolled by 10T roller and consolidated to desired level.

- ii) On consolidated sub grade, two layers of granular sub base each of 75 mm thickness shall be laid Total consolidated thickness of sub base shall be 150 mm. Refer specification No.C-1.6.0 - Granular Sub Base (Hard core)
- iii) On consolidated sub base water proof paper shall be placed with minimum 150mm overlaps on all sides.
- iv) Concrete grade M20, 150 mm thick shall be poured in strips as per drawing and as directed by the Engineer.

The strips shall be prepared by placing formwork in straight line and level. Each strip may be of size 4 metre wide x 20 metre long alternate strips shall be cast by leaving 24 hours interval in between.

Form work shall be strong enough to hold the screed vibrator.

The concrete shall be vibrated by screed vibrator / surface vibrator and when it becomes touch dry it shall be machine trowel led to smooth uniform level surface. Ramp surfaces shall then be “**Broom Finished**”.

Under no circumstances dry cement or cement slurry shall be separately spread on concrete at any time.

Special care shall be taken to pour and vibrate the concrete along the form work to avoid any segregation of aggregate and honey combing.

- v) 24 hours after concreting, the form work shall be removed and immediately the grooves of size 10mm x 50mm as shown on the drawing shall be cut in concrete at an interval of about 4.0 metres or as shown on the drawing.

The grooves shall be cleaned and concrete surface shall then be sprayed by water based concrete curing compound as specified. The grooves shall be filled up by poly sulphide sealant after fourteen days.

- vi) Dowels shall be provided along transverse and longitudinal construction joints as shown on the drawing.
- vii) Any expansion / contraction joints in slab on grade shall be provided at locations and as per the details indicated on the drawing.

3.14.5 Acceptance criteria

All finished surface shall be smooth, uniform and at desired line and level within a tolerance of ± 3.0 mm. It shall be free from cracks and warping.

Sub-section - C4
**Technical specification for masonry and allied
works**

Sub-Section - C4

Technical specification for masonry and allied works

Contents

<u>Clause no.</u>	<u>Description</u>	<u>Page nos.</u>
4.1	Scope	152
4.2	General requirements.....	152
4.3	Codes and standards.....	152
4.4	Brick masonry	153
4.5	Fly ash brick masonry	154
4.6	Stone masonry	159
4.7	Mouldings and cornices	164
4.8	Plinth protection.....	164
4.9	Damp Proof Course (DPC).....	165
4.10	Dismantling and demolition	166
4.11	Sampling testing and quality control	167

Section - C4: Technical specifications for masonry and allied works

4.1 Scope

This section of the specification covers furnishing, installation including handling, transportation, batching, mixing, laying, scaffolding, centering, shuttering, finishing, curing, protection and repairing till handing over of brick masonry and allied works including DPC, plinth protection and dismantling.

4.2 General requirements

The Concessionaire shall furnish all skilled and unskilled labour, plant, equipment, scaffolding, materials, etc. required for complete execution of the work in accordance with the drawings and as described herein and/or as directed by the Engineer.

All workmanship shall be in accordance with the latest standards and best possible practice. Masonry work shall be true to line & level as shown on drawings. All such masonry shall be tightly built against structural members and bonded with dowels, anchors, inserts, etc, as shown on the drawings.

The Concessionaire shall carry out all works for settling out the building lines, locating the co-ordinates and establishing the reduced levels (RL's) on the basis of reference grid lines and bench mark, which shall be furnished by the Executing Agency, at one or more locations.

Any approval, instructions, permission, checking, review, etc. whatsoever by the Engineer shall not relieve the Concessionaire of his responsibility and obligation regarding adequacy, correctness, completeness, safety, strength, quality, workmanship, etc.

4.3 Codes and standards

All applicable standards, acts and codes of practice referred to shall be the latest editions including all applicable official amendments and revisions. A complete set of all these documents shall generally be available at site, with the Concessionaire.

In case of conflict between this specification and those (IS Standards, Codes etc.) more stringent shall prevail.

