



**CHENNAI METROPOLITAN WATER SUPPLY AND
SEWERAGE BOARD: CHENNAI- 600 002**

**CONTRACT NO: CNT/ CON/DESAL /ICB/Gol/ 016/2018-19
LOAN AGREEMENT No. ID-P267
JICA FUNDED PROJECT**

AGREEMENT

FOR

**PROJECT FOR CONSTRUCTION OF CHENNAI SEA WATER DESALINATION
PLANT (I)**

**CONSULTANCY FOR DESIGN, PREPARATION OF BID DOCUMENTS &
EVALUATION OF BIDS FOR THE PROPOSED CONSTRUCTION OF 400 MLD
CAPACITY SEAWATER REVERSE OSMOSIS DESALINATION PLANT AT PERUR
ALONG EAST COAST ROAD, SOUTH OF CHENNAI, TAMIL NADU AND
CONSTRUCTION MANAGEMENT & SUPERVISION FOR THE PROPOSED
DESALINATION PLANT AND ITS PRODUCT WATER CONVEYANCE PIPELINE
FROM THE PLANT AND UPTO PORUR AND ALL ALLIED WORKS.**

**SUPERINTENDING ENGINEER (CONTRACTS & MONITORING)
CHENNAI METROPOLITAN WATER SUPPLY & SEWERAGE BOARD
No.1, Pumping Station Road, Chintadripet, Chennai 600 002.
Telephone: 044 – 2845 1300 Fax : 044 – 28458181
E-mail : cmwssb@md2.vsnl.net.in / secandm@cmwssb.in**

CONTRACT FOR CONSULTANTS' SERVICES

Time-Based

Project Name: Project for Construction of Chennai Sea water Desalination Plant (I)

Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works

Loan Agreement No.: ID-P267

Contract No.: CNT/ CON/DESAL /ICB/GoI/ 016 /2018-19

between

**CHENNAI METROPOLITAN WATER SUPPLY AND
SEWERAGE BOARD:: CHENNAI- 600 002**

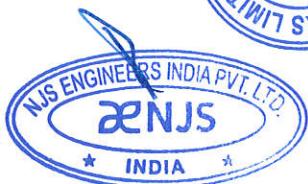
and

**M/s.SMEC INTERNATIONAL PTY LIMITED, AUSTRALIA IN CONSORTIUM WITH
M/s.NJS ENGINEERS INDIA PVT LTD, PUNE, M/s.TATA CONSULTING
ENGINEERS LTD, NAVI MUMBAI & M/s.SMEC INDIA PVT LTD, HARYANA**

Dated: _____



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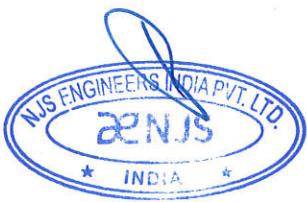
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I. Form of Contract



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I. Form of Contract

CONTRACT FOR CONSULTANT SERVICES TIME-BASED

This CONTRACT for the Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works" is made the Nineteen [day] day of the month of January [month], [year], 2020 between, on the one hand, Chennai Metropolitan Water Supply and Sewerage Board (CMWSS Board), No:1, Pumping Station Road, Chintadripet, Chennai- 600 002, India (hereinafter called the "Client") and, on the other hand, a Joint Venture/ Consortium consisting of the following entities, each of which will be jointly and severally liable to the Client for all the Consultant's obligations under this Contract, namely,

SMEC International Pty. Ltd. having its registered office at Level 10, 71, Queen Road, Melbourne VIC 3004 and India office at 1st Floor, Novus Tower, West Wing, Plot Number -18, Sector – 18, Gurgaon – 122015, Haryana (hereinafter referred to as 'SMEC' '(Lead Partner')), And

NJS Engineers India Pvt. Ltd. having its headquarter at 18, Shailesh Society, Karvenagar, Pune-411052 (hereinafter referred to as 'NJSEI')
And

Tata Consulting Engineer Limited having its registered office at Matulya Centre 'A', 1st Floor, 249 Senapati Bapat Marg, Lower Parel (West), Mumbai 400013 (hereinafter referred to as 'TCE')
And

SMEC (India) Private Limited having its registered office at 507, Bhikaji Cama Place, New Delhi, India and corporate office at 1st Floor, Novus Tower, West Wing, Plot No. 18, Sector-18, Gurugram – 122015 (hereinafter referred to as 'SMEC India'); (hereinafter collectively called the "Consultant").]

WHEREAS

- the Client has requested the Consultant to provide certain consulting services as defined in this Contract (hereinafter called the "Services");



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- (b) the Consultant, having represented to the Client that it has the required professional skills, expertise and technical resources, has agreed to provide the Services on the terms and conditions set forth in this Contract;
- (c) by an Agreement dated 29.03.2018 (hereinafter called the Loan Agreement) between the Government of India (hereinafter called the Borrower) and Japan International Cooperation Agency (hereinafter called "JICA"), JICA has agreed to make a loan to the Borrower for the purpose of financing "**Project for Construction of Chennai Sea Water Desalination Plant Project (I) – Setting Up of 400 MLD SWRO Desalination Plant and its allied works along ECR at Perur, Chennai.**" (hereinafter called the Project);

NOW THEREFORE the parties hereto hereby agree as follows:

1. The following documents attached hereto shall be deemed to form an integral part of this Contract:
 - (a) Minutes of Contract Negotiations
 - (b) The Special Conditions of Contract (SCC);
 - (c) The General Conditions of Contract (GCC);
 - (d) The following Appendices:

Appendix A: Description of Services

Appendix B: Reporting Requirements

Appendix C: Expert Schedule

Appendix D: Remuneration Cost Estimates

Appendix E: Reimbursable Cost Estimates

Appendix F: Summary of Cost Estimates

Appendix G: Services, Facilities and Equipment to be provided by the Client

Appendix H: Form of Advance Payments Security

Appendix I: Acknowledgment of Compliance with Guidelines for the Employment of Consultants under Japanese ODA Loans

Appendix J: Bid clarifications and Addendum

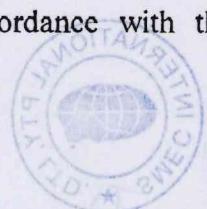
Appendix K: Letter of Award

Appendix L: Performance Bank Guarantee

Appendix M: Registered consortium Agreement

In the event of any ambiguity or conflict between the documents listed above, the order of precedence shall be the order in which the documents are listed in this Clause 1.

2. The mutual rights and obligations of the Client and the Consultant shall be as set forth in the Contract, in particular:
 - (a) the Consultant shall carry out the Services in accordance with the provisions of the Contract;
 - (b) the Client shall make payments to the Consultant in accordance with the provisions of the Contract;



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- (c) Subject to subparagraph (d) hereunder, and notwithstanding any other provisions of this Contract, payments under this Contract shall not exceed as follows, except as otherwise agreed between the Client and the Consultant:
- (i) Foreign currency payments to the Consultant hereunder will be made in; **USD, \$9,411,963 (Nine Million Four Hundred Eleven Thousand Nine hundred Sixty Three Dollars Only)**
 - (ii) Local currency payments to the Consultant hereunder will be made in; **INR.57,55,55,630.00 (Rupees Fifty Seven Crore Fifty Five Lakh Fifty Five Thousand Six Hundred Thirty Only).**
- (d) The maximum amount specified in subparagraph (c) here above has been fixed on the understanding that the Client will make available free of charge to the Consultant the exemptions, assistance, services and facilities provided for under Clause 5 of the General Conditions of Contract and in Appendix G as required for the purposes of the Services. If any such exemptions, assistance, services and facilities are not supplied, the parties shall consult regarding what additional allowance (if any) should be made to the Consultant as a result thereof to cover necessary additional expenses not envisaged in the cost estimates in Appendices D and E.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names as of the day and year first above written.

For and on behalf of **Chennai Metropolitan Water Supply and Sewerage Board**


[Signature]
 Contracts Engineer - I
 C.M.W.S.S. Board
 Chennai-600 002

[Authorized Representative of the Client – name, title and signature]

For and on behalf of **SMEC International Pty Limited, Australia**



[Signature]
 Dr. JASWANTH H. SUNDARAM

[Authorized Representative of the Consultant – name and signature]



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[Signature]
 Assistant Contracts Engineer
 C.M.W.S.S. Board
 Chennai-600 002



For and on behalf of NJS Engineers India Pvt. Ltd, Pune

Pradip Sarkar

PRADIPTO SARKAR



[Authorized Representative of the Consultant – name and signature]

For and on behalf of Tata Consulting Engineers Ltd, Navi Mumbai

G.N. Virupaksha

G.N. Virupaksha

[Authorized Representative of the Consultant – name and signature]



For and on behalf of SMEC India Pvt Limited, Haryana

Pushpendra Kumar Sharma

PUSHPENDRA KUMAR SHARMA

[Authorized Representative of the Consultant – name and signature]



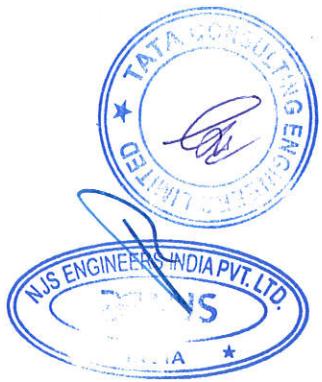
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II. General Conditions of Contract



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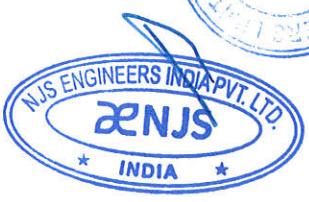
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II. General Conditions of Contract

The General Conditions of Contract governing this Contract are the "General Conditions of Contract for Time-Based Contract, Annex I-II, Section 6" of the Standard Request for Proposals (version 1.1) published by JICA in October 2012. Those General Conditions of Contract are also available on the JICA's web site shown below

[http://www.jica.go.jp/english/our work/types of assistance/oda loans/oda op info/guide/tender/index.html](http://www.jica.go.jp/english/our_work/types_of_assistance/oda_loans/oda_op_info/guide/tender/index.html)



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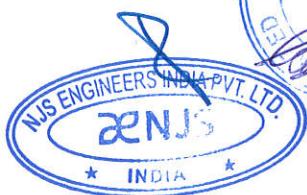
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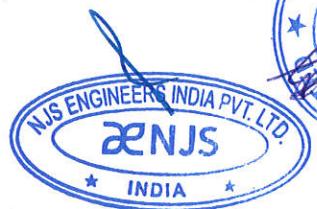


[Signature]
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General Conditions of Contract

1. GENERAL PROVISIONS

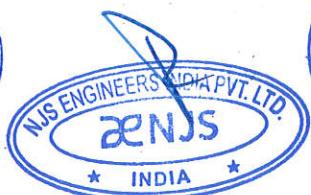
1.1	Definitions	<p>Unless the context otherwise requires, the following terms whenever used in this Contract have the following meanings:</p> <ul style="list-style-type: none"> (a) "Applicable Guidelines" means the Guidelines for the Employment of Consultants under Japanese ODA Loans, published on the date specified in the Special Conditions of Contract (SCC). (b) "Applicable Law" means the laws and any other instruments having the force of law in the Client's country, or in such other country as may be specified in the SCC, as they may be issued and in force from time to time. (c) "Borrower" means the Government, Government agency or other entity that signs the Loan Agreement with JICA. (d) "Client" means the executing agency that signs the Contract for the Services with the selected Consultant. (e) "Consultant" means any entity or individual including a Joint Venture selected by the Client to provide the Services under the signed Contract. (f) "Contract" means the legally binding written agreement signed between the Client and the Consultant and includes all the attached documents listed in paragraph 1 of the Form of Contract (the General Conditions (GCC), the Special Conditions (SCC), and the Appendices). (g) "day" means calendar day unless indicated otherwise. (h) "Effective Date" means the date on which this Contract comes into force and effect pursuant to Clause GCC 2.1. (i) "Experts" means, collectively, Key Experts, Non-Key Experts, or any other professional personnel of the Consultant, Sub-consultant or JV member(s) assigned by the Consultant to perform the Services or any part thereof under the Contract. (j) "Foreign Currency" means any currency other than the currency of the Client's country. (k) "GCC" means these General Conditions of Contract. (l) "Government" means the Government of the Client's country. (m) "JICA" means Japan International Cooperation Agency.
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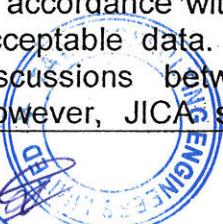
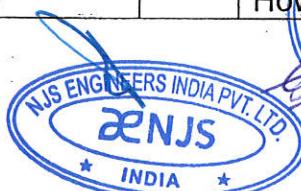
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C.M.W.S.S. Board
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			<p>(n) "Joint Venture" means an association with or without a legal personality distinct from that of its members, of more than one Consultant where one member has the authority to conduct all businesses for and on behalf of any and all the members of the JV, and where the members of the JV are jointly and severally liable to the Client for the performance of the Contract.</p> <p>(o) "Key Expert(s)" means an individual professional whose skills, qualifications, knowledge and experience are critical to the performance of the Services under the Contract and whose Curricula Vitae (CV) was taken into account in the technical evaluation of the Consultant's Proposal.</p> <p>(p) "Local Currency" means the currency of the Client's country.</p> <p>(q) "Non-Key Expert(s)" means an individual professional provided by the Consultant or its Sub-consultant to perform the Services or any part thereof under the Contract.</p> <p>(r) "Party" means the Client or the Consultant, as the case may be, and "Parties" means both of them.</p> <p>(s) "SCC" means the Special Conditions of Contract by which the GCC may be amended or supplemented but not over-written.</p> <p>(t) "Services" means the work to be performed by the Consultant pursuant to this Contract, as described in Appendix A.</p> <p>(u) "Sub-consultant(s)" means an entity or an individual to whom/which the Consultant subcontracts any part of the Services while remaining solely liable for the execution of the Contract.</p> <p>(v) "Third Party" means any person or entity other than the Government, the Client, the Consultant or a Sub-consultant.</p>
1.2	Relationship between the Parties		Nothing contained herein shall be construed as establishing a relationship of master and servant or of principal and agent as between the Client and the Consultant. The Consultant, subject to this Contract, has complete charge of Experts and Sub-consultants, if any, performing the Services and shall be fully responsible for the Services performed by them or on their behalf hereunder.
1.3	Law Governing Contract		This Contract, its meaning and interpretation, and the relation between the Parties shall be governed by the Applicable Law



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1.4	Language		This Contract shall be executed in the language specified in the SCC, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this Contract.
1.5	Headings		The headings shall not limit, alter or affect the meaning of this Contract.
1.6	Communications	1.6.1	Any communication required or permitted to be given or made pursuant to this Contract shall be in writing in the language specified in Clause GCC 1.4. Any such communication shall be deemed to have been given or made when delivered in person to an authorized representative of the Party to whom the communication is addressed, or when sent to such Party at the address specified in the SCC.
		1.6.2	A Party may change its address for notice hereunder by giving the other Party any communication of such change to the address specified in the SCC.
1.7	Location		The Services shall be performed at such locations as are specified in Appendix A and, where the location of a particular task is not so specified, at such locations, whether in the Client's country or elsewhere, as the Client may approve.
1.8	Authority of Lead Member		In case the Consultant is a Joint Venture, the members hereby authorize the member specified in the SCC to act on their behalf in exercising all the Consultant's rights and obligations towards the Client under this Contract, including without limitation the receiving of instructions and payments from the Client.
1.9	Authorized Representatives		Any action required or permitted to be taken, and any document required or permitted to be executed under this Contract by the Client or the Consultant may be taken or executed by the officials specified in the SCC.
1.10	Corrupt and Fraudulent Practices		The Consultant is required to comply with JICA's policy in regard to corrupt and fraudulent practices as declared in Appendix I.
1.11	Monitoring by JICA		Without assuming the responsibilities of the Client or the Consultant, JICA may monitor the Services as necessary in order to satisfy itself that it is being carried out in accordance with appropriate standards and is based on acceptable data. As appropriate, JICA may take part in discussions between the Client and the Consultant. However, JICA shall not be liable in any way for the



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			performance of the Services by reason of such monitoring or participation in discussions. Neither the Client nor the Consultant shall be released from any responsibility of this Contract by reason of JICA's monitoring or participation in discussion.
1.12	Difference of Opinion		In the case of a difference of opinion between the Client and the Consultant on any important matters involving professional judgment that might affect the proper evaluation or execution of the Project, the Client shall allow the Consultant to submit promptly to the Client a written report and, simultaneously, to submit a copy to JICA. The Client shall forward the report to JICA with its comments in time to allow JICA to study it and communicate with the Client before any irreversible steps are taken in the matter. In cases of urgency, the Consultant has the right to request the Client and/or JICA that the matter be discussed immediately between the Client and JICA.
2. COMMENCEMENT, COMPLETION, MODIFICATION AND TERMINATION OF CONTRACT			
2.1	Effectiveness of Contract		<p>Unless otherwise specified in the SCC, this Contract shall come into force and effect on the date (the "Effective Date") when:</p> <ul style="list-style-type: none"> (a) This Contract has been signed by the Parties; and (b) This Contract has been reviewed and concurred by JICA. <p>Upon fulfillment of the conditions indicated above, the Client shall issue a written notice to the Consultant which confirms the Effective Date and instructs the Consultant to deliver an advance payment security and an invoice for advance payment to the Client.</p> <p>The Consultant shall submit the required advance payment security and the invoice for the advance payment, pursuant to Clause GCC 6.5 (a), within fourteen (14) days or within such other period specified in the SCC following the receipt of the notice specified in this Clause GCC 2.1.</p>
2.2	Termination of Contract for Failure to Become Effective		Unless a different period of time is otherwise specified in the SCC, if this Contract has not become effective within four (4) months after the date of the Contract signed by the Parties, the Consultant or the Client may, by not less than twenty one (21) days written notice to the other Party, declare this Contract to be null and void, and in the event of such a declaration by either Party, neither Party shall have any claim against the other Party with respect hereto.



