

Schedule 1
Scope of Work

1. Design, development, finance, construction of Facilities, which shall include:
 - a. Design, development, finance, construction, testing & commissioning of civil, mechanical and electrical & instrumentation works of Varanasi STP with a design capacity of 50 MLD, at Ramana, Varanasi. The Varanasi STP shall, inter-alia, include provision of the following components - the online monitoring system to measure the volume of the Sewage conveyed to the Varanasi STP and the volume of Treated Effluent discharged from the Varanasi STP, on-site testing laboratory facilities, temporary storage facility for the Digested Sludge and any other facility associated with the operations of the Varanasi STP.
 - b. Design, development, finance, construction of Effluent Disposal Pipeline (PSC pipeline of 1200 mm diameter and approx. 5.5 km in length) from STP to the Discharge Point, an effluent disposal pumping station and a 250 kilolitre overhead tank for the disposal of Treated Effluent. The Effluent Disposal Pipeline shall be provided with outlet points, in locations as specified by the Jal Nigam, with valve arrangement to enable usage of the treated effluent for irrigation purpose.
 - c. Provision of the following as part of the Facilities:
 - i. Staff quarters with one number of type D, two number of type C, seven number of type B and four number of type A;
 - ii. Construction of a flood protection earthen embankment along the boundary wall of 1800 meters around the STP Site with a height which would be the higher of 4.5 m or one meter above HFL;
 - iii. Out of the estimated 4.5 kilometers length of the peripheral road, about 2.3 kilometers of road has already been constructed up to WBM level. This 2.3 km length has to be completed by BM and SDBC. Construction of rest approximately 2.2 kilometers peripheral bitumen road along the existing boundary wall around the Site is to be completed.
 - iv. Strengthening & part construction of external boundary wall of length of approximately 1800 meters and height of 2.1 meters;
 - v. Construction of a boundary wall of approximate length of 1800 meters with height of 1.5 meters above the top of earthen embankment around the STP Site;
 - vi. Construction of approach road to the Varanasi STP of 20 feet width and approximately 300 meters length;
 - vii. Construction of approximately 2.0 kms internal bitumen roads;
 - viii. Construction of 200/ 180 meters deep tube well, 100 kiloliters RCC overhead tank for potable water supply along with rising main and distribution system for staff quarters and other appurtenant works as per Applicable Laws;
 - ix. Set up a site office with all necessary equipment, two computers, printers and staff them adequately, which can also be used by the Jal Nigam;
 - x. Internal sewerage and drainage system within the Site; and
 - xi. Two new sedan category four wheelers with fuel and drivers running limit up to a distance of 2500 km per month each up to completion of construction and trial run & commissioning period, out of which one vehicle with fuel and driver will be continued up to completion of Operation and Maintenance period. Vehicle will be replaced as per the fitness and running certificate issued by RTO office.
2. Design, finance, rehabilitate and restore the Associated Infrastructure

The purpose of rehabilitation and restoration of Associated Infrastructure would be to make them operational as per the requirements of the Concession Agreement. The extent of rehabilitation requirements shall be determined based on the condition assessment undertaken by the Concessionaire. The minimum scope of work related to the repair and rehabilitation of Associated Infrastructure shall include the following –