Some of the applicable Indian Standards, Codes, etc. are referred to here below:

IS:1127	Recommendations for Dimensions and Workmanship of Natural Building Stones for Masonry Work.
IS:1597	Code of practice for construction of Stone Masonry.
IS:1905	Code of Practice for Structural Safety of Buildings - Masonry walls.
IS:2116	Specification for sand for masonry mortars.
IS:2185	Specification for Hollow cement concrete blocks
IS:2212	Code of Practice for Brickwork.
IS:2250	Code of Practice for preparation and use of masonry mortar.
IS:2572	Code of Practice for construction of Hollow concrete block masonry
IS:3414	Design and installation of joints in buildings.
IS:3696	Safety code for scaffolds and ladders.
IS:4130	Safety code during demolition of buildings.
IS:4326	Code of practice for earthquake resistant design and construction of buildings
IS:12894	Fly ash lime bricks specifications.
SP:20	Explanatory hand book on masonry code.

4.4 Brick masonry

4.4.1 Materials

Properties of common building materials for the construction of brick masonry, viz. burnt clay bricks, sand lime and cement shall be in accordance with the technical specification for 'Properties, Storage and Handling of Common Building Materials' (vide Mode C2). Besides clay bricks, other type of bricks like, fly ash-lime bricks cured by autoclave process shall also be used, whenever specified, or shown on the drawing.

4.5 Fly ash brick masonry

4.5.1 Materials

Properties of common building materials for the construction of brick masonry, viz. fly ash bricks, sand lime and cement shall be in accordance with the technical specification for 'Properties, Storage and Handling of Common Building Materials' (vide Mode C2). Besides fly ash bricks, other type of bricks like, fly ash-lime bricks cured by autoclave process shall also be used, whenever specified, or shown on the drawing.

4.5.2 Mortar

IS: 2250 shall be followed as general guidance for preparation and use of mortar. Only cement & Fly ash-sand mortar shall be used. Lime shall be added for composite mortar with specific approval of the Engineer.

Unless otherwise specified, mortar for brickwork having one or more brick thickness shall be 1 part cement & fly ash (20% replacement ratio of cement with fly ash): and 6 parts sand by volume. Mortar for half-brick thick walls shall be 1 part cement & fly ash (20% replacement ratio of cement with fly ash): and 4 parts sand by volume. Richer mix proportion shall be used, whenever specified or as per design requirement. Mortar shall meet the compressive strength requirement as per IS: 2250 and IS: 1905.

Sand shall conform to IS: 2116. Grading of sand when tested as per IS: 2386 shall be as specified in Table -1.

Table 1: Grading of sand for use in masonry mortars

IS sieve designation IS:460 (Part – I)	Percentage passing by mass	Method of test
4.75mm	100	IS:2386
2.36mm	90 to 100	(Part-I)
1.18mm	70 to 100	
600 micron	40 to 100	
300 micron	5 to 70	
150 micron	0 to 15	

Sand, whose grading falls outside the specified limits due to excess or deficiency of coarse or fine particles, may be processed to comply with the standard by screening through a

suitably sized sieve and/or blending with required quantities of suitable sizes of sand particles. Based on test results and in the light of practical experience with the use of local materials, deviation in grading of sand given in Table-1 may be considered by the Engineer. The various sizes of particles of which the sand is composed, shall be uniformly distributed throughout the mass. The required grading may often be obtained by screening and/or by blending together either natural sands or crushed stone screenings, which are by themselves of unsuitable grading.

Cement, fly ash (20% replacement ratio of cement with fly ash): and sand shall be thoroughly mixed dry in a mechanical mixer and water shall then be added to obtain a mortar of the consistency of a stiff paste, care being taken to add just sufficient water for the purpose. Water shall be clean and free from injurious amount of deleterious matter such as oil, acid alkali, salt and vegetable growth. Hand mixing may be allowed by the Engineer on clean approved platform in special cases only. Mortar shall be used as soon as possible after mixing, before it begins to set and preferably within 30 minutes after water is added to the dry mixture. Mortar unused for more than 30 minutes shall generally be rejected and removed from site of work. However, the Engineer may allow the use of mortar upto 2 hours.