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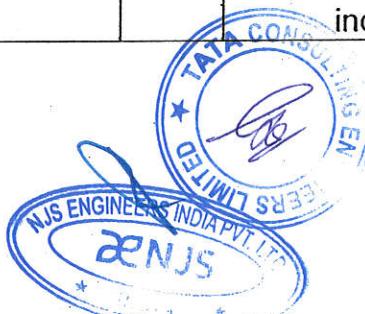
2.3	Commencement of Services	2.3.1	Subject to Clause GCC 6.5 (a), the Consultant shall begin carrying out the Services not later than fourteen (14) days from the receipt of the advance payment.
		2.3.2	The Consultant shall confirm the availability of Key Experts before the commencement of the Services.
2.4	Expiration of Contract		Subject to Clause GCC 2.7.3 (c) and unless terminated earlier pursuant to Clause GCC 2.9, this Contract shall expire at the end of such time period, as specified in the SCC, after the commencement of the Services specified in Clause GCC 2.3.
2.5	Entire Agreement		This Contract contains all covenants, stipulations and provisions agreed by the Parties. No agent or representative of either Party has authority to make, and the Parties shall not be bound by or be liable for, any statement, representation, promise or agreement not set forth herein.
2.6	Modifications		
	Modifications or Variations	2.6.1	<p>(a) Any modification or variation of the terms and conditions of this Contract, including any modification or variation of the scope of the Services, may only be made by written agreement between the Parties. However, each Party shall give due consideration to any proposals for modification or variation made by the other Party.</p> <p>(b) In case of substantial modifications or variations, the prior written concurrence of JICA is required.</p>
	Extension	2.6.2	<p>(a) If the Consultant has been delayed or impeded in the performance of any of its obligations under this Contract by any of the reasons specified in paragraphs (i) through (vi) of this Clause 2.6.2 (a), the contract term as set forth in Clause GCC 2.4 shall be extended by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Consultant, and an appropriate adjustment in the Contract Price (which includes both remuneration and/or reimbursable expenses) shall be made accordingly.</p> <p>(i) Any modifications or variations pursuant to Clause GCC 2.6.1;</p>



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			<ul style="list-style-type: none"> (ii) Any occurrence of Force Majeure pursuant to Clause GCC 2.7; (iii) Any suspension by the Client pursuant to Clause GCC 2.8.1 (b), suspension or reduction in the rate of performance of the Services pursuant to Clause GCC 2.8.2; (iv) Any unreasonable delay by the Client in giving his decision, approval or consent (where required) to the documents (e.g. designs, plans, etc.) prepared and submitted by the Consultant; (v) Any act or omission of or any default or breach of this Contract by the Client or any act or omission of any other Consultants and/or contractors employed by the Client; or (vi) Any other matter mentioned in this Contract as giving rise to an entitlement to an extension of the contract term. <p>(b) Except where otherwise provided elsewhere in this Contract, the Consultant shall submit to the Client a notice of a claim for an extension of the contract term and/or adjustment in the Contract Price, together with particulars of the event or circumstance justifying such extension and adjustment, as soon as reasonably practicable after the occurrence of such event or circumstance. As soon as reasonably practicable after the receipt of such notice and supporting particulars of the claim, the Client and the Consultant shall agree upon the extended period and/or the adjusted Contract Price.</p> <p>(c) The Consultant shall at all times use all commercially reasonable endeavors to minimize any delay in the performance of its obligations under this Contract.</p>
2.7	Force Majeure		
	Definition	2.7.1	<p>a) For the purposes of this Contract, "Force Majeure" means an event which is beyond the reasonable control of a Party, is not foreseeable, is unavoidable, and which makes a Party's performance of its obligations hereunder impossible or so impractical as reasonably to be considered impossible in the circumstances, and subject to those requirements, includes, but is not limited to, war, riots, terrorism,</p>



Assistant Contracts Engineer
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			<p>civil disorder, earthquake, fire, explosion, storm, flood or other adverse weather conditions, strikes, lockouts or other industrial action, confiscation or any other action by Government agencies.</p> <p>b) Force Majeure shall not include (i) any event which is caused by the negligence or intentional action of a Party or such Party's Experts, Sub-consultants or agents or employees, nor (ii) any event which a diligent Party could reasonably have been expected both to take into account at the time of the conclusion of this Contract, and avoid or overcome in the carrying out of its obligations hereunder.</p> <p>c) Force Majeure shall not include insufficiency of funds or failure to make any payment required hereunder.</p>
	No Breach of Contract	2.7.2	The failure of a Party to fulfill any of its obligations hereunder shall not be considered to be a breach of, or default under, this Contract insofar as such inability arises from an event of Force Majeure, provided that the Party affected by such an event has taken all reasonable precautions, due care and reasonable alternative measures, all with the objective of carrying out the terms and conditions of this Contract.
	Measures to be Taken	2.7.3	<p>(a) A Party affected by an event of Force Majeure shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall take all reasonable measures to minimize the consequences of any event of Force Majeure.</p> <p>(b) A Party affected by an event of Force Majeure shall notify the other Party of such event as soon as possible, and in any case not later than fourteen (14) days following the occurrence of such event, providing evidence of the nature and cause of such event, and shall similarly give written notice of the restoration of normal conditions as soon as possible.</p> <p>(c) Any period within which a Party shall, pursuant to this Contract, complete any action or task, shall be extended for a period equal to the time during which such Party was unable to perform such action as a result of Force Majeure.</p> <p>(d) During the period of their inability to perform the Services as a result of an event of Force Majeure, the Consultant, upon instructions by the Client, shall either:</p> <p style="text-align: right;">(i) demobilize, in which case the Consultant</p>



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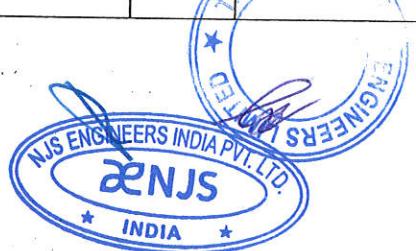
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			<p>shall be reimbursed for additional costs they reasonably and necessarily incurred, and, if required by the Client, in reactivating the Services; or</p> <p>(ii) continue the Services to the extent reasonably possible, in which case the Consultant shall continue to be paid under the terms of this Contract and be reimbursed for additional costs reasonably and necessarily incurred.</p> <p>(e) In the case of disagreement between the Parties as to the existence or extent of Force Majeure, the matter shall be settled according to Clause GCC 8.</p>
2.8	Suspension		
	By the Client	2.8.1	<p>(a) The Client may, by written notice of suspension to the Consultant, suspend in whole or part, the Services if an event shall have happened and be continuing, in which the Consultant fails to perform any of its obligations under this Contract, including the carrying out of the Services, provided that such notice of suspension shall:</p> <ul style="list-style-type: none"> (i) specify the nature of the failure, and (ii) request the Consultant to remedy such failure within a period not exceeding twenty-eight (28) days after receipt by the Consultant of such notice of suspension. <p>(b) If the Project or the Services are suspended by the Client for any reason other than those provided in Clause GCC 2.8.1 (a) more than twenty-eight (28) days, over the term of this Contract, the Consultant shall be paid for all services performed and reimbursable expenses incurred prior to the receipt of a notice of suspension.</p> <p>(c) During any suspension of the Services under Clause GCC 2.8.1 (b), the Consultant shall be compensated for any costs of maintaining fixed assets, the costs of leases or other items acquired for the Project, as well as all expenses reasonably incurred by, including but not limited to, temporary demobilization, reassignment of the Experts. In addition, upon resumption of the Services, the Client shall compensate the Consultant for expenses incurred as a result of the resumption</p>



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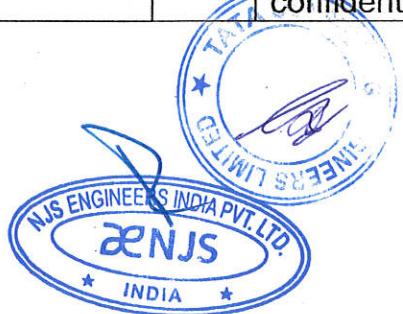
			of its services, and the Consultant's schedules (Expert and other relevant schedules) shall be appropriately adjusted.
	By the Consultants	2.8.2	Without prejudice to entitlement to financing charges on late payments under Clause GCC 6.6, the Consultant may suspend the Services or reduce the rate of performance of the Services after twenty-eight (28) days prior notice to the Client, if the Client fails to pay the Consultant the amount due, pursuant to Clause GCC 6.5 (c). In no event shall the suspension of the Services or reduction of the rate of performance of the Services pursuant to this Clause GCC 2.8.2 be subject to termination of this Contract by the Client pursuant to Clause GCC 2.9.1.
2.9	Termination		This Contract may be terminated by either Party as per provisions set up below:
	By the Client	2.9.1	<p>The Client may terminate this Contract in case of the occurrence of any of the events specified in paragraphs (a) through (f) of this Clause GCC 2.9.1. In such an occurrence the Client shall give at least twenty-eight (28) days' written notice of termination to the Consultant in case of the events referred to in (a) through (e); and at least fifty-six (56) days' written notice in case of the event referred to in (f):</p> <ul style="list-style-type: none"> (a) If the Consultant fails to remedy a failure in the performance of its obligations hereunder, as specified in a notice of suspension pursuant to Clause GCC 2.8.1 (a); (b) If the Consultant becomes (or, if the Consultant consists of more than one entity, if any of its members becomes) insolvent or bankrupt or enter into any agreements with their creditors for relief of debt or take advantage of any law for the benefit of debtors or go into liquidation or receivership whether compulsory or voluntary; (c) If the Consultant fails to comply with any final decision reached as a result of arbitration proceedings pursuant to Clause GCC 8; (d) If, as the result of Force Majeure, the Consultant is unable to perform a material portion of the Services for a period of not less than fifty-six (56) days; (e) If the Consultant fails to confirm availability of Key Experts as required in Clause GCC 2.3.2;



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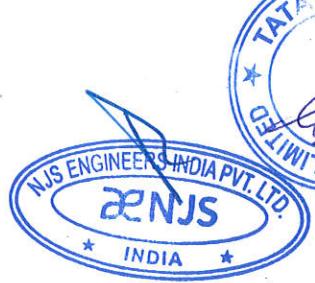
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			<p>(f) If the Client, in its sole discretion and for any reason whatsoever, decides to terminate this Contract.</p> <p>Furthermore, if the Client determines that the Consultant has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Client may, after giving fourteen (14) days' written notice to the Consultant, terminate this Contract.</p>
	By the Consultant	2.9.2	<p>The Consultant may terminate this Contract, by not less than twenty-eight (28) days' written notice to the Client, in case of the occurrence of any of the events specified in paragraphs (a) through (e) of this Clause GCC 2.9.2.</p> <p>(a) If the Client fails to pay any money due to the Consultant pursuant to this Contract and not subject to dispute pursuant to Clause GCC 8 within forty-two (42) days after receiving written notice from the Consultant that such payment is overdue.</p> <p>(b) If, as the result of Force Majeure, the Consultant is unable to perform a material portion of the Services for a period of not less than fifty-six (56) days.</p> <p>(c) If the Client fails to comply with any final decision reached as a result of arbitration pursuant to Clause GCC 8.</p> <p>(d) If the Client is in material breach of its obligations pursuant to this Contract and has not remedied the same within forty-two (42) days (or such longer period as the Consultant may have subsequently approved in writing) following the receipt by the Client of the Consultant's notice specifying such breach.</p> <p>(e) If the Services are suspended pursuant to Clause GCC 2.8.1 (b) for more than eighty-four (84) days.</p>
	Cessation of Rights and Obligations	2.9.3	Upon termination of this Contract pursuant to Clauses GCC 2.2 or GCC 2.9, or upon expiration of this Contract pursuant to Clause GCC 2.4, all rights and obligations of the Parties hereunder shall cease, except (i) such rights and obligations as may have accrued on the date of termination or expiration, (ii) the obligation of confidentiality set forth in Clause GCC 3.3, (iii) the



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C.M.W.S.S. Board
Chennai-600 002.

			Consultant's obligation to permit inspection, copying and auditing of their accounts and records set forth in Clause GCC 3.6, and (iv) any right which a Party may have under the Applicable Law.
	Cessation of Services	2.9.4	Upon termination of this Contract by notice of either Party to the other pursuant to Clauses GCC 2.9.1 or GCC 2.9.2, the Consultant shall, immediately upon dispatch or receipt of such notice, take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenses for this purpose to a minimum. With respect to equipment, vehicles and materials provided by the Client, the Consultant shall proceed as provided by Clause GCC 3.9.
	Payment upon Termination	2.9.5	<p>Upon termination of this Contract pursuant to Clauses GCC 2.9.1 or GCC 2.9.2, the Client shall make the following payments to the Consultant:</p> <p>(a) remuneration pursuant to Clause GCC 6.2 for Services satisfactorily performed prior to the effective date of termination, and reimbursable expenses pursuant to Clause GCC 6.2 for expenses actually incurred prior to the effective date of termination; and</p> <p>(b) in the case of termination pursuant to paragraphs (d) and (f) of Clause GCC 2.9.1 and to GCC 2.9.2, reimbursement of any reasonable cost incidental to the prompt and orderly termination of this Contract including demobilization, associated overhead cost, the cost of the return travel of the Experts and their eligible dependents, and all other expenses, damages and losses resulting from the termination.</p>
	Disputes about Events of Termination	2.9.6	If either Party disputes whether an event specified in paragraphs (a) through (e) of Clause GCC 2.9.1 or in Clause GCC 2.9.2 has occurred, such Party may, within forty-two (42) days after receipt of notice of termination from the other Party, refer the matter for dispute settlement in accordance with the procedures stated in Clause GCC 8, and this Contract shall not be terminated on account of such event unless otherwise settled in accordance with GCC 8.



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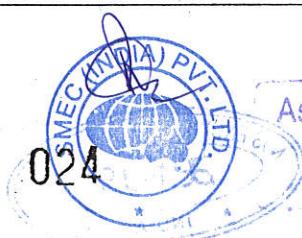
3. OBLIGATIONS OF THE CONSULTANT

3.1	General		
	Standard of Performance	3.1.1	<p>(a) The Consultant shall perform the Services and carry out the Services with all due diligence, efficiency and economy, in accordance with generally accepted professional standards and practices, and shall observe sound management practices, and employ appropriate technology and safe and effective equipment, machinery, materials and methods. The Consultant shall always act, in respect of any matter relating to this Contract or to the Services, as faithful adviser to the Client, and shall at all times support and safeguard the Client's legitimate interests in any dealings with the third parties.</p> <p>(b) The Consultant shall employ and provide such qualified and experienced Experts and Sub-consultants as are required to carry out the Services.</p> <p>(c) The Consultant may subcontract part of the Services to an extent and with such Key Experts and Sub-consultants as may be approved in advance by the Client. Notwithstanding such approval, the Consultant shall retain full responsibility for the Services</p>
	Law Applicable to Services	3.1.2	The Consultant shall perform the Services in accordance with the Contract and the Applicable Law and shall take all practicable steps to ensure that any of its Experts and Sub-consultants, comply with the Applicable Law. The Client shall notify the Consultant in writing of relevant local customs, and the Consultant shall, after such notification, respect such customs.
3.2	Conflict of Interest		The Consultant shall hold the Client's interests paramount, without any consideration for future work, and strictly avoid conflict with other assignments or their own corporate interests.
	Consultants Not to Benefit from Commissions, Discounts etc	3.2.1	<p>(a) The payment to the Consultant pursuant to Clause GCC 6 shall constitute the Consultant's only payment in connection with this Contract and, subject to Clause GCC 3.2.2, the Consultant shall not accept for its own benefit any trade commission, discount or similar payment in connection with activities pursuant to this Contract or in the discharge of its obligations hereunder, and the Consultant shall use its best efforts to ensure that any Sub-consultants, as well as the Experts and agents of either of them,</p>



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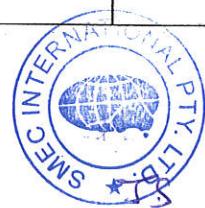
			<p>similarly shall not receive any such additional payment.</p> <p>(b) Furthermore, if the Consultant, as part of the Services, has the responsibility of advising the Client on the procurement of goods, works or services, the Consultant shall comply with the Applicable Guidelines and JICA's Guidelines for Procurement under Japanese ODA Loans, as amended from time to time and shall at all times exercise such responsibility in the best interest of the Client. Any discounts or commissions obtained by the Consultant in the exercise of such procurement responsibility shall be for the account of the Client.</p>
	Consultant, and Affiliates Not to Engage in Certain Activities	3.2.2	The Consultant agrees that, during the term of this Contract and after its termination, the Consultant and any entity affiliated with the Consultant as well as any Sub-consultants and any entity affiliated with such Sub-consultants, shall be disqualified from providing goods, works or services or non-consulting services resulting from or directly related to the Services for the preparation or implementation of the Project, unless otherwise indicated in the SCC.
	Prohibition of Conflicting Activities	3.2.3	The Consultant shall not engage, and shall cause its Experts as well as its Sub-consultants not to engage, either directly or indirectly, in any business or professional activities that would conflict with the activities assigned to them under this Contract.
	Strict Duty to Disclose Conflicting Activities	3.2.4	The Consultant has an obligation and shall ensure that its Experts and Sub-consultants shall have an obligation to disclose any situation of actual or potential conflict that impacts their capacity to serve the best interest of their Client, or that may reasonably be perceived as having this effect. Failure to disclose said situations may lead to the termination of its Contract.
3.3	Confidentiality		Except with the prior written consent of the Client, the Consultant and the Experts shall not at any time communicate to any person or entity any confidential information acquired in the course of the Services, nor shall the Consultant and the Experts make public the recommendations formulated in the course of, or as a result of, the Services.
3.4	Liability of the Consultant		<p>(a) The Consultant shall be responsible for, and shall indemnify the Client, in respect of loss of or damage to equipment and materials furnished by the Client, or</p>



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purchased by the Consultant in whole or in part with funds provided by the Client.