- a. Main Pumping Station (MPS)
 - i. Rehabilitation and construction of weir across Assi Nalla;
 - ii. Desilting of the MPS;
 - iii. Procurement & installation of new mechanical screen; and
 - iv. Any other works that could be required for commissioning and operating MPS as per the requirements of the Concession Agreement.
 - b. Rising Main, which would include desilting, repair works, strengthening, pipe protection and shifting in different sections of the 6.68 km. of 1000 mm PSC rising main as per the following:
 - i. Desilting of rising main of length of approximately 300 meters;
 - ii. Strengthening and pipe protection of rising main of a length of approximately 500 meters along the river Ganga;
 - iii. In this stretch of 500 meters of rising main, where strengthening and pipe protection will be done, provision for & laying of 1000mm diameter PSC rising main pipeline in a length of approximately 150 meters and shifting of rising main by approximately 250 meters near approach road of Samne Ghat bridge;
 - iv. Any other repair of rising main required for commissioning and operating the rising main as per the requirements of the Concession Agreement; and
 - v. Extension of existing rising main to the Inlet Point at the STP Site.
3. Operations and Maintenance of the Facilities and the Associated Infrastructure for a period of 15 years from the Commercial Operations Date, as per the Concession Agreement.
4. Overview of other activities to be undertaken
- a) Carry out all preparatory work like clearing out debris, excavated earth within the STP Site to the extent possible and proper disposal of the extra surplus excavated earth to a suitable location as per Applicable Laws;
 - b) Develop the site, landscaping, arboriculture and horticulture at the STP Site and by providing earth filling, greenery, plantation and diversion & extension of storm water drainage network, etc. and maintain condition of landscape establishment;
 - c) Design and construct all necessary buildings for administrative, laboratory, PLC room buildings for E&M equipment as per Technical Specifications;
 - d) Provide electrical substation of required area as per electricity board requirements;
 - e) Keep the Facilities in clean, hygienic, tidy and safe conditions;
 - f) Illuminate the STP with suitable arrangement, as per the Technical Specifications;
 - g) Undertake trial runs, testing, commissioning of Facilities as per the requirements of Concession Agreement;
 - h) 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;
 - i) Undertake Operations and Maintenance of Facilities as per Technical Specifications and safe disposal of Treated Effluent and STP By-Products;

- j) Develop and implement the environment, social, health and safety plans as per the requirements of the Concession Agreement;
- k) Implement quality system and environmental management system in accordance with ISO 9001 and ISO 14001;
- l) Prepare appropriate records and reports as outlined in the Concession Agreement;
- m) Undertake security control of the Facilities
- n) Carry out the required tests and laboratory analysis;
- o) Obtain and renew licenses, permits and certificates necessary to operate the Facilities;
- p) Hand-back the Facilities and the Associated Infrastructure to the Jal Nigam at the end of the O&M Period;
- q) 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	<p>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 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
Designs and Drawings before Effectiveness	<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 storm water 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

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	<p>appropriate landscaping scheme</p> <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 water proofing, 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"> • Detailed design calculations of foundations and superstructure • 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. • 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 & cable ways. ○ 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.

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	<ul style="list-style-type: none"> ○ 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. ○ Labelling 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 catalogues and data sheets ○ Calculations to support control system design ○ Specification for protective coatings and painting ● 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 <p>Geotechnical analysis and topography survey report</p> <ul style="list-style-type: none"> ● Topographical survey reports ● 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 drawings</p> <p>Information on equipment during installation</p> <ul style="list-style-type: none"> ● Performance curves and drawings of equipment

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	<ul style="list-style-type: none"> • Schedules of equipment • Quality plans for electrical, mechanical, instrumentation and SCADA works • Test and inspection certificates
Upon Construction Completion	<p>As-Built Drawings</p> <ul style="list-style-type: none"> • Final version of the design calculations • Key construction records and tests • Asset sheets
At least 60 days prior to the Scheduled Construction Completion Date	<p>O&M Manual including the following –</p> <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; ○ Upkeep of the central control and monitoring system to ensure availability of reliable on-line 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

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	<ul style="list-style-type: none"> ○ Procedures to prepare and submit routine records and reports to the Jal Nigam ● 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; ● 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 ○ Labour 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 ○ Assetoverview <ul style="list-style-type: none"> ▪ description of various components of the Facilities and Associate 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

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	<p>conditions required under the Concession Agreement</p> <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

Table: Guaranteed Energy Consumption

Year of O&M Period	Guaranteed Energy Consumption (kWh / month)		
	Average Sewage BOD <170,000 kg/month	Average Sewage BOD 170,000 to 2,60,000 kg/month	Average Sewage BOD >2,60,000 kg/month
1			
2			
3			
4			
5			
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