Surplus mortar droppings while laying masonry, if received on a surface from dirt, may be mixed with fresh mortar if permitted by the Engineer, where direct for addition of extra cement and this shall be implemented.

4.5.3 Laying

IS:2212 shall be followed as general guidance for construction of brick masonry Vat/tank of suitable size shall be provided by the Concessionaire for soaking of bricks. Bricks shall be soaked in water before use for a period generally not less than 6 hours so that the water just penetrates the whole depth of the bricks. Bricks shall be laid in by hand and not thrown inside the tank. Bricks shall be taken out sufficiently in advance so that these are skin dry at the time of laying.

Bricks shall be laid in English Bond unless otherwise specified. Half or cut bricks shall not be used except where necessary to complete the bond. Closers in such cases shall be cut to the required size and used near the ends of the walls, next to quoin headers.

Bricks shall be laid generally with frogs upwards. A layer of mortar shall be spread on the full width and over a suitable length of the lower course. Each brick shall be properly bedded and set home (in position) by gently tapping with the trowel handle or with a wooden mallet. It's inside face shall be buttered with mortar before the next brick is laid and pressed against it. On completion of a course, all vertical joints shall be fully filled from the top with mortar. The thickness of joints shall be kept uniform and shall not exceed 10 mm. Bricks shall be so laid that all joints are full of mortar.

All face joints shall be raked to a minimum depth of 15 mm by raking tools during the progress of brickwork, when the mortar is still green, so as to provide proper key for the plaster or pointing to be done. When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying.

Brickwork in walls shall be taken up truly plumb. All courses shall normally be laid truly horizontal unless indicated to be laid on slope and all vertical joints shall be truly vertical. Vertical joints in alternate courses shall come directly one over the other. Brick wall shall be construed with atleast one plain face with proper alignment.

All connected brickwork shall be carried up simultaneously and no portion of work shall be left more than one metre below the rest of the work. Where this is not possible, in the opinion of the Engineer, the work shall be raked back according to bond (and not toothed) at an angle not steeper than 45 deg. The work done per day should not be more than one metre height

All iron fixtures, pipes, water outlets, holdfasts for doors and windows, etc. which are required to be built into the brickwork shall be embedded in their correct position in mortar or cement concrete as the work proceeds as per directions of the Engineer.

All brickwork shall be built tightly against columns, floor slabs or other structural parts and around door and window frames with proper distance to permit caulked joint. Where drawings indicate that structural steel columns and spandrel beams are to be partly or wholly covered with brickwork, the bricks shall be laid closely against all flanges and webs with all spaces between the steel and brickwork filled solid with mortar not less than 10mm in thickness.

The top courses of all plinth, parapet, steps and top wall below CRC shall be laid with brick on edge (other than modular size bricks) unless otherwise specified. Care shall be taken

that the bricks forming the top courses and ends of walls are properly radiated and keyed into position as shown on the drawings.

Scaffolding shall be strong enough to withstand all the dead, live and impact loads which are likely to come upon it. It shall also be so designed as to ensure the safety of the workmen using them.

For all brick masonry except for exposed brickwork, single scaffolding shall be permitted. In such cases, the inner end of the horizontal scaffolding pole shall rest in a hole provided only in header course for the purpose. Only one header for each pose shall be left out. Such holes for scaffolding shall, however, not be allowed in pillars/columns less than one metre in width. The holes left in masonry works for scaffolding purposes shall be filled and made good before plastering.

In case of joining old brickwork with new brick work, the old work shall be toothed to the full width of the new wall and to the dept of quarter of a brick in alternate courses. It shall be cleaned of all dust, loose mortar, etc., and thoroughly wetted before starting new brick work. Thickness of each course of new work shall be made equal to the thickness of the corresponding course of the old work by adjusting thickness of horizontal mortar joints.