- (b) The Consultant undertakes full responsibility in respect of life, health, and accidents for the Experts and for the dependents of any such Expert.
- (c) The Consultant shall indemnify the Client from and against any and all claims, liabilities, obligations, losses, damages, penalties, actions, judgment, suits, proceedings, demands, costs, expenses and disbursements of whatsoever nature that may be imposed on, incurred by or asserted against the Client during or in connection in the Services by reason of: (i) infringement or alleged infringement by the Consultant of any patent or other protected right; or (ii) plagiarism or alleged plagiarism by the Consultant.
- (d) The Consultant shall ensure that all goods and services (including without limitation all computer hardware, software and systems) procured by the Consultant out of funds provided or reimbursed by the Client or used by the Consultant in the carrying out of the Services do not violate or infringe any industrial property or intellectual property right or claim of any Third Party.
- (e) The Consultant shall indemnify, protect and defend at their own expense the Client, and its agents and employees from and against any and all actions, claims, losses or damages arising out of Consultant's failure to exercise the skill and care required under Clause GCC 3.1.1 provided, however:
 - (i) that the Consultant is notified of such actions, claims, losses or damages not later than twelve (12) months after conclusion of the Services, unless a different period of time is otherwise specified in the SCC;
 - (ii) that the ceiling on Consultant's liability shall be limited to the amount indicated in the SCC, except that such ceiling shall not apply to actions, claims, losses or damages caused by Consultant's gross negligence or reckless conduct;



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		<p>(iii) that Consultant's liability under Clause GCC 3.1.1 shall be limited to actions, claims, losses or damages directly caused by such failure to exercise the said skill and care, and shall not include liability for any actions, claims, losses or damages arising out of occurrences incidental or indirectly consequential to such failure.</p> <p>(f) Upon request of the Client, the Consultant shall, at its own cost and expense, re-perform the Services in the event of Consultant's failure to exercise the skill and care required under Clause GCC 3.1.1.</p> <p>(g) Notwithstanding the provisions of paragraph (a) of this Clause GCC 3.4, the Consultant shall have no liability whatsoever for actions, claims, losses or damages occasioned by (i) the Client's overriding a decision or recommendation of the Consultant or requiring the Consultant to implement a decision or recommendation with which the Consultant does not agree; or (ii) the improper execution of the Consultant's instructions by agents, employees or independent contractors of the Client.</p>
3.5	Insurance to be Taken Out by the Consultant	The Consultant (i) shall take out and maintain, and shall cause any Sub-consultants to take out and maintain, at its (or the Sub-consultants', as the case may be) own cost but on terms and conditions approved by the Client, insurance against the risks, and for the coverage specified in the SCC, and (ii) at the Client's request, shall provide evidence to the Client showing that such insurance has been taken out and maintained and that the current premiums therefore have been paid. The Consultant shall ensure that such insurance is in place prior to commencing the Services as stated in GCC 2.3
3.6	Accounting, Inspection and Auditing	The Consultant (i) shall keep accurate and systematic accounts and records in respect of the Services hereunder, in accordance with internationally accepted accounting principles and in such form and detail as will clearly identify all relevant time changes and costs, and the bases thereof, and (ii) shall periodically permit the Client or its designated representative, and up to five years from the expiration or termination of this Contract, to inspect the same and make copies thereof as well as to have them audited by auditors appointed by the Client, if so required by the Client as the case may be.



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3.7	Reporting		
	Reporting Obligations	3.7.1	The Consultant shall submit to the Client the reports and documents specified in Appendix B, in the form, in the numbers and within the time periods set forth in the said Appendix.
	Serious Hindrances	3.7.2	The Consultant shall report to the Client and JICA promptly the occurrence of any event or condition which might delay or prevent completion of any significant part of the Project in accordance with the schedules and to indicate what steps shall be taken to meet the situation. When the Client receives such a report from the Consultant, the Client shall immediately forward a copy of it to JICA, together with its comments.
3.8	Property of the Reports and Records		The Consultant retains the design rights and other intellectual property rights and copyrights of all documents prepared by him under this Contract. Unless otherwise stated in the SCC, the Client shall be entitled to use them or copy them only for the Project and the purpose for which they are intended, and need not obtain the Consultant's permission to copy for such use.
3.9	Equipment, Vehicles and Materials Furnished by the Client		Equipment, vehicles and materials made available to the Consultant by the Client, or purchased by the Consultant wholly or partly with funds provided by the Client, shall be the property of the Client and shall be marked accordingly. Upon termination or expiration of this Contract, the Consultant shall make available to the Client an inventory of such equipment, vehicles and materials and shall dispose of such equipment, vehicles and materials in accordance with the Client's instructions. While in possession of such equipment, vehicles and materials, the Consultant, unless otherwise instructed by the Client in writing, shall insure them at the expense of the Client in an amount equal to their full replacement value.
3.10	Equipment and Materials Provided by the Consultant		Any equipment or materials brought into the Client's country by the Consultant or its Experts and used either for the Project or personal use shall remain the property of the Consultant or the Experts concerned, as applicable.

4. CONSULTANTS' EXPERTS AND SUB-CONSULTANTS

4.1	Description of Experts		(a) The title, agreed job description, minimum qualification and time input estimates to carry out the
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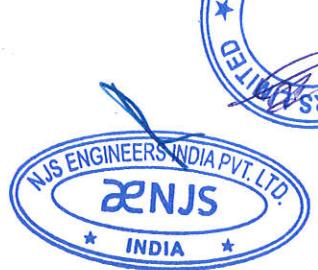


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		<p>Services of each of the Consultant's Experts are described in Appendix C.</p> <p>(b) With the prior approval of the Client, the Consultant may make adjustment in the periods of time indicated in Appendix C, as may be appropriate to ensure the efficient performance of the Services and provided that such adjustments will not cause payments made under the Contract to exceed the maximum amount payable as specified in Clause GCC 6.1.</p>
4.2	Replacement of Key Experts	<p>(a) Except as the Client may otherwise agree in writing, no changes shall be made in the Key Experts.</p> <p>(b) Notwithstanding the above, the substitution of Key Experts during Contract execution may be considered only based on the Consultant's written request and due to circumstances outside the reasonable control of the Consultant, including but not limited to death or medical incapacity. In such case, the Consultant shall forthwith provide as a replacement, a person of equivalent or better qualifications and experience, and at the same rate of remuneration.</p>
4.3	Approval of Additional Key Expert	<p>If during execution of the Contract, additional Key Experts are required to carry out the Services, the Consultant shall submit to the Client for review and approval a copy of their Curricula Vitae (CVs). If the Client does not object in writing (stating the reasons for the objection) within twenty one (21) days from the date of receipt of such CVs, such additional Key Experts shall be deemed to have been approved by the Client.</p> <p>The rate of remuneration payable to such new additional Key Experts shall be based on the rates for other Key Experts position which require similar qualifications and experience.</p>
4.4	Removal of Experts or Sub-consultants	<p>(a) If the Client finds that any of the Experts or Sub-consultants has committed serious misconduct or has been charged with having committed a criminal action, or shall the Client determine that Consultant's Experts or Sub-consultants have engaged in corrupt, fraudulent, collusive, coercive or obstructive practice while performing the Services, the Consultant shall, at the Client's written request, provide a replacement.</p> <p>(b) In the event that any of Experts or Sub-consultants is found by the Client to be incompetent or incapable in discharging assigned duties, the Client, specifying the grounds therefore, may request the Consultant to provide a replacement.</p> <p>(c) Any replacement of the removed Experts or Sub-consultants shall possess equivalent or better</p>



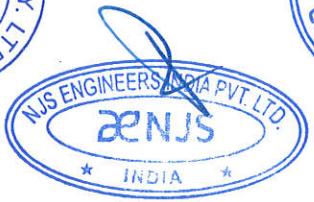
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		qualifications and experience and shall be acceptable to the Client.
4.5	Replacement/ Removal of Experts – Impact on Payments	Except as the Client may otherwise agree, (i) the Consultant shall bear all additional travel and other costs arising out of or incidental to any removal and/or replacement, and (ii) the remuneration to be paid for any of the Experts provided as a replacement shall not exceed the remuneration which would have been payable to the Experts replaced or removed.
4.6	Working Hours, Overtime, Leave etc.	<p>(a) Working hours and holidays for Experts are set forth in Appendix C. To account for travel time to/from the Client's etc. country, Experts carrying out Services inside the Client's country shall be deemed to have commenced or finished work in respect of the Services such number of days before their arrival in, or after their departure from, the Client's country as is specified in Appendix C.</p> <p>(b) The Experts shall not be entitled to be paid for overtime nor to take paid sick leave or vacation leave except as specified in Appendix C, and the Consultant's remuneration shall be deemed to cover these items.</p> <p>(c) Any taking of leave by Key Experts shall be subject to the prior approval by the Consultant who shall ensure that absence for leave purposes will not delay the progress and/or impact adequate supervision of the Services.</p>

5. OBLIGATIONS OF THE CLIENT

5.1	Assistance and Exemptions	<p>Unless otherwise specified in the SCC, the Client shall use its best efforts to:</p> <ul style="list-style-type: none"> (a) Assist the Consultant with obtaining work permits and such other documents as shall be necessary to enable the Consultant to perform the Services. (b) Assist the Consultant with promptly obtaining, for the Experts and, if appropriate, their eligible dependents, all necessary entry and exit visas, residence permits, exchange permits and any other documents required for their stay in the Client's country while carrying out the Services under the Contract. (c) Facilitate prompt clearance through customs of any property required for the Services and of the personal effects of the Experts and their eligible dependents. (d) Issue to officials, agents and representatives of the Government all such instructions and information as
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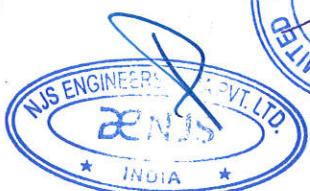


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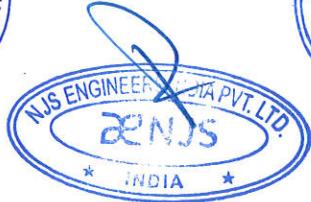
		<p>may be necessary or appropriate for the prompt and effective implementation of the Services.</p> <p>(e) Assist the Consultant and the Experts and any Sub-consultants employed by the Consultant for the Services with obtaining exemption from any requirement to register or obtain any permit to practice their profession or to establish themselves either individually or as a corporate entity in the Client's country according to the applicable law in the Client's country.</p> <p>(f) Assist the Consultant, any Sub-consultants and the Experts of either of them with obtaining the privilege, pursuant to the applicable law in the Client's country, of bringing into the Client's country reasonable amounts of foreign currency for the purposes of the Services or for the personal use of the Experts and of withdrawing any such amounts as may be earned therein by the Experts in the execution of the Services.</p> <p>(g) Provide to the Consultant any such other assistance as may be specified in the SCC.</p>
5.2	Access to Project Site	The Client warrants that the Consultant shall have, free of charge, unimpeded access to the Project site in respect of which access is required for the performance of the Services. The Client will be responsible for any damage to the Project site or any property thereon resulting from such access and will indemnify the Consultant and each of the Experts in respect of liability for any such damage, unless such damage is caused by the willful default or negligence of the Consultant or any Sub-consultants or the Experts of either of them.
5.3	Change in the Applicable Law Related to Taxes and Duties	If, after the date of this Contract, there is any change in the Applicable Law in the Client's country with respect to taxes and duties which increases or decreases the cost incurred by the Consultant in performing the Services, then the remuneration and reimbursable expenses otherwise payable to the Consultant under this Contract shall be increased or decreased accordingly by agreement between the Parties hereto, and corresponding adjustments shall be made to the ceiling amounts specified in Clause GCC 6.1(b).
5.4	Services, Facilities and Property of the Client	<p>(a) The Client shall make available to the Consultant and the Experts, for the purposes of the Services and free of any charge, the services, facilities and property described in Appendix G at the times and in the manner specified in said Appendix G.</p>



			(b) In case that such services, facilities and property shall not be made available to the Consultant as and when specified in Appendix G, the Parties shall agree on (i) any time extension that it may be appropriate to grant to the Consultant for the performance of the Services, (ii) the manner in which the Consultant shall procure any such services, facilities and property from other sources, and (iii) the additional payments, if any, to be made by the Client to the Consultant as a result thereof pursuant to Clause GCC 6.1 (c).
5.5	Counterpart Personnel		<p>(a) The Client shall make available to the Consultant free of charge such professional and support counterpart personnel, to be nominated by the Client with the Consultant's advice, if specified in Appendix G.</p> <p>(b) If counterpart personnel are not provided by the Client to the Consultant as and when specified in Appendix G, the Parties shall agree on (i) any time extension that it may be appropriate to grant to the Consultant for the performance of the Services, (ii) how the affected part of the Services shall be carried out, and (iii) the additional payments, if any, to be made by the Client to the Consultant as a result thereof pursuant to Clause GCC 6.1 (c).</p> <p>(c) Professional and support counterpart personnel, excluding Client's liaison personnel, shall work under the exclusive direction of the Consultant. If any member of the counterpart personnel fails to perform adequately any work assigned to such member by the Consultant that is consistent with the position occupied by such member, the Consultant may request the replacement of such member, and the Client shall not unreasonably refuse to act upon such request.</p>
5.6	Payment Obligation		In consideration of the Services performed by the Consultant under this Contract, the Client shall make such payments to the Consultant and in such manner as is provided by Clause GCC 6 below.

6. PAYMENTS TO THE CONSULTANT

6.1	Cost Estimates; Ceiling Amount		(a) An estimate of the cost of the Services is set forth in Appendix D (Remuneration) and Appendix E (Reimbursable expenses).
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		<p>(b) Payments under this Contract shall not exceed the ceilings in foreign currency and in local currency specified in the SCC.</p> <p>(c) For any payments in excess of the ceilings specified in GCC 6.1 (b), an amendment to the Contract shall be signed by the Parties referring to the provision of this Contract that evokes such amendment.</p>
6.2	Remuneration and Reimbursable Expenses	<p>(a) The Client shall pay to the Consultant (i) remuneration that shall be determined on the basis of time actually spent by each Expert in the performance of the Services after the date of commencing the Services or such other date as the Parties shall agree in writing; and (ii) reimbursable expenses that are actually and reasonably incurred by the Consultant in the performance of the Services.</p> <p>(b) All payments shall be at the rates set forth in Appendix D and Appendix E.</p> <p>(c) Unless otherwise provided in the SCC, the remuneration rates and reimbursable expenses shall be adjusted in accordance with the adjustment formula specified in the SCC for the duration of the Contract.</p> <p>(d) The remuneration rates shall cover: (i) such salaries and allowances as the Consultant shall have agreed to pay to the Experts as well as factors for social charges and overheads (bonuses or other means of profit-sharing shall not be allowed as an element of overheads), (ii) the cost of backstopping by home office staff not included in the Experts' list in Appendix C, (iii) the Consultant's fee.</p> <p>(e) Any rates specified for Experts not yet appointed shall be provisional and shall be subject to revision, with the written approval of the Client, once the applicable remuneration rates and allowances are known.</p>
6.3	Taxes and Duties	<p>(a) The Consultant, Sub-consultants and Experts are responsible for meeting any and all tax liabilities arising out of the Contract except as otherwise provided in the SCC.</p> <p>(b) If so specified in the SCC, all local identifiable indirect taxes and direct tax are exempt from, reimbursed to the Consultant or are paid by the Client on behalf of the Consultant.</p>
6.4	Currency of Payment	Any payment under this Contract shall be made in the currency(ies) specified in the SCC.

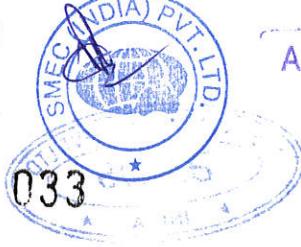
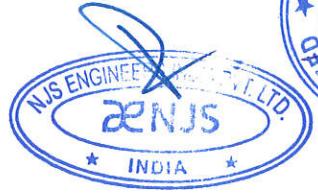


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6.5	Mode of Billing and Payment	<p>Billings and payments in respect of the Services shall be made as follows:</p> <p>(a) Within twenty eight (28) days after the receipt of the advance payment security and the invoice for advance payment, the Client shall pay to the Consultant an advance payment, as an interest-free loan for mobilization and cash flow support, as specified in the SCC. The advance payment security shall be in the amount (or amounts) and in the currency (or currencies) of the advance payment specified in the SCC. Such security (i) is to remain effective until the advance payment has been fully set off, and (ii) is to be in the form set forth in Appendix H, or in such other form as the Client shall have approved in writing. The advance payments will be set off by the Client in equal installments against the statements for the number of months of the Services specified in the SCC until said advance payments have been fully set off.</p> <p>(b) As soon as practicable and not later than fourteen (14) days after the end of each calendar month during the period of the Services, or after the end of each time intervals otherwise indicated in the SCC, the Consultant shall submit to the Client, in duplicate, itemized invoices, accompanied by the receipts or other appropriate supporting documents, of the amounts payable pursuant to Clauses GCC 6.4 and GCC 6.5 for such interval, or any other period indicated in the SCC. Separate invoices shall be submitted for expenses incurred in foreign currency and in local currency. Each invoice shall show remuneration and reimbursable expenses separately.</p> <p>(c) The Client shall pay the Consultant's invoices within fifty-six (56) days after the receipt by the Client of such itemized invoices with supporting documents. Only such portion of an invoice that is not satisfactorily supported may be withheld from payment. Should any discrepancy be found to exist between actual payment and costs authorized to be incurred by the Consultant, the Client may add or subtract the difference from any subsequent payments.</p>
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		<p>(d) The final payment under this Clause 6.5 (d) shall be made only after the final report and a final invoice, identified as such, shall have been submitted by the Consultant and approved as satisfactory by the Client. The Services shall be deemed completed and finally accepted by the Client and the final report and final invoice shall be deemed approved by the Client as satisfactory eighty-four (84) days after receipt of the final report and final invoice by the Client unless the Client, within such eighty-four (84) day period, gives written notice to the Consultant specifying in detail deficiencies in the Services, the final report or final invoice. The Consultant shall thereupon promptly make any necessary corrections, and thereafter the foregoing process shall be repeated. Any amount that the Client has paid or caused to be paid in accordance with this Clause GCC 6.5 (d) in excess of the amounts actually payable in accordance with the provisions of this Contract shall be reimbursed by the Consultant to the Client within twenty-eight (28) days after receipt by the Consultant of notice thereof. Any such claim by the Client for reimbursement must be made within fourteen (14) calendar months after receipt by the Client of a final report and a final invoice approved by the Client in accordance with the above.</p> <p>(e) All payments under this Contract shall be made to the accounts of the Consultant specified in the SCC.</p> <p>(f) Payments in respect of remuneration or reimbursable expenses, which exceed the cost estimates for these items as set forth in Appendices D and E, may be charged to the respective contingencies provided for foreign and local currencies only if such expenses were approved by the Client prior to being incurred.</p> <p>(g) With the exception of the final payment under (d) above, payments do not constitute acceptance of the Services nor relieve the Consultant of any obligations hereunder.</p>
6.6	Interest on Delayed Payments	If the Consultant does not receive payment in accordance with Clause GCC 6.5 (c), the Consultant shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay. This period shall be deemed to commence



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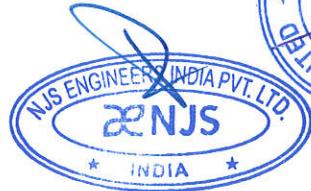
		<p>on the date for payment specified in Clause GCC 6.5 (c), irrespective of the date on which any notice is issued by the Consultant.</p> <p>Unless otherwise stated in the SCC, these financing charges shall be calculated at the annual rate of three (3) percentage points above the discount rate of the central bank in the country of the currency of payment, or if not available, the interbank offered rate, and shall be paid in such currency.</p> <p>The Consultant shall be entitled to this payment without formal notice or statement, and without prejudice to any other right or remedy provided by the Applicable Law or this Contract.</p>
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7. FAIRNESS AND GOOD FAITH

7.1	Good Faith	<p>The Parties undertake to act in good faith with respect to each other's rights under this Contract and to adopt all reasonable measures to ensure the realization of the objectives of this Contract.</p>
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8. SETTLEMENT OF DISPUTES

8.1	Amicable Settlement	<p>The Parties shall seek to resolve any dispute amicably by mutual consultation.</p> <p>If either Party objects to any action or inaction of the other Party, the objecting Party may file a written Notice of Dispute to the other Party providing in detail the basis of the dispute. The Party receiving the Notice of Dispute will consider it and respond in writing within fourteen (14) days after receipt. If that Party fails to respond within fourteen (14) days, or the dispute cannot be amicably settled within fourteen (14) days following the response of that Party, Clause GCC 8.2 shall apply.</p>
8.2	Dispute Resolution	<p>Any dispute between the Parties as to matters arising pursuant to this Contract that cannot be settled amicably according to Clause GCC 8.1 shall be submitted by either Party for settlement proceedings in accordance with the following provisions:</p> <ul style="list-style-type: none"> (i) Contract with foreign Consultants (or, in case of a Joint Venture, where the Lead Member is a foreign Consultant) (ii) Mediation



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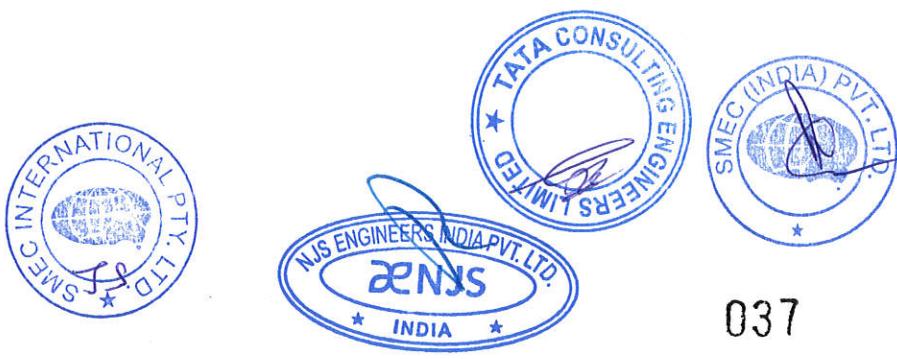
		<p>The Parties may agree to submit any dispute or disagreement that has not been settled amicably according to Clause GCC 8.1 to settlement proceedings under the "ICC ADR Rules" (Rules of Amicable Dispute Resolution of the International Chamber of Commerce).</p> <p>(ii) Arbitration</p> <p>If the dispute or disagreement cannot be settled amicably pursuant to Clause GCC 8.1, or if, where the settlement proceedings under Clause GCC 8.2.1(a) are agreed, the dispute or disagreement has not been settled pursuant to the ICC ADR Rules within forty-two (42) days following the filing of a Request for ADR or within such other period as the Parties may agree in writing, such dispute or disagreement shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce ("ICC Rules of Arbitration") by one or more arbitrators appointed in accordance with said Rules, and the proceedings shall be held in a neutral venue selected in accordance with these Rules of Arbitration. The award in any arbitration proceedings shall be final and binding upon the Parties and judgment thereon may be entered in any court of competent jurisdiction on application of either Party.</p> <p>(ii) Contract with Consultants national of the Client's country</p> <p>The Parties agree to submit any dispute or disagreement that has not been settled amicably according to Clause GCC 8.1 to settlement proceedings under the laws of the Client's country.</p>
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III. Special Conditions of Contract



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III. Special Conditions of Contract

Number of GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
1.1 (a)	The Applicable Guidelines are those published in April 2012.
1.4	The Contract shall be executed in: English
1.6	<p>The addresses are:</p> <p>Client: CMWSS Board 1, Pumping Station Road, Chintadripet, Chennai 600 002</p> <p>Attention: Managing Director Telephone: 91 44 28451300 Facsimile: 91 44 28458181 E-mail: <u>md@cmwssb.in, sedesalwing@gmail.com</u> Web- site: <u>www.chennaimetrowater.tn.nic.in</u></p> <p>Consultant: SMEC International Pty Ltd (SMEC) in Consortium with NJS Engineers India Pvt Ltd (NJSEI) , Tata Consulting Engineers Limited (TCE) and SMEC (India) Private Limited (SMEC India)</p> <p>For SMEC <u>SMEC International Pty Limited</u> Attention:Dr. Janardhan Sundaram 1st Floor, Novus Tower, West Wing, Plot No. 18, Sector-18, Gurugram – 122015 E-mail: <u>janardhan.sundaram@smecl.com</u></p> <p>For NJSEI NJS Engineers India Pvt Ltd 18, Shailesh Society, Karvenagar, Pune-411052 Attention:Pradipto Sarkar, Director, NJS Engineers India Pvt Ltd Facsimile:<u>080-41131655</u> E-mail: <u>psarkar@njsei.com</u></p> <p>For TCE <u>Tata Consulting Engineers Limited</u> Matulya Centre 'A', 1st Floor, 249 Senapati Bapat Marg, Lower Parel (West), Mumbai 400013 Attention: G N.Virupaksha. Associate Vice President E-mail: <u>gnvirupaksha@tce.co.in</u></p>



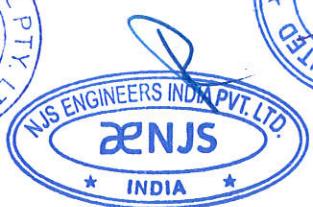
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	<p><u>For SMEC India</u> <u>SMEC India Private Limited</u> Pushpendra Kumar Sharma, Company Secretary & GM (Legal & Commercial) 1st Floor, Novus Tower, West Wing, Plot No. 18, Sector-18, Gurugram – 122015 E-mail: pushpendra.sharma@smecl.com</p>
1.8	<p>The Lead Member is SMEC International Pty Ltd. 1st Floor, Novus Tower, West Wing, Plot No. 18, Sector-18, Gurugram – 122015</p>
1.9	<p>The Authorized Representatives are:</p> <p>For the Client: Managing Director or his designated representative CMWSS Board 1, Pumping Station Road, Chintadripet, Chennai 600 002</p> <p>For the Consultant: For: SMEC International Pty Limited Dr.Janardhan Sundaram E-mail: Janardhan.Sundaram@smecl.com Authorized Representative</p> <p>For: NJS Engineers India Pvt Ltd. Mr. Pradipto Sarkar, Director, NJS Engineers India Pvt Ltd E-mail: psarkar@njsei.com Authorized Representative</p> <p>For: Tata Consulting Engineers Limited Virupaksha.G N, Associate Vice President E-mail: gnvirupaksha@tce.co.in Authorized Representative</p> <p>For: SMEC India Private Limited Pushpendra Kumar Sharma, Company Secretary & GM (Legal & Commercial) 1st Floor, Novus Tower, West Wing, Plot No. 18, Sector-18, Gurugram – 122015 E-mail: pushpendra.sharma@smecl.com</p>



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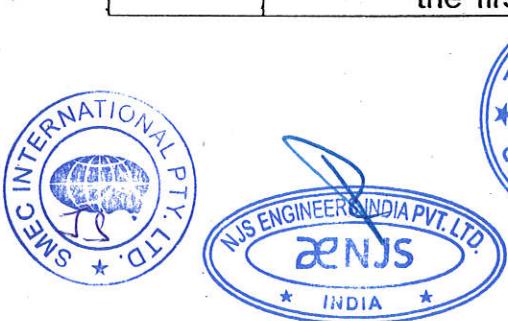
2.1	The successful consultant shall furnish an irrevocable Contract Performance Bank Guarantee from any of the Scheduled/Nationalized Bank for the value computed at One percent (1%) of the consultancy value before signing the agreement which shall be valid upto one year beyond the date of completion of consultancy contract period.
2.4	The time period shall be 89 Months (Eighty Nine Months)
3.4 (e) (ii)	The ceiling on Consultants' liability shall be limited to 10% of the contract value .
3.5	<p>The risks and the coverage shall be as follows:</p> <ul style="list-style-type: none"> a. Third Party motor vehicle liability insurance in respect of motor vehicles operated as required under Motor Vehicles Act, 1988 in India by the Consultant or its Experts or any Sub-consultants or their Experts, for the period of Consultancy, as required under Indian Motor Vehicles Act. b. professional liability insurance, with a minimum coverage of equal to total contract value for this consultancy; c. employer's liability and worker's compensation insurance in respect of the Experts of the Consultant and of any Sub-consultants, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Experts, any such life, health, accident, travel or other insurance as may be appropriate; and d. insurance against loss of or damage to (i) equipment purchased in whole or in part with funds provided under this Contract, and (ii) the Consultant's property used in the performance of the Services.
3.8	The Client is entitled to use the documents prepared by the Consultant under this contract for other projects, "without" prior written permission of the consultant.
6.1(b)	<p>The ceiling in Foreign currency is: Foreign currency payments to the Consultant in USD, \$9,411,963 (Nine Million Four Hundred Eleven Thousand Nine hundred Sixty Three Dollars Only)</p> <p>The ceiling in local currency is: Local currency payments to the Consultant in INR.57,55,55,630.00 (Rupees Fifty Seven Crore Fifty Five Lakh Fifty Five Thousand Six Hundred Thirty Only).</p> <p>The Consultant's total cost shall include all staff costs, printing, communications, travel, accommodation, and all other costs incurred by the Consultant in carrying out the Services</p>



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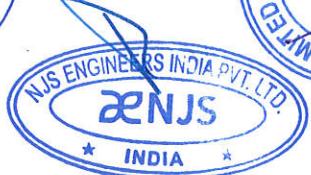
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	Any local indirect taxes chargeable in respect of this Contract for the Services provided by the Consultant shall be included in this Contract.
6.2(c)	<p>Price Adjustment for Local and Foreign Currency</p> <p>1. <u>Adjustment of remuneration</u></p> <p>Payments for remuneration made in accordance with Clause GCC 6.2(a) in Foreign and Local currency (Indian Rupees) shall be adjusted as follows:</p> <p>(a) Remuneration paid in local currency pursuant to the rates set forth in Appendix D shall be adjusted every 12 months (and, for the first time, with effect for the remuneration earned in the 13th calendar month after the date of the Contract) by applying the following formula:</p> $R_f = R_{fo} \times \frac{I_f}{I_{fo}}$ <p>where: R_f is the adjusted remuneration; R_{fo} is the remuneration payable on the basis of the rates set forth in Appendix D for remuneration payable in local currency; I_f is the relevant index for salaries in the Client's country for the first month for which the adjustment is to have effect and; I_{fo} is the official index for salaries in the Client's country for the month of the date of the Contract.</p> <p>The official index for salaries corresponding to I_f and I_{fo} in the adjustment formula for remuneration paid in local currency is the Consumer Price Index for Industrial Workers (CPI -IW), Labour Bureau, Government of India.</p> <p>(b) Remuneration paid in foreign currency pursuant to the rates set forth in Appendix D shall be adjusted every 12 months (and, the first time, with effect for the remuneration earned in the 13th calendar month after the date of the Contract) by applying the following formula:</p> $R_f = R_{fo} \times \frac{I_f}{I_{fo}}$ <p>where: R_f is the adjusted remuneration; R_{fo} is the remuneration payable on the basis of the rates set forth in Appendix D for remuneration payable in foreign currency; I_f is the official index for salaries in the country of the foreign currency for the first month for which the adjustment is supposed to have effect;</p>



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	<p>and</p> <p>I_{fo} is the official index for salaries in the country of the foreign currency for the month of the date of the Contract.</p> <p>The Consultant shall state here the name, source institution, and any necessary identifying characteristics of the official index for salaries corresponding to I_f and I_{fo} in the adjustment formula for remuneration paid in foreign currency: [For Foreign currency as per the Bureau for labour statistics US Department of Labour].</p> <p>2. Adjustment of reimbursable expenses</p> <p>Payments for reimbursable expenses made in accordance with Clause GC 6.2(a) in Foreign and local currency (Indian Rupees) shall be adjusted as follows:</p> <p>Reimbursable expenses pursuant to the rates set forth in Appendix E shall be adjusted every 12 months (and, for the first time, with effect for the reimbursable expenses in the 13th calendar month after the date of the Contract) by applying the following formula for each of the currencies of payment under the Contract:</p> $P = P_o \times \frac{I}{I_o}$ <p>where P is the adjusted reimbursable expenses, P_o is the reimbursable expenses payable on the basis of the rates set forth in Appendix E for reimbursable expenses, I is the relevant official index in the country of the currency for the first month for which the adjustment is to have effect and, I_o is the relevant official index in the country of the currency for the month of the date of the Contract.</p> <p>The Index I for each of the currencies of payment under the Contract shall be as follows:</p> <ul style="list-style-type: none"> • For Indian Currency, as per Industrial Workers (CPI -IW), Labour Bureau, Government of India; and • For Foreign currency as per the Bureau for labour statistics US Department of Labour
6.3 (a) and (b)	As per Entry No. 3 of Exemption Notification No.9/2017 - Integrated Tax (Rate) dated 28.06.2017 issued by the Central Government of India, Consultancy Services being a Pure Service (without involving any Supply of Goods) provided to the CMWSS Board (Being a Governmental Authority) is exempted from Goods and Service Tax.
6.4	<p>The currency [currencies] of payment shall be the following:</p> <ul style="list-style-type: none"> (i) Name of Foreign Currency : USD (ii) Name of Local Currency : INR



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6.5	<p>Retention Amount The payment amount of 5% of the contract value will be retained as Retention Money from each payment due to the contractor which will be paid to the consultants without interest on completion of the work including Defect Liability Period.</p> <p>Disbursement Procedure The disbursement procedure shall be Commitment Procedure and Reimbursement Procedure.</p> <p>Commitment Procedure Brochure on Commitment Procedure for Japanese ODA Loans dated August 2012, as may be amended from time to time (hereinafter referred to as the "Commitment Brochure") shall be applied with the following supplemental stipulations, for disbursement of the proceeds of the Loan for the purchase of goods and services from the Supplier(s) with respect to the portion of the contract stated in the internationally traded currency other than that of India.</p> <ol style="list-style-type: none"> 1. The Paying Bank mentioned in the Commitment Brochure shall be Bank of India, Tokyo. 2. The Issuing Bank mentioned in the Commitment Brochure shall be identified in the notice and the Authorization Letters mentioned in Article III, Section 1.(6). <p>Article III, Section 1.(6) of Loan Agreement :"The Loan Agreement shall become effective on the date on which JICA declares itself satisfied with the evidence of authority and the specimen' signatures; the Legal Opinion; the Guarantee, if any; and the notice concerning the L/C Issuing Bank mentioned in the Commitment Brochure. The notice shall be together with the Authorization Letter of No. 1/5/2014-Japan. I, issued by the Ministry of Finance for the L/C Issuing Bank and the Paying Bank on June 23, 2016, which is satisfactory to JICA, in case that the L/C Issuing Bank is not the same as the Paying Bank."</p> <p>Reimbursement Procedure Brochure on Reimbursement Procedure for Japanese ODA Loans dated August 2012, as may be amended from time to time, (hereinafter referred to as the "Reimbursement Brochure") shall be applied with the following supplemental stipulations, for disbursement of the proceeds of the Loan for the payments already made to the Supplier(s).</p> <ol style="list-style-type: none"> 1. The Paying Bank mentioned in this Schedule, including the Reimbursement Brochure shall be Bank of India, Tokyo. 2. The supporting documents evidencing each payment and its usage, of the Reimbursement Brochure, shall be as follows:
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(1) For payments for consulting services:

- the claim from the consultant(s) indicating, in sufficient details, the services rendered, period covered, and amount payable to them; and
- the receipt from the consultant(s) showing the date and amount of payment, cancelled bank cheque, demand draft or similar document evidencing the date and amount of payment made to the consultant(s).

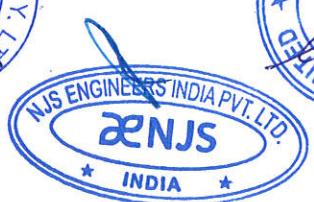
3. Reimbursement Brochure shall be substituted as follows:

(1) When the currency used for the actual payments to the Supplier(s) is Indian Rupee, the amount stated in the Request for Reimbursement shall be either in Japanese Yen, converted at the RBI rate quoted by the Reserve Bank of India, Mumbai, one (1) business day prior to the date on which the Request for Reimbursement is made, or in Indian Rupee. In the former case, the amount paid to the Supplier(s) and the exchange rate used for conversion to Japanese Yen shall be described in the Summary Sheet of Payments. In the latter case, the amount of disbursement in Japanese Yen shall be calculated at the RBI rate quoted by the Reserve Bank of India, Mumbai, informed to JICA through the Paying Bank two (2) business days before the date on which the disbursement is made.

(2) When the currency used for the actual payments to the Supplier(s) is other than Indian Rupee, the amount stated in the Request for Reimbursement shall be either:

- in Japanese Yen, Indian Rupee or other internationally traded currency acceptable to JICA, converted at the telegraphic transfer buying (TTB) rate quoted by a foreign exchange bank authorized as such by the authority in the territories of the Borrower, one (1) business day prior to the date on which the Request for Reimbursement is made; or
- in the same currency used for the actual payments, provided that it is Japanese Yen or other internationally traded currency acceptable to JICA.

In case (2) (a) above, the amount paid to the Supplier(s) and exchange rate used for conversion to Japanese Yen, Indian Rupee or other internationally traded currency acceptable to JICA, shall be described in the Summary Sheet of Payments. In case (2) above, if the amount stated in the Request for Reimbursement is other than Japanese Yen, the amount of disbursement in



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	<p>Japanese Yen shall be calculated at the telegraphic transfer selling (TTS) rate quoted by the Paying Bank two (2) business days before the day when the reimbursement is made.</p> <p>4. The Borrower shall make necessary arrangement with the Paying Bank, including but not limited to, the following for this brochure:</p> <ul style="list-style-type: none"> a) to open a Loan Account with the Paying Bank; and b) to confirm necessary arrangements for transaction of funds after the proceeds of the Loan is credited to the Loan Account. 												
6.5(a)	<p>The amount of the advance payment is: 5% of the value put to tender (Interest Free)</p> <p>The advance payment will be set off by the Client after completion of 30% of contract amount paid or after 12 months of the duration of the contract whichever is earlier.</p> <p>The Advances shall be made to the consultant by the Employer subject to the consultant providing a Bank Guarantee for an equivalent amount as per the Stipulations. The advance payment securities shall be in the amounts and in the currencies of the advance payment.</p>												
6.5(b)	<p>The Consultant shall submit to the Client Itemized Invoices at time intervals of 1 Month</p>												
6.5(e)	<p>The accounts are: SMEC International Pty Limited</p> <table border="1"> <tr> <td>For Foreign Currency:</td><td>For Local Currency:</td></tr> <tr> <td>For local currency:</td><td>For local currency:</td></tr> <tr> <td>Branch Name</td><td>Branch Name</td></tr> <tr> <td>Account No:</td><td>Account No.:</td></tr> <tr> <td>Type of Account:</td><td>Type of Account:</td></tr> <tr> <td>Branch Code:</td><td>Branch Code:</td></tr> </table>	For Foreign Currency:	For Local Currency:	For local currency:	For local currency:	Branch Name	Branch Name	Account No:	Account No.:	Type of Account:	Type of Account:	Branch Code:	Branch Code:
For Foreign Currency:	For Local Currency:												
For local currency:	For local currency:												
Branch Name	Branch Name												
Account No:	Account No.:												
Type of Account:	Type of Account:												
Branch Code:	Branch Code:												

NJS Engineers India Pvt Ltd

<p>For Foreign Currency:</p> <p>Account Name: NJS Engineers India Pvt. Ltd. Branch Name: Kothrud Branch, Pune Account No: 033806000259</p>	<p>For Local Currency:</p> <p>Account Name: NJS Engineers India Pvt. Ltd. Branch Name: IDBI Bank, Gandhinagar Branch, Bangalore</p>
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Chennai-600 002.