The face of the brickwork shall be cleaned on the same day on which brickwork is laid and all mortar dropping removed promptly.

Template (bed-block) of plain or reinforced cement concrete shall generally be provided to support ends of RCC beams. Top surface of the wall shall be suitably treated as per direction of the Engineer so as to minimise the friction to movement of the concrete slab over the bearing.

Brickwork shall be protected from rain by suitable covering when the mortar is green. Masonry work shall be cured by keeping it constantly moist on all faces for a minimum period of seven days. Brickwork carried out during the day shall be suitably marked indicating the date on which the work is done so as to keep a watch on the curing period.

4.5.4 Half brick masonry

The work shall be done in the same manner, as mentioned in 4.03 except that all course shall be laid with stretchers. In cases where reinforcement is considered necessary from structural consideration, 2 nos. 8 mm dia bars shall be provided generally at every 4th layer of bricks or as specified on the drawings. Before laying reinforcement, it shall be cleaned of rust and loose flakes with a wire brush. They shall be securely anchored at their ends where the partitions bond. Half the mortar thickness for the bedding joint shall be laid first and then 8mm dia bars laid straight out near each face of the brickwork maintaining a side cover of 12mm mortar. Subsequently the other half of the mortar thickness shall be laid covering the reinforcement fully.

4.5.5 Exposed brickwork

Exposed brickwork i.e. brickwork is superstructure which is not covered by plaster shall be as shown on the drawings and shall be done by specially skilled masons. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in alternate courses shall come directly one over the other. Thickness of brick courses shall be kept uniform and for this purpose wooden straight edge with graduations indicating thickness of each course including joint shall be used. The height of window sills, bottom of lintels and other such important points in the height of the wall shall be marked on the graduated straight edge. Masons must check workmanship frequently with plumb, spirit level, rule and string.

For all exposed brick work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

If face bricks are specified on the drawings, the brickwork shall be in composite work with face bricks on the exposed face and balance in standard bricks, but maintaining the bond fully. Where face bricks are not specified, bricks for the exposed face shall be specially selected from available stack of bricks. All exposed brickwork on completion of work shall be rubbed down, washed clean and pointed as specified. Where face bricks are used, carborundum stone shall be used for rubbing down.

4.5.6 Reinforcing anchorage

For external walls, the anchorage in the form of flats or rods from spandrel beams and columns and any other anchoring and reinforcement as shown on the drawing shall be adequately embedded in the masonry.

4.6 Stone masonry

Rubble stone masonry which is commonly used in stone work has been covered under this specification. Details of construction for Random Stone Masonry (uncoursed) and Coursed Rubble Masonry (first and second sorts) are given in the following clauses. IS: 1597 shall be followed as general guidance for construction of stone masonry

4.6.1 Stone masonry

The stone shall be of the type specified, such as granite, sand stone, quartzite and /or best locally available stone which shall be subject to approval of the Engineer. It shall be obtained only from an approved quarry. Colour of the stone shall be as shown on the drawings or approved by the Engineer. It shall be hard, sound, durable and free from decay, weathering. It shall also be free from defects like cavities, cracks, sand holds, flaws, veins, patches of soft and loose materials, etc. Stones with round surface shall not be more than 5 percent when tested in accordance with IS: 1124. The minimum crushing strength of stone shall be 200 kg/sq cm unless otherwise specified.

4.6.2 Size of stone

Normally, stones used should be small enough to be lifted and placed by hand. The length of stone, shall not exceed three times the height and the breadth on base shall not be greater than three fourth of the thickness of wall not more than 15 cm. The height of stone may be upto 30 cm.

4.6.3 Mortar

Unless otherwise specified, mortar for stone masonry shall be 1 part of cement & fly ash (20% replacement ratio of cement with fly ash): and 6 parts sand by volume. Properties, preparation and use of mortar shall be same as specified for brick masonry work.

4.6.4 Dressing of stone

The dressing of stone shall be as specified below for individual types of masonry work and it shall also conform to the general requirements for stone covered in IS:1129.