	Type of Account: Current (EEFC) Branch Code: 000338 IFSC/SWIFT Code: IFSC Code ICIC0000338 SWIFT CODE ICICINBBCCTS	Account No: 0551102000017152. Type of Account: Current Account Branch Code: 0551 IFSC Code: IBKL0000551
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Tata Consulting Engineers Limited

For Foreign Currency:	For Local Currency:
Account Name : TATA CONSULTING ENGINEERS LIMITED (TATA CONSULTING ENGINEERS LTD.-EEFC) Account number 0009325026 SWIFT Code : CITIINBX NEFT/RTGS IFSC Code : CITI0100000 MICR Number : 400037002	TATA CONSULTING ENGINEERS LIMITED Bank: HDFC Bank Branch: Fort, MUMBAI A/C No: 00600310012261 IFSC Code: HDFC 0000060, MICR Code: 400240015

Please refer below the routing details for USD remittances:

Correspondent Bank : Citibank New York
 Correspondent Bank SWIFT Code : CITIUS33
 Beneficiary Bank of USD : Citibank India
 Beneficiary Bank SWIFT Code : CITIINBX
 Citibank India Nostro A/c Number with Citi NY : 10990896
 Corresponding Bank Address : CITIBANK. NA, 111, WALL STREET, NEW YORK NY 1 10043
 CHIP No : 0008
 FEDWIRE ROUTING No : 021000089

SMEC India Private Limited

For Foreign Currency:
Account Details: (For local currency INR & Foreign Currency USD) Company Name : SMEC India Pvt. Ltd. Bank Account Number : 003000036204 Bank Name : Australia and New Zealand Banking Group Ltd. Branch Address : Cnergy, Unit No. A, 6 th Floor, Appa Saheb Marathe Marg, Prabhadevi, Mumbai-400025 RTGS/NEFT RTGS : ANZB0000001



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Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.



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IV. Appendices



Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

Appendix A – Description of Services



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Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.



Description of Services

Consultancy for “Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works”.

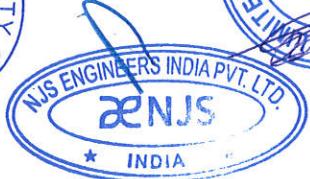
1. BACKGROUND

Chennai Metropolitan Area (CMA) spread over an area of 1189 sq. km and comprised of Chennai Corporation, 16 Municipalities, 20 Town Panchayats and 214 Village Panchayats comprised in 10 Panchayat unions and one cantonment namely St. Thomas Mount with the total population of the CMA area is about 8.0 million. Rapid urbanization is taking place not only in the city but also in the surrounding urban local bodies (ULBs), Municipal areas, and Town Panchayats. Due to this rapid urbanization, it warrants for providing essential infrastructures such as road, street lights, EB cables, water supply, sewerage and solid waste disposal etc., CMWSSB is a statutory body for providing water supply and sewerage infrastructures in the entire city and CMA. Though its present operation is limited to the Corporation City limit, the Board is extending its services to entire CMA according to the need in phased manner.

1.1. Expansion of City Limit.

Earlier the city limit was expanded in the year 1978 by adding erstwhile 15 Panchayats adjoining the City to an area of 174 sq. km. CMWSSB covered its services for providing water supply and sewerage infrastructures to the entire city since its formation in 1978 in a phased manner. However, such infrastructures provided by the urban local bodies adjacent to Chennai City in their area differ qualitatively and quantitatively. Hence, it was felt essential by the Government to expand the city by annexing the deserving urban local bodies contiguous to the Chennai City.

In view of the above, the Government issued orders, vide G.O.(Ms) No.256, MA&WS (Election) Department, dated 26.12.2009, for expansion of the limits / boundaries of the Chennai City Corporation by annexing 9 Municipalities, 8 Town Panchayats and 25 Village Panchayats. Now, the extent of the expanded City limit is



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427 sq. km. As directed in G.O., the expanded area of the Corporation of Chennai has come to effect from October, 2011 after recently held local body elections. CMWSSB is in the endeavour of providing water supply and sewerage infrastructures on par with the erstwhile City on priority.

1.2. Source of Water Supply

The main sources of water supply to the Chennai city is from surface water sources such as Poondi, Cholavaram and Redhills reservoirs and also from ground water sources from Araniar and Korataliar basin. The water supply source has been augmented with distant sources such as Krishna Water Supply scheme with supply from the State of Andhra Pradesh and by Chennai Water Supply Augmentation Project with supply from Veeranam Tank. A desalination plant of capacity 100 MLD has been commissioned during July 2010 near Kattupalli village, Minjur in North Chennai and is in operation. Another 100 MLD capacity Desalination plant has been commissioned during 2013 at Nemmeli at the southern outskirts of Chennai and is in operation.

1.3. Need for the Project

Even after implementation of the above water supply augmentation projects there is still a demand supply gap of about 450 MLD now. There is no alternative reliable surface / ground water source adjacent to the City. In order to bridge the demand – supply gap CMWSS Board proposed to augment the water supply to the city through construction of additional Sea Water Desalination Plant. CMWSS Board gets the necessary financial assistance for this Project from the Government of India through the Government of Tamil Nadu. Government of India (GOI) finalized the financial assistance with the Government of Japan (GOJ) to extend Japanese Official Development Assistance (ODA) loan.

2. OBJECTIVES OF THE PROJECT

The Project aims to deliver an additional water production of 400 MLD by seawater desalination for the CMA and improve the efficiency of the existing water distribution network in the Chennai Core City, the central area of the CMA.



Outlines of the Project

Construction Items

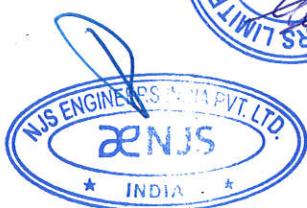
The Project consists of the following components:

- a) Construction of a Sea Water Desalination Plant, which is named as the perur Seawater Desalination Plant" (hereinafter refer to "Perur DSP" having a production capacity of 400 MLD in Perur Commune, Tamil Nadu State
- b) Construction of Pumping Stations and Reservoirs
- c) Installation of a Product Water Transmission Main from the 400 MLD Desalination Plant to the Headworks at Porur.
- d) Improvement of the existing water distribution networks in the Chennai City.

Construction items in the Project are listed in Table below.

Table - Construction Items in the Project

Component	Construction items
a) Construction of the Perur DSP (400 MLD)	<ul style="list-style-type: none"> - Seawater intake facilities - Pre-treatment facility - Seawater desalination facilities by reverse osmosis (RO) technology - Post-treatment facility for remineralization and disinfection - Potable water storage - Effluent discharge pipelines - Substation for power receiving - All other buildings and structures necessary for the seawater desalination plant such as administration building, storage, guard house, etc.
b) Construction of Pumping Stations and Reservoirs	<ul style="list-style-type: none"> - Perur UGT of Capacity of 9 ML (4 Cells) - Porur UGT of Capacity of 10 ML
c) Construction of product water transmission system	<ul style="list-style-type: none"> - Product water transmission pumping station on the premises of the Perur DSP - Product water transmission main (D 1000, 1600, 1800 and 2000mm, 65 km, MS or DCIP) - Water transmission pumping station and reservoir in the Porur Water Distribution Station (WDS)



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d) Improvement of the existing distribution system in Chennai Core City	<ul style="list-style-type: none"> - Replacement of the existing distribution pipes (D100-450 mm, 375 km, DCIP) - Installation of supplementary distribution pipes to strengthen the capacity of the existing distribution networks (D150-700 mm, 101km, DCIP) - Installation of new water distribution pipes in un-covered streets in Core city.(D100-150 mm, 258km, DCIP) - Reinforcement of the storage capacity of Under Ground Tank (UGT) and Elevated Storage Tanks (ESRs) - Installation of service connections and water meters - Setup of district metered areas (DMA)
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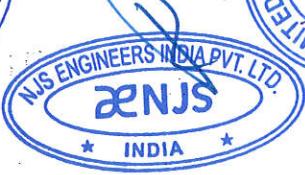
Procurement packages and procedure

All contract packages from CP 1 to CP3 will be procured through International Competitive Bidding (ICB) based on Single-Stage Two-Envelope Bidding Procedure with Pre-qualification (P/Q) in compliance with the JICA's Procurement Guideline (Section 2.03, Part II).

All contract packages of CP4 and CP 5 will be procured through Local Competitive Bidding (LCB), as shown in Table below.

Table - Procurement Package and Procedure of the Project

	Package	Procurement procedure
CP1	Construction of the Perur DSP (400MLD)	<ul style="list-style-type: none"> - International Competitive Bid (ICB) with P/Q - Single-Stage Two-Envelope - Design-Build-Operation (DBO) contract - 20 years of O&M of the DSP after the commissioning - JICA's Standard Bidding Document "Design-Build"*
CP 2	Construction of pumping stations and reservoir	<ul style="list-style-type: none"> - International Competitive Bid (ICB) with P/Q - Single-Stage Two-Envelope - Design-Bid-Build contract - JICA's Standard Bidding Document "Works"
CP 3	Installation of product water transmission mains CP 3-1: L=12.2 km CP 3-2: L=14.5 km CP 3-3: L=21.6 km CP 3-4: L=17.0 km	<ul style="list-style-type: none"> - International Competitive Bid (ICB) with P/Q - Single-Stage Two-Envelope - Design-Bid-Build contract - JICA's Standard Bidding Document "Works"



Dk
Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

CP 4	Improvement of the existing water distribution system	- Local Competitive Bid (LCB)
CP 5	Installation of external power transmission line	- Local Competitive Bid (LCB)

* The general conditions of the contract shall be prepared using the FIDIC Gold book (Edition 2008).

Funding Source

The funding source of the Project, including that for the Services is Japanese ODA Loan, excluding construction cost of CP 4 which is funded by the State Government.

Executing Agency

The Executing Agency of the Project is Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB). Project Implementation Unit (PIU) in CMWSSB is the direct counterpart to the Consultant.

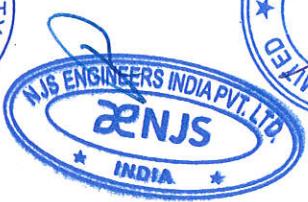
Technical Information

The final report on the "Preparatory Survey for Chennai Seawater Desalination Plant Project" is available at CMWSSB. Also, the natural condition survey results implemented by CMWSSB are available as below:

- Bathymetric survey of the seabed
- Geotechnical survey in the DSP site
- Topographical survey in the DSP site
- Raw seawater quality of the existing Nemmeli DSP
- EIA Report including assessment of the environmental conditions of the Project
- Ocean current survey conducted at in front of the DSP site

3. SCOPE OF THE CONSULTING SERVICES

The scope of work under this consultancy services is to prepare **Conceptual & Detailed Design, Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu including Construction of Pumping Station & Reservoirs, Improvement of Existing Water Distribution Networks and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works.** The consulting services shall be provided by a single or a J/V of international consulting firm(s) in compliance with Guidelines for the Employment of Consultants under Japanese ODA Loans, April 2012. The objectives



of the Consulting Services are to achieve efficient and proper preparation and implementation of the Project through the following works:

- Design works(CP1, CP2 and CP4)
- Bid document preparation and Tender assistance (CP1, CP2 and CP4)
- Construction supervision including defect notification period (CP1, CP2, CP3 and CP4)
- Facilitation of implementation of Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) (CP1, CP2, CP3, CP4 and CP5)
- Capacity development, organizational improvement and public awareness activities.

The Consultant shall carry out the Consulting Services through the following work items:

3.1 Design works (CP1, CP2 and CP4)

The conceptual design for CP 1 will include the following works:

- a) Review of the technical information on the Project
- b) Implementation of the supplementary natural condition surveys, which will be provided as a part of the tender document
- c) Conceptual design of the Perur DSP, which includes brine diffusion analysis using the ocean current survey data
- d) Preparation of conceptual design report, which includes a description of all the processes, general layout plan, water and material balance sheet, overall process flow diagram, and instrumentation plan.
- e) Preparation of technical specifications to be included in the bid documents.
- f) Preparation of "Operation and Maintenance Requirement (including risk allocation, payment method, monitoring and evaluation method etc.) " to be included in the bid documents

The detailed design for CP 2 will include the following works:

- a) Review of the technical information on the Project;
- b) Implementation of the topographic and geotechnical surveys for the construction area of the pumping stations in the premises of the Perur DSP and the pumping station and reservoir in the Porur WDS;
- c) Review of the preliminary design in the DPR;
- d) Hydraulic analyses of the product water transmission main for final determination of the pump head and counter measure for water hammer;



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- e) Detailed design of the pumping stations and reservoir including architectural, structural, civil, mechanical and electrical works;
- f) Preparation of the construction plan including design of the temporary works;
- g) Preparation of detailed design drawings; and
- h) Preparation of technical specifications and bill of quantities to be included in the bid documents

The detailed design for CP 4 will include the following works:

- a) Review of the technical information on the Project
- b) Collect and review topographic data for the Chennai Core City
- c) Review of the inventory data of the distribution network map to be provided by CMWSSB
- d) Study on specifications of software for water distribution network management in CMWSSB and determination of the software through discussion with CMWSSB
- e) Procurement of the desktop personal computers and software
- f) Preparation of the database by the software procured for the Chennai Core City
- g) Provision of training to CMWSSB staff on the database preparation and maintenance through on-the-job training (OJT)
- h) Preparation of the hydraulic modeling for the existing water distribution networks in the core city and calibration
- i) Plan of the improvement of the existing network taking into account the establishment of district metered areas (DMAs)
- j) Hydraulic analyses of the water distribution network to determine the scope of the improvement of the existing water distribution network
- k) Preparation of detailed design drawings for the improvement of the existing distribution networks
- l) Preparation of technical specifications and bill of quantities to be included in the bid documents

3.2 Bid document preparation (CP1, CP2 and CP4)

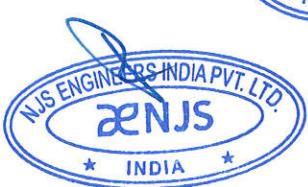
The bid document preparation will include the following works:

- a) Preparation of the pre-qualification (PQ) document, complying with the following instructions:
 - ✓ The technical and financial requirements for PQ shall take into account the technical feature and the magnitude of the Project;



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- ✓ The PQ part shall be in accordance with the latest version of Standard Prequalification Documents under Japanese ODA Loans;
 - ✓ Assistance to CMWSSB in PQ announcement, addendum/corrigendum, and clarifications to the applicants' queries;
 - ✓ PQ evaluation of the applicants in accordance with the criteria set forth; and
 - ✓ Preparation of PQ evaluation report to be submitted to CMWSSB.
- b) Preparation of the Bid document, complying with the following instructions:
- ✓ For procurement of goods and services under CP1, the latest version of "Standard Bidding Documents under Japanese ODA Loans, Procurement of Electrical and Mechanical Plant, and for Building and Engineering Works, Designed by the Contractor" will be applied, together with all relevant specifications, drawings and other documents. The general conditions of the contract shall be prepared using the FIDIC Gold book (Edition 2008), since the operation work of the DSP will be included in CP1 under DBO scheme.
 - ✓ For procurement of goods and services under CP2, the latest version of "Standard Bidding Documents under Japanese ODA Loans, Procurement of Works" will be applied, along with all relevant specifications, drawings, and other documents; and
 - ✓ Prepare bidding documents which includes i) clauses stating that the Contractor is to comply with the requirement of the Environmental Management Plan (EMP) and JICA Guidelines for environmental and social considerations (April 2010) (JICA Environmental Guidelines) and to conduct environmental monitoring following the Environmental Monitoring Plan (EMoP), ii) the specification clearly stipulating the safety requirements in accordance with the laws and regulations in the country of the Borrower, relevant international standards (including guidelines of international organization), if any, and also in consideration of "the Guidance for the Management of Safety for Construction Works in Japanese ODA Projects of JICA," iii) the requirement to furnish a safety plan to meet the safety requirements, iv) the requirement for the personnel for key positions to include an accident prevention officer; and v) the requirement to submit method statements of safety to CMWSSB and the consultant at the construction stage.
 - ✓ For procurement of services and goods for CP2, the bidding documents will include the maintenance of the facilities.
 - ✓ Preparation of Bid Documents for CP 4 shall be as per Local Competitive Bid (LCB)



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Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

3.3 Tender assistance (CP1, CP2 and CP 4)

The Consultant shall assist CMWSSB in the bid by doing the following works:

- a) Assistance to CMWSSB in tender call, addendum/corrigendum, clarifications to the bidders and conducting pre-bid conferences;
- b) Evaluations of the bids in accordance with the criteria set forth in the bidding documents, laws, regulations;
- c) Preparation of bid evaluation reports for approval to be submitted to CMWSSB;
- d) Assistance to CMWSSB in contract negotiations by preparing agenda and facilitating negotiations including preparation of minutes of negotiation meetings; and
- e) Preparation of draft and final contract agreements.

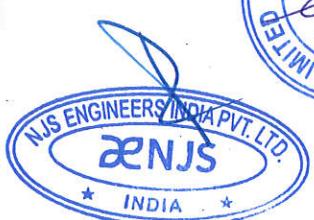
3.4 Construction supervision (CP1, CP2, CP3 and CP4)

The Consultant shall perform his duties during the construction period in accordance with the contracts to be executed between CMWSSB and the contractors. Standard Bidding Documents under Japanese ODA Loans for Procurement of Electrical and Mechanical Plant, and for Building and Engineering Works, Designed by the Contractor will be applied to this Project (the Contract). In this context, the Consultant shall act as the Engineer for CP1 to execute construction supervision and contract administration services in accordance with the power and authority delegated by CMWSSB. Construction supervision by the Consultant will include the following works:

- a) Act as the Engineer to execute construction supervision and contract administration services in accordance with the power and authority to be delegated by the Employer;
- b) Provide assistance to the Employer concerning variations and claims that are to be ordered/issued at the initiative of the Employer. Advise the Employer on resolution of any dispute with the Contractor;
- c) Issue instructions, approvals, and notices as appropriate;
- d) Provide recommendation to the Employer for acceptance of the Contractor's performance security, advance payment security and required insurances;
- e) Provide commencement order to the Contractor;
- f) Assess adequacy of all inputs such as materials, labor, and equipment provided by the Contractor;



- g) Check and approve the Contractor's method of work, including site organization, program of performance, quality assurance system, safety plan, method statements of safety, and environmental monitoring plan so that the requirements set forth in the applicable laws and regulations, the specifications or other parts of the contract are to be duly respected;
- h) Regularly monitor physical and financial progress and take appropriate action to expedite progress, if necessary, so that the time for completion set forth in the contract will be duly respected by the Contractor;
- i) Explain and/or adjust ambiguities and/or discrepancies in the Contract Documents and issue any necessary clarifications or instructions;
- j) Review and approve the Contractor's design for the works to be constructed, working drawings, shop drawings and drawings for temporary works;
- k) Liaise with the appropriate authorities to ensure that all the affected utility services are promptly relocated;
- l) Carry out field inspections on the Contractor's setting out of the works in relation to original points, lines and levels of reference specified in the contract;
- m) Organize, as necessary, management meetings with the Contractor to review the arrangements for future work. Prepare and deliver minutes of such meetings to the Employer and the Contractor;
- n) Supervise the works so that all the contractual requirements are met by the Contractor, including those in relation to i) quality of the works, ii) safety, and iii) protection of the environment. Confirm that an accident prevention officer proposed by the Contractor is duly assigned at the project site. Require the contractors to take appropriate remedies if any questions are recognized regarding the safety measures;
- o) Supervise field tests, sampling, and laboratory test to be carried out by the Contractor;
- p) Inspect the construction method, equipment to be used, and workmanship at the site, and attend shop inspection and manufacturing tests in accordance with the Employer's Requirements;
- q) Verify statements submitted by the Contractor and issue payment certificates such as interim payment certificates and final payment certificate as specified in the contract;
- r) Coordinate the works among different contractors employed for the Project;
- s) Modify the Employer's Requirements as may be necessary in accordance with the actual site conditions and issue variation orders (including necessary actions in



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Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

relation to the works performed by other contractors working on other projects, if any);

- t) Carry out timely reporting to the Employer for any inconsistency / causes of delaying executing the works and suggesting appropriate corrective measures to be applied;
 - u) Inspect, verify and fairly determine claims issued by the parties to the contract (i.e. the Employer and Contractor) in accordance with the contract;
 - v) Supervise the Test on Completion carried out by the Contractor and assist the Employer in carrying out the Test after Completion, if applicable;
 - w) Perform the inspection of the works and issue certificates such as the Taking-Over Certificate, Performance Certificate as specified in the contract,
 - x) Check and certify as-built drawings prepared by the Contractor; and
 - y) Check and certify the operation and maintenance manual prepared by the Contractor.
 - z) In case of accidents during the construction, assist the Employer to report to JICA the details of such accidents in a manner reasonably requested by JICA.
- aa) Prepare and submit reports CMWWSB, which are detailed in TOR 7 in relation to the implementation of the Project.

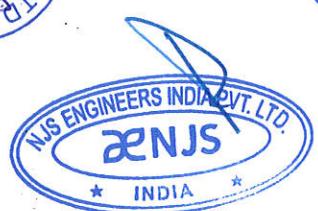
The Consultant shall perform his duties during the construction period in accordance with the contracts to be executed between CMWSSB and the contractors.

FIDIC MDB Harmonized Edition 2010 complemented with the Specific Provisions as included in the Standard Bidding Documents under Japanese ODA Loans for Procurement of Works will be applied to civil works of this Project (the Contract). In this context, the Consultant shall act as the Engineer for CP2, CP3 and CP4 to execute construction supervision and contract administration services in accordance with the power and authority delegated by CMWSSB. Construction supervision by the Consultant will include the following works:

- a) Act as the Engineer to execute construction supervision and contract administration services in accordance with the power and authority to be delegated by the Employer;
- b) Provide assistance to the Employer concerning variations and claims that are to be ordered/issued at the initiative of the Employer. Advise the Employer on resolution of any dispute with the Contractor;
- c) Issue instructions, approvals, and notices as appropriate;



- d) Provide recommendation to the Employer for acceptance of the Contractor's performance security, advance payment security and required insurances;
- e) Provide commencement order to the Contractor;
- f) Assess adequacy of all inputs such as materials, labor, and equipment provided by the Contractor;
- g) Check and approve the Contractor's method of work, including site organization, program of performance, quality assurance system, safety plan, method statements of safety, and environmental monitoring plan so that the requirements set forth in the applicable laws and regulations, the specifications or other parts of the contract are to be duly respected;
- h) Regularly monitor physical and financial progress and take appropriate action to expedite progress if necessary, so that the time for completion set forth in the contract will be duly respected by the Contractor;
- i) Explain and/or adjust ambiguities and/or discrepancies in the Contract Documents and issue any necessary clarifications or instructions. Issue further drawings and give instructions to the Contractor for any works that may not be sufficiently detailed in the contract documents, if any;
- j) Review and approve the Contractor's working drawings, shop drawings, and drawings for temporary works. Also review and approve, if any, designs prepared by the Contractor for any part of the permanent works;
- k) Liaise with the appropriate authorities to ensure that all the affected utility services are promptly relocated;
- l) Carry out field inspections on the Contractor's setting out of the works in relation to original points, lines, and levels of reference specified in the contract;
- m) Organize, as necessary, management meetings with the Contractor to review the arrangements for future work. Prepare and deliver minutes of such meetings to the Employer and the Contractor;
- n) Supervise the works so that all the contractual requirements are met by the Contractor, including those in relation to i) quality of the works, ii) safety and iii) protection of the environment. Confirm that an accident prevention officer proposed by the Contractor is duly assigned at the project site. Require the contractors to take appropriate remedies if any questions are recognized regarding the safety measures;
- o) Supervise field tests, sampling, and laboratory test to be carried out by the Contractor;



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C.M.W.S.S. Board
Chennai-600 002.

- p) Inspect the construction method, equipment to be used, and workmanship at the site, and attend shop inspection and manufacturing tests in accordance with the specifications;
 - q) Survey and measure the work output performed by the Contractor. Assist the Employer to verify statements submitted by the Contractor and issue payment certificates such as interim payment certificates and final payment certificate as specified in the contract;
 - r) Coordinate the works among different contractors employed for the Project;
 - s) Modify the designs, technical specifications and drawings, relevant calculations and cost estimates as may be necessary in accordance with the actual site conditions, and issue variation orders (including necessary actions in relation to the works performed by other contractors working on other projects, if any);
 - t) Carry out timely reporting to the Employer for any inconsistency in executing the works and suggesting appropriate corrective measures to be applied;
 - u) Inspect, verify, and provide recommendation to the Employer concerning claims issued by the parties to the contract (i.e. the Employer and Contractor) in accordance with the civil works contract;
 - v) Perform the inspection of the works and issue certificates such as the Taking-Over Certificate, Performance Certificate as specified in the contract;
 - w) Supervise commissioning and carry out tests during the commissioning, if applicable;
 - x) Provide periodic and/or continuous inspection services during defects notification period, and if any defects are noted, instruct the Contractor to rectify;
 - y) Check and certify as-built drawings; and
 - z) Check and certify an operation and maintenance manual for the works constructed in the Project.
- aa) Review of entire alignment of transmission main in terms of hydraulic, geo-technical aspects and flag any potential delays in terms of delay in obtaining permissions particularly on stretches pertaining to NHAI and Railways.
- bb) In case of accidents during the construction, assist the Employer to report to JICA the details of such accidents in a manner reasonably requested by JICA.
- cc) Prepare and submit reports CMWWSB, which are detailed in TOR 7 in relation to the implementation of the Project.

3.5 Facilitation of Implementation of Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) (CP1, CP2, CP3, CP4 and CP5)



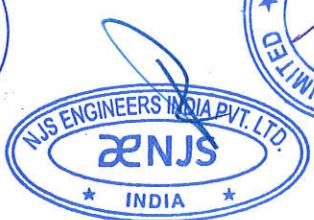
The Consultant shall assist CMWSSB in the environmental management and monitoring through the following works:

- a) Review and update EMP according to the actual site conditions, designs, technical specifications and contract documents;
- b) Review and update EMoP according to the updated EMP;
- c) During the preparation of bidding documents, clearly identify environmental responsibilities as explained in the EIA, Final Report of Preparatory Survey and EMP;
- d) Assist CMWSSB to review the Construction Contractor's Environmental Program to be prepared by the contractor in accordance with EMP, relevant plans and JICA Environmental Guidelines and to make recommendations to CMWSSB regarding any necessary amendments for its approval
- e) Supervision of EMP implementation and implementation of regular compliance monitoring according to EMoP to ensure that the construction works are implemented in accordance with the EMP;
- f) Assist CMWSSB to implement the measures identified in the EMP
- g) Monitor the effectiveness of EMP and negative impacts on environment caused by the construction works and provide technical advice, including a feasible solution, so that CMWSSB can improve situation when necessary;
- h) Assist CMWSSB in monitoring the compliance with conditions stated in the environmental permit certifications and the requirements under EMP and JICA Environmental Guidelines;
- i) Assist CMWSSB in preparation of the answer to the request from JICA's advisory committee for environmental and social considerations if necessary; and
- j) Assistance to CMWSSB in the capacity building of CMWSSB staff on environmental management through on-the-job training so that the EMoP would be carried out appropriately in the O&M of the seawater desalination plant.

Scope of the Consulting Services for CP5

The Consultant shall perform the following tasks throughout the execution of CP5;

- a) Prepare the technical requirement to CP 5
- b) Monitor the progress of construction of CP5
- c) Interface coordination between CP 1 and CP 5



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Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

3.6 Capacity Development and Organizational Improvement

The Consultant shall assist CMWSSB in capacity development and organizational improvement by the following services:

Asset management

- a) Assistance in development of digital pipe inventory data base using geotechnical information system (GIS) through OJT to CMWSSB staff during detailed design of CP 4
- b) Assistance in development of capability of maintenance of the data base through OJT to CMWSSB staff during detailed design of CP 4
- c) Assistance in preparation of water loss reduction plan within 12 months after commencement of the consulting services

Acceleration of installation of service connections and water meters

- a) Analysis on obstacles preventing in expansion of installation of service connections and water meters
- b) Assistance in preparation of proposal of CMWSSB to GOTN on organizational improvement based on the analysis above for acceleration of service connection and water meter installation and the appropriate maintenance within 12 months after commencement of the consulting services

Improvement of customer services and publication

- a) Assistance in improvement of customer information data base within 12 months after commencement of the consulting services
- b) Assistance in planning and implementation of customer satisfaction survey within 12 months after commencement of the consulting services and at the end of the project period
- c) Assistance in publication for appreciation of and cooperation to activities of CMWSSB within 18 months after commencement of the consulting services based on customer satisfaction survey results
- d) Assistance in preparation of improvement plan of procedure of water tariff payment to enhance tariff collection rate within 18 months after commencement of the consulting services based on customer satisfaction survey results
- e) Assistance in preparation of public awareness activities on issues such as water tariff payment, sanitation and water saving within 18 months after commencement of the consulting services based on customer satisfaction survey results, taking into account the perspective of gender equality



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Improvement of business operation

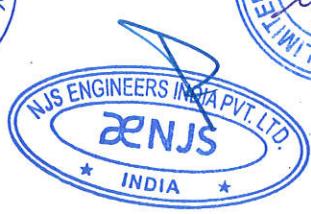
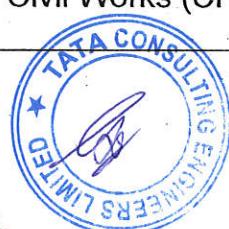
- a) Assistance in preparation of financial plan to simulate appropriate future water rate within 12 months after commencement of the consulting services
- b) Assistance in preparation of organizational improvement plan for efficient business operation within 12 months after commencement of the consulting services
- c) Assistance in introduction of information technology (IT) within 12 months after commencement of the consulting services
- d) Assistance in preparation of training program of technical and administrative staff within 12 months after commencement of the consulting services
- e) Assistance in preparation of business plan within 24 months after commencement of the consulting services based on the results of accomplishment of the all activities.

4. PERIOD OF ASSIGNMENT AND SCHEDULE FOR COMPLETION OF TASK

The Contract period for this PMC Assignment is planned for 89 months including commissioning period and Defect Liability period of 12 months to monitor the performance of this Desalination Plant, product water conveyance pipeline and its allied works. However on any circumstances and on force majeure events, the contract completion period may have to be altered by the Client.

The implementation schedule expected is as shown below.

Sl. No	Description	Schedule	Time Duration
1	Conceptual Design, Preparation of Bid Documents for CP1	Feb 2019 to Oct 2019	9 Months
2	Detailed Design, Preparation of Bid Documents for CP2	Oct 2019 to Dec 2020	15 Months
3	Detailed Design, Preparation of Bid Documents for CP4	Feb 2019 to Apr 2021	27 Months
4	Commencement of Civil Works (CP1)	Oct 2020 to Mar 2024	42 Months
5	Commencement of Civil Works (CP2)	Oct 2021 to Sep 2023	24 Months
6	Commencement of Civil Works (CP3-1, CP3-2)	May 2019 to July 2022	39 Months



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SI. No	Description	Schedule	Time Duration
7	Commencement of Civil Works (CP3-3, CP3-4)	May 2019 to July 2023	51 Months
8	Commencement of Civil Works (CP4)	Feb 2022 to Mar 2025	38 Months
9	Defect Notification Period for CP2, CP3 & CP4	+ 1 year	12 Months
10	Completion of Consulting Services	June 2026	

5. STAFFING

Staffing and Consulting Input for the Respective Phase

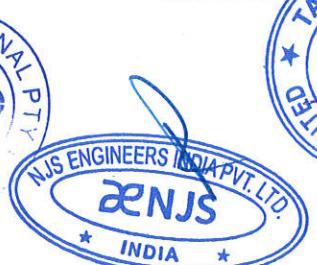
It is proposed that 20 of International Expert (IE) and 21 of Local Expert (LE) will be engaged for a total of 385 man-months (MM) for Professional (A) consultants and 883 MM for Professional (B) consultants. Total consulting input is 1,268 MM. In addition to the consultants, supporting staff such as secretaries, CAD operators, GIS operators, office keepers, and inspectors will be necessary, and the total input is estimated to 654 MM.

The Consultant Team for the design works, tender assistances, construction supervisions, and capacity development consists of the members listed in Table below.

Note : The International Experts (IE) is the person who has relevant experience in works of similar nature and has experience of working in Developed and Developing Countries. (with atleast 5 years of experience in Developed Countries).

Table - List of Consulting Experts

Pr. Type	N. o.	Position	Contract Package (CP)										C D
			1			2			3		4		
D	A	V	D	A	V	S	V	S	A	V	T	S	
IE	1	Project Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IE	2	Desalination Expert	✓	✓	✓								
IE	3	Water Supply Engineer	✓	✓		✓	✓		✓	✓			✓
IE	4	Civil and Structure Engineer (Desal)	✓	✓	✓								
IE	5	Mechanical Engineer (Desal)	✓	✓	✓								
IE	6	Mechanical Engineer (Distribution)						✓	✓				
IE	7	Electric Engineer (Desal)	✓	✓	✓								✓
IE	8	Electric Engineer (Distribution)						✓	✓				



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Pr o. Ty pe	N o.	Position	Contract Package (CP)										C D	
			1			2			3		4			
			D	T A	S V	D	T A	S V	S V	D	T A	S V	T A	S V
IE	9	Monitoring and control expert (Desal)	✓	✓	✓									
IE	10	Monitoring and control expert (Distribution)				✓	✓	✓		✓	✓	✓		
IE	11	Pipeline Engineer								✓	✓	✓	✓	
IE	12	Specification Specialist (Desal)	✓											
IE	13	Specification Specialist (Distribution)				✓				✓				
IE	14	Financial Expert	✓	✓										✓
IE	15	Contract Specialist (Desal)	✓	✓										
IE	16	Contract Specialist (Distribution)				✓	✓			✓	✓			
IE	17	Environmental Specialist	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
IE	18	Commissioning Engineer		✓										
IE	19	Social Communication Specialist	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
IE	20	Organizational Expert												✓
LE	1	Senior Civil Engineer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LE	2	Civil Engineer								✓	✓		✓	
LE	3	Mechanical Engineer		✓	✓	✓	✓	✓		✓	✓	✓		
LE	4	Electrical Engineer		✓	✓	✓	✓	✓		✓	✓	✓	✓	
LE	5	Structural Engineer		✓	✓			✓		✓		✓		
LE	6	Architect	✓	✓	✓			✓						
LE	7	Building Mechanical and Electrical Engineer	✓	✓	✓	✓		✓						
LE	8	Senior Pipeline Engineer								✓	✓		✓	
LE	9	Pipeline Engineer 1									✓		✓	
LE	10	Pipeline Engineer 2									✓		✓	
LE	11	Pipeline Engineer 3								✓				
LE	12	Hydraulic Modeler 1									✓			
LE	13	Hydraulic Modeler 2									✓			
LE	14	Construction Planner/Cost Estimator					✓				✓			
LE	15	Specification Specialist					✓				✓			
LE	16	Environmental Specialist	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	
LE	17	Social Communication Specialist	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
LE	18	Safety and Health Expert 1		✓				✓			✓		✓	
LE	19	Safety and Health Expert 2								✓		✓		
LE	20	Quantity Surveyor 1			✓			✓						✓
LE	21	Quantity Surveyor 2							✓		✓			

D: Design, TA: Tender Assistance, SV: Construction Supervision, CD: Capacity Development and Organizational Improvement



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Basic professional requirements of key expert

The key expert requirements with qualification and experience for each position are given in the table below.