- a) For Random Rubble Stone Masonry, stone shall be hammered ---- the face, the sides and the beds to enable it to come into close with the neighbouring stone. the bushing on the face shall be than 4 cm on an exposed face, and 1 cm on a face, to
- b) For coursed Rubble Masonry (First sort) Face stones, shall dressed on all beds, and joints, so as to give them approx. angular shape.

4.6.5 Laying

a) Random rubble masonry

All stones shall be wetted before use. The wall shall be carried up truly plumb or to the specified batter. Every stone shall be carefully fitted to the adjacent stones, so as to form neat and close joints. Stones may be brought to level courses at plinth, window sills and roof level. Levelling up shall be done with concrete comprising of one part of mortar (used for the masonry) and two parts of graded stone aggregate of 20 mm nominal size. The bond shall be obtained by fitting in closely, the adjacent stones and by using bond stones.

Face stones shall extend and bond well into the backing. These shall be arranged to break joints as much as possible, and to avoid long vertical lines of joints, the hearting or interior filling of the wall shall consist of rubble stones which may be of any shape but shall not pass through a circular ring of 15 cm inner diameter. Thickness of these stones in any direction shall not be less than 10 cm. These shall be carefully laid, hammered down with a wooden mallet into the position and solidly bedded in mortar. Clips and spells of stone shall be used where necessary to avoid thick mortar beds or joints and at the same time ensuring that no hollow spaces are left any where in the masonry. The hearting shall be laid nearly level with facing and backing except that at about one metre intervals, vertical 'plumb' projecting about 15 cm to 20 cm shall be firmly embedded to form a bond between successive courses. The chips shall not be used below the hearting stone to bring these upto the level of face-stones. The use of chips shall be restricted to the fillings of interstices between the adjacent stones in hearting and these shall not exceed 20% of the quantity of stone masonry. The

masonry in a structure shall be carried regularly. Where the masonry of one part has to be delayed, the work shall be raked back at an angle not steeper than 45 deg. Tothing in masonry shall not be permitted.

Bond or through stones running right through the thickness of walls shall be provided in walls upto 60 cm thick and in case of walls above 60 cm thickness, a set of two or more bond stones overlapping each other by atleast 15 cm shall be provided in a line from back to back.

In case of highly absorbent type of stones (porous lime stone and sand stone etc.) the bond stone shall extend about two third into the wall. Through stones in such cases may give rise to damp penetration and therefore, for all thickness of such walls, a set of two or more bond stones overlapping each other by atleast 15 cm shall be provided.

Where bond stones of suitable length are not available, cement concrete block of mix 1:3:6 (with 20mm nominal size graded stone aggregate) shall be used. Atleast one bond stone or a set of bond stones shall be provided for every 0.5 sq m of the wall surface. All bond stones in stone masonry shall be marked suitably as directed by the Engineer.

The quoins shall be selected stones, neatly dressed with the hammer or chisel to form the required angle, and laid header and stretcher in the alternate layers. Volume of these stones shall not be less than 0.03 cu m.

Stones shall be so laid that all joints are fully packed with mortar and chips. Face joints shall not be more that 20mm think. When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. Otherwise the joints shall be raked to a minimum depth of 20 mm by raking tool during the progress of work, when the mortar is still green.

Single scaffolding having one set of vertical support shall be allowed. Masonry work shall be kept constantly moist on all faces for a minimum period of seven days. Green work shall be protected from damage, mortar dropping and rain during construction.

b) Coursed rubble masonry (First Sort)

All stones shall be wetted before use. The walls shall be built up truly plumb or to specified batter. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. The height of each course shall not be less than 150 mm nor more than 300 mm. Every stone shall be carefully fitted to the adjacent stones, so as to form neat and close joints. Face stones shall be laid in alternate header and stretcher fashion. No face stone shall be less in breadth than its height and at least one third of the stones shall tail into the work for length not less than twice their height. These shall be so arranged as to break joints by 7 atleast 75 mm. Each face stone shall be of the same height in any given course. The bond shall be obtained by fitting in closely the adjacent stones and by using bond stones.

Stones shall be laid with grains horizontal so that the load is transmitted along the direction of the maximum crushing strength.

The hearting or the interior filling of the wall shall consist of stones carefully laid on their proper beds in mortar; chips and spalls of stone being used where necessary to avoid thick beds or joints of mortar and at the same time ensuring that no hollow spaces are left anywhere in the masonry. The chips shall not be used below the hearting stone to bring these upto the level of face stones. The use of chips shall be restricted to the filling of interstices between the adjacent stones in hearting and these shall not exceed 10% of the total volume of stone masonry. All bed joints shall be horizontal and all side joints vertical. All joints shall be fully packed with mortar. Face joints shall not be more than 10 mm thick. When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. Otherwise, the joints shall be raked to a minimum depth of 20mm by raking tool during the progress of work, when the mortar is still green.

Stone may be brought to level courses at plinth, window sills and roof level. Levelling up at plinth level, window sills and roof level shall be done with concrete comprising of one part of the mortar (use for the masonry) and two parts of graded stone aggregate of 20mm nominal size.

The masonry in a structure shall be raised up uniformly and regularly but where breaks are unavoidable, the work shall be raked back at angle not steeper than 45 deg. Too things shall not be allowed. Masonry on any day should not be raised by more than 1 metre in height.

Bond or through stones running right through the thickness of walls shall be provided in walls upto 600 mm thick and in case of walls above 600 mm thickness, a set of two or more bond stones overlapping each other by atleast 150mm shall be provided in a line from face to back.

In case of highly absorbent types of stones (porous limestone and sand stone etc.) the bond stone shall extend about two-third into the wall. Through stones in such cases may give rise to damp penetration. Therefore, for all the thickness of such walls, a set of two or more bond stones overlapping each other by atleast 150mm shall be provided.

Where bond stones of suitable lengths are not available, cement concrete blocks of 1:3:6 mix (1 cement : 3 sand : 6 graded stone aggregate 20mm nominal size) shall be used.

A bond stone or a set of bond stones shall be inserted 1.5 to 1.8 metres apart, in every course. All bond stones shall be suitably marked during construction for subsequent verification and shall be staggered in subsequent layers. The quoins shall be of selected stones, neatly dressed with the hammer or chisel to form the required angle. These shall be of the same height in which these occur. These shall be atleast 450 mm long and shall be laid stretchers and headers alternately. These shall be laid square on the beds, which shall be rough chisel dressed to a depth of atleast 100 mm. In case of exposed work, these stones shall have a minimum 25mm wide chisel drafts at four edges, all the edges being in the same plane. Single scaffolding having one set of vertical support shall be allowed. The supports shall be sound and strong, tied together by horizontal scaffolding member may rest in a hole provided in the masonry. Such holes, however, shall not be allowed in pillars less than one metre in width. The holes left in masonry work for supporting scaffolding shall be filled and made good with cement concrete 1:3:6 (1 cement : 3 sand : 6 stone aggregate 20 mm nominal size)

Masonry work shall be kept constantly moist on all faces for a minimum period of seven days. Green work shall be protected from rain by suitable covering. The work shall also be suitably protected from damage, mortar dropping and rain during construction.

c) Coursed rubble masonry (second sort)

Laying of this type of masonry shall be in the same manner as First Sort masonry described above except for the following:

The use of chips for filling of interstices of adjacent stones in hearting shall not exceed 15% of the total volume of stone masonry, and stone in each course need not be of the same height, but more than two stones shall not be used in the height of a course. Face joints shall not be more than 20mm thick.

4.7 Mouldings and cornices

The bricks or stones shall be cut and dressed to the required shape as shown on architectural drawings. If no subsequent finish is envisaged, these shall be rubbed to correct profile with carborundum stone.