Table - Qualification of Key Experts

Designation		Qualification
A1	Project Manager (International Expert)	<ul style="list-style-type: none"> Post Graduate in Civil Engineering At least 20 years' experience in water supply projects At least two experiences of water supply projects of ICB contract financed by bilateral or multilateral funding agency, of which each contract amount is more than USD 50 million Have experience of working in developed as well as developing countries on projects assisted by bilateral and multilateral agencies
A2	Desalination Expert (International Expert)	<ul style="list-style-type: none"> Graduate in Civil, Mechanical or Electrical Engineering At least 15 years' experience in seawater desalination projects Experience of at least three projects of seawater desalination plant construction projects by RO involving design and tender assistance, of which each plant capacity is 50 MLD or more, as desalination process expert
A3	Water Supply Engineer (International Expert)	<ul style="list-style-type: none"> Graduate in Civil Engineering At least 10 years' experience in water supply projects At least three experiences of water supply projects involving planning or design of water distribution network At least two water supply projects involving planning or design of water loss reduction program
A5	Mechanical Engineer (Desal) (International Expert)	<ul style="list-style-type: none"> Graduate in Mechanical Engineering At least 10 years' experience in seawater desalination projects At least two experiences of seawater desalination plant construction projects by RO involving design and tender assistance, of which each plant capacity is 20 MLD or more, as mechanical engineer
A7	Electrical Engineer (Desal) (International Expert)	<ul style="list-style-type: none"> Graduate in Electrical Engineering At least 10 years' experience in seawater desalination projects At least two experiences of seawater desalination plant construction projects by RO involving design and tender assistance, of which each plant capacity is 20 MLD or more, as electrical engineer
A11	Pipeline Engineer (International Expert)	<ul style="list-style-type: none"> Graduate in Civil Engineering At least 10 years' experience in water supply projects At least three experiences of water supply projects involving detailed design and construction supervision of water transmission or distribution pipes, of which total pipe length is 30 km or more
A15	Contract Specialist (Desal) (International Expert)	<ul style="list-style-type: none"> At least 10 years' experience as contract specialist At least two experiences of international projects



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		<p>financed by bilateral or multilateral funding agency.</p> <ul style="list-style-type: none"> • At least two experiences of water supply projects under public-private partnership (PPP) scheme involving O&M by private sector • At least one experience of seawater desalination project
A16	Contract Specialist (Distribution) (International Expert)	<ul style="list-style-type: none"> • At least 10 years' experience as contract specialist • At least two experiences of international water supply projects of ICB financed by bilateral or multilateral funding agency
B1	Senior Civil Engineer (Local Expert)	<ul style="list-style-type: none"> • Graduate in Civil Engineering • At least 15 years' experience in water supply projects • At least three experiences of water supply projects involving detailed design or construction supervision of water treatment plants • At least two international water supply projects financed by bilateral or multilateral funding agency involving detailed design or construction supervision
B9	Senior Pipeline Engineer (Local Expert)	<ul style="list-style-type: none"> • Graduate in Civil Engineering • At least 10 years' experience in water supply projects • At least two experiences of water supply projects involving detailed design or construction supervision of water transmission or distribution pipes, of which total pipe length is 20 km or more

Task of Professional Staff

A1: Project Manager

- a) Shall take the overall responsibility, and shall represent the project Consultant's Team in all matters relating to the performance of services, communication between the Client and Consultant's Team, coordinating with all other consultant's staff to deliver excellent product during the stipulated time schedule
- b) Shall oversee and supervise the Consultant's services in design, tender assistance, construction supervision, and capacity development.

A2: Desalination Expert

- a) Shall function as technical supervisor in design, tender assistance and construction supervision in CP1
- b) Shall conduct process design of the plant and coordinate with other engineers and specialists for design and bid documents for CP1
- c) Shall assist the Client in correspondence to clarifications from the bidders in technical aspects in CP1 and evaluate the bids regarding process aspect
- d) Shall assist the Client in contract negotiation with the successful bidder in CP1
- e) Shall review detailed design by the contractor and supervise the construction on site in process aspect as well as coordination with other supervision engineers for CP1



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A3: Water Supply Engineer

- a) Shall function as technical supervisor in design and tender assistance for CP 1, CP 2 and CP 4
- b) Shall study the improvement of the water distribution network and plan the scope of CP 4
- c) Shall evaluate the bids for CP 1, CP 2 and CP 4 in technical aspects
- d) Shall assist the Organizational Expert in capacity development and organizational improvement in technical aspects
- e) Shall be responsible for skill transfer to CMWSSB for establishment and maintenance of GIS database and hydraulic model

A4: Civil and Structure Engineer (Desal)

- a) Shall conduct civil, structural and building designs in CP1 including preparation of technical specifications with Professionals B6 and B7
- b) Shall evaluate the bids for CP1 in civil, structural and building aspects
- c) Shall supervise the civil, structural and building works in CP1 with Professionals B5 to B7

A5: Mechanical Engineer (Desal)

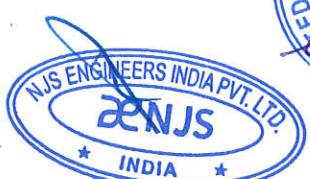
- a) Shall conduct mechanical design in CP1 including preparation of technical specifications
- b) Shall evaluate the bids for CP1 in mechanical aspect
- c) Shall review detailed design by the contractor and supervise the construction in mechanical aspect with Professional B3

A6: Mechanical Engineer (Distribution)

- a) Shall conduct mechanical design in CP2, for the reservoir and pumping stations, including preparation of technical specifications
- b) Shall evaluate the bids for CP2 in mechanical aspect

A7: Electrical Engineer (Desal)

- a) Shall conduct electrical design in CP1 including preparation of technical specifications
- b) Shall prepare technical requirement to CP5 and assist the Client in discussion and negotiation with CP5 contractor.
- c) Shall evaluate the bids for CP1 in electrical aspect



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- d) Shall review detailed design by the contractor and supervise the construction in electrical aspect with Professional B4

A8: Electrical Engineer (Distribution)

- a) Shall conduct electrical design in CP2, for the reservoir and pumping stations, including preparation of technical specifications
- b) Shall evaluate the bids for CP2 in electrical aspect

A9: Monitoring and Control Expert (Desal)

- a) Shall evaluate the bids for CP1 in monitoring and control aspect
- b) Shall review detailed design by the contractor and supervise the construction in monitoring and control aspect

A10: Monitoring and Control Expert (Distribution)

- a) Shall conduct design of monitoring and control system of the product water transmission system for CP2 using distributed control system (DCS) or supervisory control and data acquisition (SCADA) system, including preparation of technical specifications
- b) Shall conduct planning of monitoring and control system for improvement of the water distribution network in the Chennai Core City
- c) Shall conduct design of monitoring and control system in CP4 including preparation of technical specifications
- d) Shall evaluate the bids for CP2 and CP4 in monitoring and control aspect
- e) Shall supervise the monitoring and control work during the constructions in CP2 and CP4

A11: Pipeline Engineer

- a) Shall conduct hydraulic calculation for CP 4 with Professionals B8, B12 and B13
- b) Shall conduct detailed design of pipelines for CP4 including preparation of technical specifications, with Professional B15
- c) Shall evaluate the bids for CP4 in pipe installation work
- d) Shall supervise pipe installation work in CP3 and CP4

A12: Specification Specialist (Desal)

- a) Shall prepare technical specifications for CP1 by compiling draft specifications to be provided by the design engineers

A13: Specification Specialist (Distribution)

- a) Shall prepare technical specifications for CP2 and CP4 by compiling draft specifications to be provided by the design engineers



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A14: Financial Expert

- a) Shall prepare financial model for the bid documents and financial evaluation for CP1 suitable to the DBO scheme
- b) Shall evaluate the financial bid for CP1
- c) Shall assist the Organizational Expert in capacity development and organizational improvement in financial aspect

A15: Contract Specialist (Desal)

- a) Shall prepare PQ documents and bid documents for CP 1
- b) Shall assist the Client in PQ evaluation in CP 1
- c) Shall assist the Client in correspondence to clarifications from the bidders and evaluate the bids in contractual aspects in CP 1
- d) Shall assist the Client in contract negotiation with the successful bidder in CP 1

A16: Contract Specialist (Distribution)

- a) Shall prepare PQ documents and bid documents for CP 2 and CP 4
- b) Shall assist the Client in PQ evaluation in CP 2 and CP 4
- c) Shall assist the Client in correspondence to clarifications from the bidders and evaluate the bids in contractual aspects in CP 2 and CP 4
- d) Shall assist the Client in contract negotiations with the successful bidders in CP2 and CP4

A17: Environmental Specialist

- a) Shall prepare requirement to the contractors from the viewpoint of environmental and social considerations in preparation of the bid documents for CP 1, CP 2, CP 4 and CP 5
- b) Shall conduct facilitation of implementation of EMP and EMoP for CP1, CP2, CP3, CP4 and CP5

A18: Commissioning Engineer

- a) Shall review commissioning plan from the contractor for CP 1
- b) Supervise the commissioning of CP 1 on site with other desalination experts

A19: Social Communication Specialist

- a) Shall provide assistance to CMWSSB for the capacity development in acceleration of installation of service connections and water meters and improvement of customer care and publication with Professional A20



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- b) Shall prepare requirement to the contractors from the viewpoint of social communication in preparation of bid documents for CP 1, CP 2, CP 4 and CP 5
- c) Supervise the contractors for CP 1, CP 2, CP 3, CP 4 and CP 5 from the viewpoint of social communication for smooth implementation of the construction works

A20: Organizational Expert

- a) Shall provide assistance to CMWSSB for all the scope in the capacity development and organizational improvement

B1: Senior Civil Engineer

- a) Shall function as leader of the Professional B consultants
- b) Shall assist Project Manager in communication with the Client and all other relevant local authorities
- c) Shall assist Professional A consultants in design of CP 1 and conduct civil design in CP 2
- d) Shall supervise civil construction works in CP 1 and CP 2
- e) Shall monitor the supervision works in CP 3 and CP 4

B2: Civil Engineer

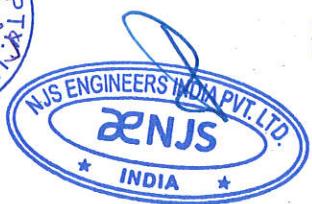
- a) Shall assist Professional A consultants in overall planning and design works in CP 4
- b) Shall supervise civil works in CP 3 and CP 4

B3: Mechanical Engineer

- a) Shall assist Professional A6 in mechanical design in CP 2 and CP 4
- b) Shall assist Professional A6 in bid evaluation in CP 2 and CP 4 in mechanical aspect
- c) Shall assist Professional A5 in supervision of mechanical work in CP 1
- d) Shall supervise mechanical works in CP 2 and CP 4

B4: Electrical Engineer

- a) Shall assist Professional A8 in electrical design in CP 2 and CP 4
- b) Shall assist Professional A7 in preparation of technical requirement to CP 5
- c) Shall assist Professional A8 in bid evaluation in CP 2 and CP 4 in electrical aspect
- d) Shall assist Professional A7 in supervision of electrical work in CP 1
- e) Shall supervise electrical works in CP 2, CP 4 and CP 5



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B5: Structural Engineer

- a) Shall conduct structural design in CP2 and CP4 including preparation of technical specifications
- b) Shall assist Professional A4 in supervision of structural work in CP 1
- c) Shall supervise structural works in CP 2 and CP 4

B6: Architect

- a) Shall conduct building designs in CP 1 with Professional A4 including preparation of technical specifications
- b) Shall conduct building designs in CP 2 including preparation of technical specifications
- c) Shall supervise building works in CP 1 and CP 2

B7: Building Mechanical and Electrical Engineer

- a) Shall conduct building mechanical and electrical designs in CP1 and CP2 with Professionals A4 and B6 including preparation of technical specifications
- b) Shall supervise building mechanical and electrical works in CP 1 and CP 2

B8: Senior Pipeline Engineer

- a) Shall conduct detailed design in CP 4 with Professional A11
- b) Shall assist Project Manager in communication with the Client and all other relevant local authorities
- c) Shall supervise pipe installation works in CP 3 and CP 4 with Professional A11

B9, B10: Pipeline Engineers 1 and 2

- a) Shall assist Professionals A11 and B8 in detailed design in CP 4
- b) Shall assist Professionals A11 and B8 in supervision of pipe installation works in CP4

B11: Pipeline Engineer 3

- a. Shall assist Professional A11 and B8 in supervision of pipe installation work in CP3

B12, B13: Hydraulic Modelers 1 and 2

- a) Shall operate the hydraulic model and simulation in the detailed design in CP 4
- b) Shall assist Professional A3 in skill transfer to CMWSSB for establishment and maintenance of asset information management system and hydraulic model

B14: Construction Planner/Cost Estimator

- a) Shall prepare construction plan in CP 2 and CP 4



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- b) Shall conduct cost estimate of the construction works in CP 2 and CP 4

B15: Specification Specialist

- a) Shall assist Professional A16 in preparation of technical specifications in CP 2 and CP 4

B16: Environmental Specialist

- a) Shall assist Professional A17 in preparation of requirement to the contractors from the viewpoint of environmental and social considerations in preparation of bid documents for CP 1, CP 2, CP 4 and CP 5

- b) Shall assist Professional A17 in facilitation of implementation of EMP and EMoP for CP1, CP2, CP3, CP4 and CP5

B17: Social Communication Specialist

- a) Shall assist Professional A19 in assistance to CMWSSB for the capacity development

- b) Shall assist Professional A19 in preparation of requirement to the contractors for CP 1, CP 2, CP 4 and CP 5

- c) Shall supervise the contractors for CP1, CP2, CP3, CP4 and CP5 from the viewpoint of social communication for smooth implementation of the construction works with Professional A19

B18: Safety and Health Expert 1

- a) Shall supervise the contractors in safety and health management aspect in CP 1 and CP 2 based on the Guidance for the Management of Safety for Construction Works in Japanese ODA Projects (September 2014, JICA)

B19: Safety and Health Experts

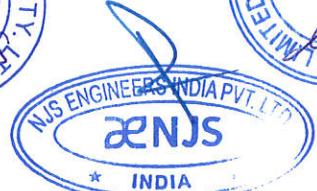
- a) Shall supervise the contractors in safety and health management aspect in CP 3 and CP 4 based on the Guidance for the Management of Safety for Construction Works in Japanese ODA Projects (September 2014, JICA)

B20: Quantity Surveyor 1

- a) Shall analyze completed work for arrangement of payment to the contractors in CP1, CP2 and CP5
- b) Shall monitor the overall construction schedule including progress monitoring, future work projection and instruction to the contractors with other engineers in charge of construction supervision in CP 1, CP 2 and CP 5

B21: Quantity Surveyor 2

- a) Shall analyze completed work for arrangement of payment to the contractors in CP 3 and CP 4



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- b) Shall monitor the overall construction schedule including progress monitoring, future work projection and instruction to the contractors with other engineers in charge of construction supervision in CP 3 and CP 4

6. SERVICES AND FACILITIES

- i. Consultants have to make their own arrangement for office accommodation and equipment, software and stationery for the consultancy study. No office accommodation will be provided by CMWSSB for the consultancy study.
- ii. Consultants should note that they are required to make necessary provision for housing their staff and that no assistance in this connection will be provided by CMWSSB.
- iii. The consultants will have to make their own arrangements for necessary computer software and hardware and transportation facilities.

7. FINAL OUTPUTS THAT SHALL BE FURNISHED BY THE CONSULTANTS

Within the scope of consulting services, the Consultant shall prepare and submit reports and documents to CMWSSB as shown in Table. The Consultant shall provide an electronic copy of each of these reports.

For the design reports and PQ and bid documents, draft reports or the documents shall be submitted before the final submission. As for the design reports, the draft reports of the conceptual design (for CP 1) and the detailed design reports (for CP2 and CP4) shall be submitted with 5 copies, respectively, 1 month before the due date in Table. The final design reports shall be submitted taking into account the review comments from CMWSSB.

Regarding the PQ documents and bid documents, the Consultant shall submit the draft documents 1 month before the due date. The final documents will be issued after the concurrences of JICA to the respective PQ and bid documents.

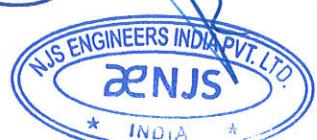
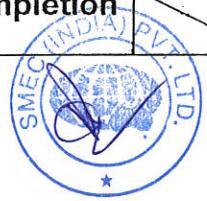


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Table - Reports and Documents to be submitted by the Consultant

Report/Document		No of Copies	Due Date/ Frequency
1	Inception Report ^{*1}	10	Within 1 month after commencement of the service
2	Monthly Progress Report	10	Every Month
3	Completion Report ^{*2}	5	Within 3 months after completion of the services
4	For Design and Tender Assistance for CP1		
	4.1 Conceptual Design Report and Drawings	10	At Appropriate timing
	4.2 PQ Document	10	At Appropriate timing
	4.3 Bid Document	10	At Appropriate timing
	4.4 PQ Evaluation Report	10	At Appropriate timing
	4.5 Bid Evaluation Report (Technical)	10	At Appropriate timing
	4.6 Bid Evaluation Report (Financial)	10	At Appropriate timing
5	For Design and Tender Assistance for CP2 and CP4		
	5.1 Detailed Design Report and Drawings ^{*3}	10	At Appropriate timing
	5.2 PQ Document ^{*3}	10	At Appropriate timing
	5.3 Bid Document ^{*3}	10	At Appropriate timing
	5.4 PQ Evaluation Report ^{*3}	10	At Appropriate timing
	5.5 Bid Evaluation Report (Technical) ^{*3}	10	At Appropriate timing
	5.6 Bid Evaluation Report (Financial) ^{*3}	10	At Appropriate timing
6	For Construction Supervision of CP 1		
	6.1 Contractor's Design Review Report ^{*4}	10	Within 1 month after submission of the contractor's design report
	6.2 Quality and Quantity Control Report [*]	10	Every Month
	6.3 Final Inspection Report [*]	10	At Appropriate timing
7	For Construction Supervision of CP 2		
	7.1 Quality and Quantity Control Report [*]	10	Every Month
	7.2 Final Inspection Report	10	At Appropriate timing
8	For Construction Supervision of CP 3-1 to CP 3-4		
	8.1 Quality and Quantity Control Report [*]	10	Every Month
	8.2 Final Inspection Report (CP 3-1, CP 3-2)	10	At Appropriate timing
	8.3 Final Inspection Report (CP 3-3, CP 3-4)	10	At Appropriate timing
9	For Construction Supervision of CP 4		
	9.1 Quality and Quantity Control Report [*]	10	Every Month
	9.2 Final Inspection Report	10	At Appropriate timing
10	Environmental and Social Safeguard		
	10.1 EIA Review Report for CP 1	10	Within 3 month after commencement of the services
	10.2 Environmental Monitoring Report [*]	10	Every Month
11	Progress Report and Project Completion Report		



Report/Document	No of Copies	Due Date/ Frequency
11.1 Progress Report (P/R)	1	Every Month
11.2 Project Completion Report (PCR)	1	Within 3 months after completion of the services

- *1: Inception Report shall be submitted within 1 month after commencement of the Consulting Services. It should present the methodologies, schedule, organization, etc.
- *2: Completion Report of the consulting services shall be submitted before completion of the services. It should compile all activities done by the Consultant.
- *3: Reports and documents shall be compiled for the respective contract packages separately.
- *4: Contractor's Design Review Report shall be submitted within 1 month after submission of the contractor's design report.
- *5: Quality and Quantity Control Report can be compiled as a part of the Monthly Progress Report.