4.8 Plinth protection

Plinth of buildings shall be protected with brick on edge paving of minimum 750mm width unless otherwise shown on the drawings. The treatment shall consist of laying bricks conforming to class 50 (min.) of IS:1077 in cement mortar 1:6 (1 cement & fly ash (20% replacement ratio of cement with fly ash): : 6 sand) over a 75 mm thick bed of dry graded brick aggregate, 40mm nominal size, grouted with sand. the top shall be finished with 1:3 cement mortar pointing (1 cement & fly ash (20% replacement ratio of cement with fly ash):: 3 sand). Plinth protection shall be laid with a minimum outward slope of 1 in 50. The brick aggregate shall be well graded, broken from well burnt or slightly over burnt and dense brick bats. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt or any other foreign matter.

The ground shall first be prepared to the required, slope around and building. The high portions of the ground should be cut down, hollows and depressions filled upto the required level from the excavated earth and rammed so as to give uniform outward slope. The bed shall be watered and rammed and heavy iron square rammers. Surplus earth, if any, shall be disposed off beyond a lead of 50 m or as directed by the Engineer.

Over this, 75mm thick bed of dry brick aggregate of 40mm nominal size shall be laid with a minimum outward slope of 1 in 50. Aggregates shall be carefully laid and packed, bigger sized being placed at the bottom. The brick aggregates shall be consolidated dry with heavy iron rammers.

The aggregates shall then be grouted evenly with sand at the rate of 0.06 cubic metre per square metre area, adequately watered to ensure filling of voids by sand and again rammed with heavy iron rammers. The finished surface shall give uniform appearance. After the sub grade has been compacted thoroughly, brick flooring with bricks of specified strength in cement mortar 1:6 (1 cement & fly ash (20% replacement ratio of cement with fly ash): 6 sand) shall be laid. The soaking of bricks shall be done as per the relevant standard. The bricks shall be laid on edge in Diagonal / herring Bone Bond or other pattern as specified or as directed by the Engineer. Bricks shall be laid on 12mm thick mortar bed and each brick shall be properly bedded and set home by gentle tapping with handle of trowel or wooden mallet. It's inside face shall be buttered with mortar before the next brick is laid and pressed against it. On completion of the portion of flooring, the vertical joints shall be fully filled from the top with mortar. The surface shall present a true plain surface with the required slope.

The point shall be done in cement mortar 1:3 (1 cement & fly ash (20% replacement ratio of cement with fly ash): 3 sand). The mortar shall be pressed into the joints and shall be finished off flush and level with the edges of the bricks so as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and a straight edge the mortar shall not spread over surface of the masonry.

Brick flooring and pointing shall be kept wet for a minimum period of seven days. These shall be protected from rain by suitable covering when the mortar is green.

4.9 Damp Proof Course (DPC)

All walls in a building shall be provided with a damp proof course generally immediately below the underside of the ground floor or as shown on the drawings. This shall run without break throughout the length of the wall, even under door or other openings.

Damp proof course shall be 50 mm thick (unless, otherwise specified) consisting of cement concrete in proportion 1:1.5:3 (1 cement: 1.5 sand: 3 graded stone aggregate 10mm nominal size) mixed with water proofing cement additive as approved by the Engineer. The additive shall be used in proportion recommended by the manufacturer.

The surface of masonry work shall be levelled and prepared before laying the cement concrete. Edges of DPC shall be straight and even. The side shuttering shall consist of

wooden forms and shall be strong and properly fixed so that it does not get disturbed during compaction and mortar does not leak through. The concrete mix shall be of workable consistency and shall be tamped thoroughly to make a dense mass. When the side shuttering are removed the surface should be smooth without any honeycombing. The top surface shall be double chequered and cured by pounding for atleast 7 days. The cement concrete shall be allowed to dry for atleast 24 hours after curing and hot bitumen of grade 85/25 conforming to IS:702 at the rate of 1.7 kg/sq metre shall be applied over the dried up surface of cement concrete after being properly cleaned with brushes and finally with a cloth soaked in kerosene oil. The bitumen shall be applied uniformly so that no blank spaces are left anywhere.

4.10 Dismantling and demolition

The term 'Dismantling' implies carefully removing without damage (up or down). This shall consist of dismantling one or more part of the building as specified or shown on the drawings.

The term 'Demolition' implies breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified or shown on the drawings.

4.10.1 General requirements

- (a) All materials obtained from dismantling or demolition shall be the property of the Executing Agency, unless otherwise specified and shall be kept in safe custody until handed over at Executing Agency's stores or to the Engineer. Demolition shall be carried out in the shape and profile shown on the drawings or as directed by the Engineer.
- (b) The dismantling or demolition shall always be planned before hand and shall be done in reverse order of the one in which the structure was constructed. The scheme shall be got approved from the Engineer before starting the work.

4.10.2 Precautions

- (a) Necessary propping, shoring and under pinning shall be provided for the safety of the adjoining work or property before dismantling or demolition is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or

property. Wherever specified, temporary enclosures or partitions shall also be provided.

- (b) All demolition work shall be carried out in conformance with the local safety regulations, ensuring the safety of men and materials.
- (c) Necessary precautions shall be taken to keep down the dust nuisance.
- (d) All materials which are likely to be damaged during the operation shall be carefully removed first.
- (e) Dismantling shall be done in a systematic manner. The dismantled articles shall be passed by hand, where necessary, lowered to the ground (and not thrown) and then properly stacked as directed by the Engineer.
- (f) Where fixing is done by nails, screws, bolts, rivets, etc. dismantling shall be done by taking out the fixing with proper tools and not be tearing or ripping off.
- (g) All serviceable materials obtained shall be separated out and stacked properly as directed by the Engineer, upto a lead of 500m or handed over at Executing Agency's stores. All unserviceable materials, rubbish etc. shall be disposed off, as directed by the Engineer upto a lead of 2 kms.

4.11 Sampling testing and quality control

4.11.1 General

- (a) The Concessionaire shall carry out all sampling and testing in accordance with the relevant Indian Standards and/or International Standards and shall conduct such tests as are called for by the Engineer. Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted engineering practice to the directions of the Engineer. Tests shall be done in the field and at a laboratory approved by the Engineer and the Concessionaire shall submit to the Engineer, the test results in triplicate within three days after completion of a test. The Engineer may at his discretion, waive off some of the stipulations given below, for small and unimportant operations.

- (b) Material / work found unsuitable for acceptance shall be removed and replaced by the Concessionaire. The works shall be redone as per specification requirements and to the satisfaction of the Engineer.

4.11.2 Quality assurance programme

The Concessionaire shall submit and finalise a detailed field Quality Assurance Programme within 30 days from the date of award of the Contract according to the requirements of the specification. This shall include setting up of a testing laboratory, arrangement of testing apparatus / equipment, deployment of qualified / experienced manpower, preparation of format for record, field quality plan etc. On finalised field quality plan, the Executing Agency shall identify, customer hold points beyond which work shall not proceed without written approval from the Engineer.

Frequency of sampling and testing including the methods for conducting the tests are given in Table - 2. The testing shall be done at site. The testing frequencies set forth are the desirable minimum and the Engineer shall have the full authority to carry out or all for tests as frequently as he may deem necessary to satisfy himself that the materials and works comply with the appropriate specifications. Some of the type tests and performance tests which are not included in the table shall be carried out at the manufacturer's premises or at an independent Government approved laboratory.

All masonry shall be built true and plumb within the tolerances prescribed as below. Care shall be taken to keep the pretends properly aligned.

- a) Deviation in vertically in total height of any wall of a building more than one storey in height shall not exceed +/- 12.5 mm.
- b) Deviation from vertical within a storey shall not exceed +/- 6mm per 3 m height.
- c) Deviation from the position shown on the plan of any brickwork more than one storey in height shall not exceed 12.5 mm.
- d) Relative displacement between load bearing walls in adjacent storeys intended to be in a vertical alignment shall not exceed 6 mm.
- e) Deviation of bed joint from horizontal in any length upto 12 m shall not exceed 6 mm, and in any length over 12m it shall not exceed 12.5mm total.