8. OBLIGATIONS OF EXECUTING AGENCY

A certain range of arrangements and services will be provided by CMWSSB to the Consultant for smooth implementation of the Consulting Services, which will include the followings:

Report and data

CMWSSB will make the existing reports and data related to the Project available to the Consultant. Such data will include the EIA and any natural condition survey report available, ocean current survey report, operation data of the existing DSPs, pipe inventory data, the existing hydraulic model of the distribution networks if any, and all available data requested by the Consultant for hydraulic modeling.

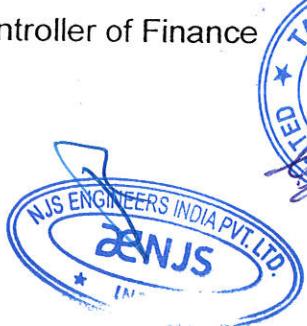
Cooperation and Counterpart staff

CMWSSB will appoint counterpart officials in Project Implementation Unit (PIU) as may be necessary for effective implementation of the Consulting Services;

Project Implementation Unit:

CMWSS Board will nominate the following Engineers in Project Implementation Unit for implementing this Project.

- | | |
|---|--|
| 1. Chief Engineer (O&M)-II | - 1 No (Overall in-charge for the execution of this Project) |
| 2. Superintending Engineer (Desalination) | - 1 No (In-charge for the execution of this Project) |
| 3. Controller of Finance | - 1 No |



- | | |
|----------------------------------|----------|
| 4. Executive Engineers | - 3 Nos |
| 5. Assistant Executive Engineers | - 7 Nos |
| 6. Assistant / Junior Engineers | - 12 Nos |

Assistance and Exemption

CMWSSB will use its best efforts to ensure that the assistance and exemption, as described in the Standard Request for Proposal issued by JICA, will be provided to the Consultant, in relation to:

- work permit and such other documents,
- entry and exit visas, residence permits, exchange permits and such other documents,
- clearance through customs,
- instructions and information to officials, agent and representatives of the Borrower's Government,
- exemption from any requirement for registration to practice their profession, and
- privilege pursuant to the applicable law in India.

Appointment of trainees/staff for CP4

CMWSSB will appoint trainees/staff who will receive OJT on the preparation and maintenance of the database for the water distribution network for CP4.

9. MODE OF BILLING AND PAYMENT

Payment Details

➤ Advance Payment

An initial Advance Payment of 5% as an interest-free loan for Mobilization shall be made to the Consultant by the Employer subject to the consultant providing a Bank Guarantee for an equivalent amount as per the Stipulations. The advance payment will be set off by the Client after completion of 30% of contract amount paid or after 12 months of the duration of the contract whichever is earlier.



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➤ Payment towards Consultancy Services

For the payment towards consultancy services in Preparation of Design, Bid Documents, Tender Assistance (Evaluation of Bids), Construction Management and Supervision, the Consultant shall submit to the Client, in duplicate, itemized invoices, accompanied by the receipts or other appropriate supporting documents not later than fourteen (14) days after the end of every two (2) calendar month during the period of the Services. Separate invoices shall be submitted for expenses incurred in foreign currency and in local currency. Each invoice shall show remuneration and reimbursable expenses separately.

The final payment shall be made only after the final report and a final invoice, identified as such, shall have been submitted by the Consultant and approved as satisfactory by the Client.

➤ Retention Money

The payment amount of 5% of the contract value will be retained as Retention Money from each payment due to the contractor which will be paid to the consultants without interest on completion of the work including Defect Liability Period.



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TECH-8: WORK SCHEDULE - CP

Project Name: Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works.

		Project Duration in Months						
Activity	Task	Activities and tasks		Duration in Months	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66			
		Work Plan		Design and Bid document preparation (9 Months)	Bid process management and selection of contractor (12 Months)	Construction and Commissioning of Desalination Plant (42 Months)		PC 12M
4.5.1	Team Mobilization and Kick Off meeting	1						
4.5.2	Inception Report: (Output-1)	1						
	Work Plan for Perur Desalination Plant (CP1)							
4.5.3	Design Works of CP1	9						
	Task 1 Data and Information Collection	2						
	Task 2 Review the Technical Information	2						
	Task 3 Conducting Surveys and Investigations	2						
	Task 4 Concept Design of Perur DSP	5						
	Task 5 Preparation & Submission of Concept Design Report	1						
	Task 6 Preparation of Technical Specifications	2						
	Task 7 Financial Analysis	2						
	Task 8 Preparation of O&M Requirements for Bid Document	2						
4.5.4	Bid Documents Preparation for Perur DSP (CP1)							
	Task 9 Preparation of Request for PreQualification [RFQ] Documents							
	Task 10 Preparation of Request for Proposal [RFP] Documents							
4.5.5	Tendering Assistance	12						
	Task 11 Prebid Meetings, Clarifications & Issue of Addendums etc...	6						
	Task 12 Submission of PQ Evaluation Report	1						
	Task 13 Submission of Bid Evaluation Report - Technical	1.5						
	Task 14 Submission of Bid Evaluation Report - Financial & Combined Evaluation	1						
4.5.6	Construction supervision for CP1	42						
	Task 15 Phase-I: Pre-construction activities	12						
	15.1 Design Review & Submission of Review Reports	12						
	15.2 Review of QAP & Construction Methodologies for Various Works	9						
	Task 16 Phase-II: Activities During Construction	30						
	16.1 Construction Supervision and Quality Control	30						
	16.2 Inspection of Material	30						
	16.3 Progress Monitoring, Record keeping and Reporting	30						
	16.4 Contract Management	30						
	16.5 Measurements, Claims and Financial Control	30						
	Task 17 Phase-II: Activities During Trial Run and Commissioning	8						
	17.1 Pre Commissioning Activities	2						
	17.2 Commissioning Activities	6						
	Monthly Progress Report with Quality & Quantity Control Details	Monthly						
	Material / Equipment Testing & Inspection Report	When Ever						

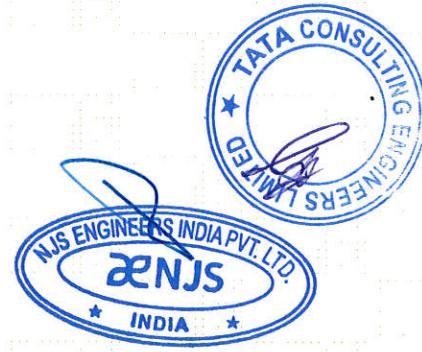
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TECH-8: WORK SCHEDULE - CP1

Project Name: Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works.



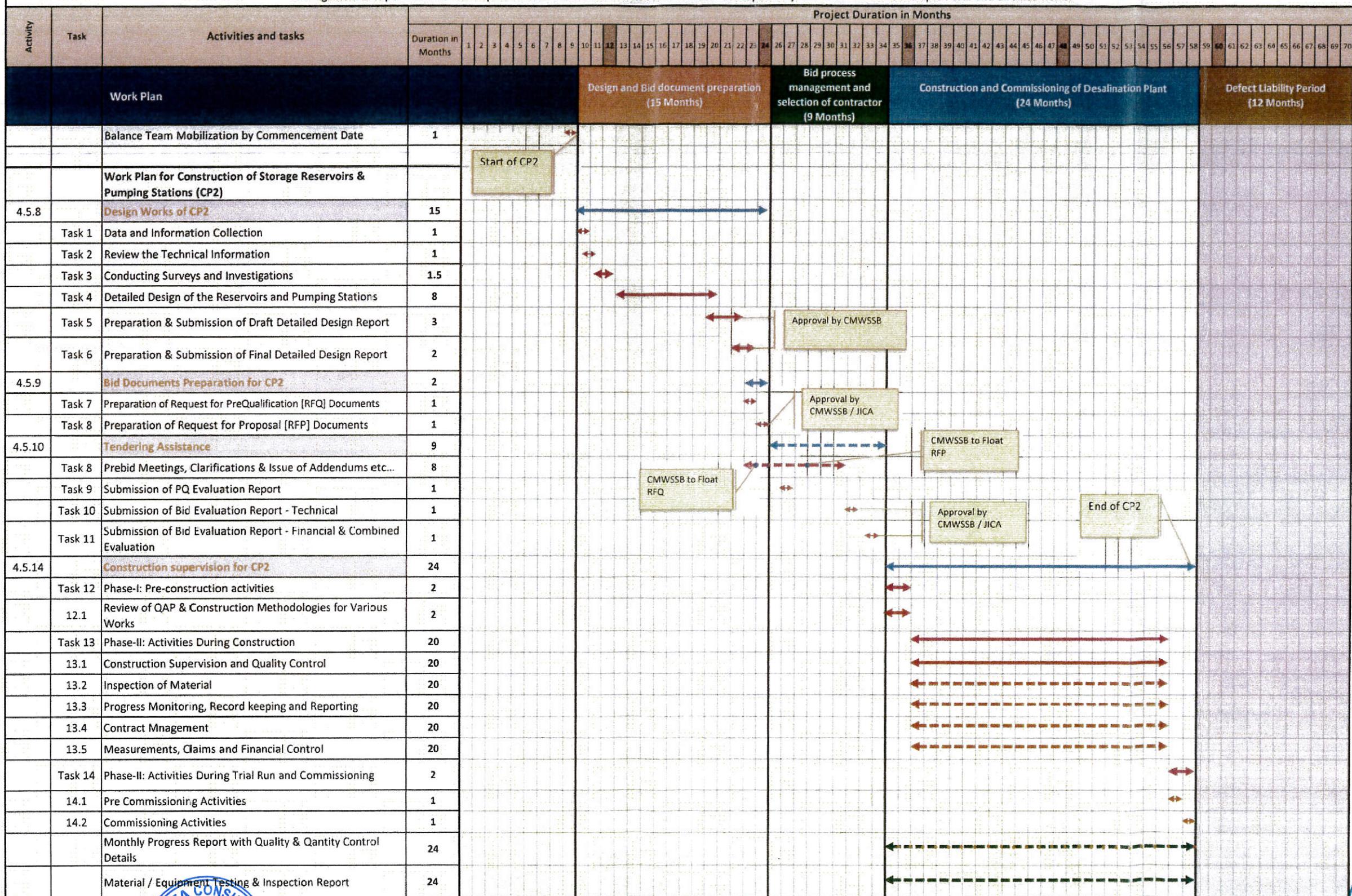
Legends	
	Main Activities [Full Time]
	Main Activities [Intermittent Time]
	Tasks Under Main Activities [Full Time]
	Tasks Under Main Activities [Intermittent Time]
	Sub Tasks Under Tasks
	Reports
	Client's Role



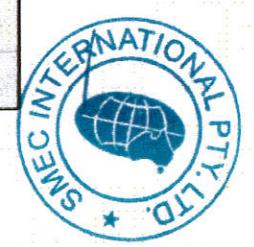
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TECH-8: WORK SCHEDULE - CP2

Project Name: Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works.



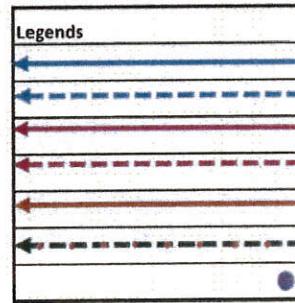
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TECH - 8

WORK SCHEDULE

Project Name: Consultancy for "Design, Preparation of Chennai, Tamil Nadu and Construction		
Activity	Task	Activities a
4.5.15	Task 15 Defect Liability Period	54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70
	15.1 As-Built Drawings	
	15.2 Submission of Project Completion R	
	Task 16 Regular Inspection During Defect Li	
	Implementation of EIA and EoM	



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TECH-8: WORK SCHEDULE - CP3

Project Name: Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works.



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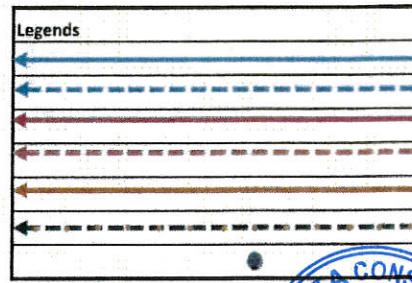
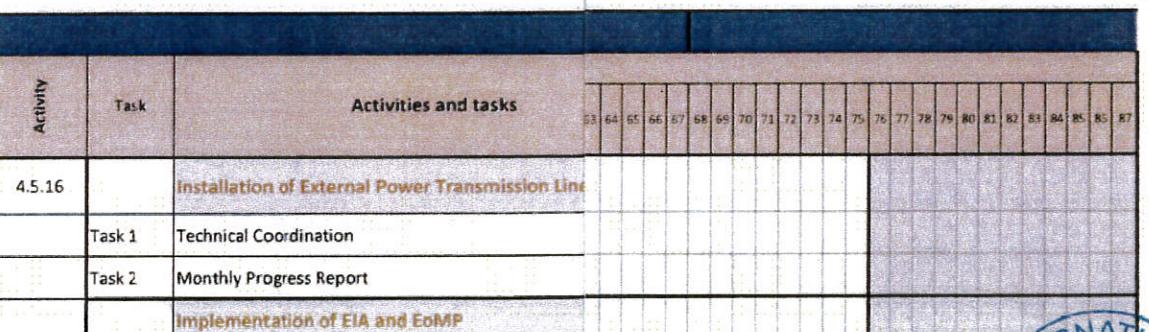
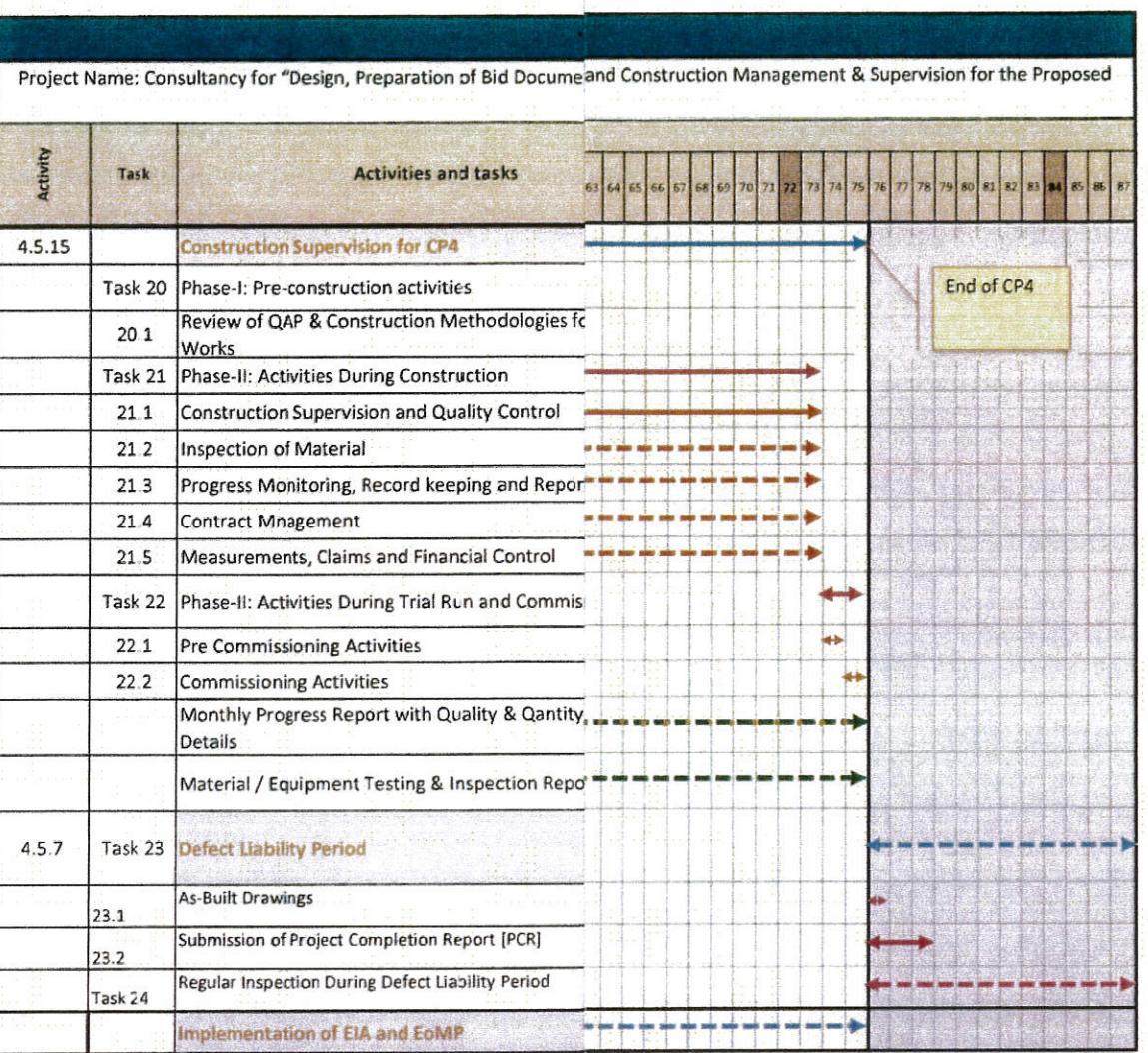
WORK SCHEDULE

		Project Name: Consultancy for "Design, Preparation of Bid Document and Construction Management & Supervision for the Proposed																								
Activity	Task	Activities and tasks																								
		Work Plan																								
		Construction Plant																								
		Defect Liability Period (12 Months)																								
		63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87
		Balance Team Mobilization by Commencement																								
		Work Plan for Improvement of Existing Water Distribution System (CP4)																								
4.5.11		Design Works of CP4																								
	Task 1	Reconnaissance Survey, Data and Information Collection																								
	Task 2	Review and Analysis of Data																								
	Task 3	Conducting Surveys and Investigations																								
	Task 4	Detailed Design of the Improvement of the Existing Distribution System CP4																								
	4.1	Upgradation of Existing network in GIS																								
	4.2	Creation of District Metered Areas (DMAs)																								
	4.3	Hydraulic Calibration of distribution system																								
	4.4	Plan to Improve the Existing Network																								
	4.5	Design and Improvement of Storage reservoirs																								
	4.6	Design and providing metered service connection																								
	4.7	Design the SCADA system																								
	Task 5	Preparation and Submission of Draft Detailed Project Report (DPR)																								
	5.1	Preparation and Submission of Final Detailed Project Report (DP)																								
	Task 6	Assisting in procurement of Software to CMWSS																								
	Task 7	Preparation of Technical Specifications																								
	Task 8	PQ Document Preparation																								
	Task 9	Bid Documents Preparation for CP4																								
4.5.13		Tendering Assistance																								
	Task 10	Prebid Meetings, Clarifications & Issue of Addendum																								
	Task 11	Submission of PQ Evaluation Report																								
	Task 12	Submission of Bid Evaluation Report - Technical																								
	Task 13	Submission of Bid Evaluation Report - Financial & Legal Evaluation																								



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Appendix B – Reporting Requirements



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Appendix B – Reporting Requirements



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Appendix B – Reporting Requirements
Reports and Documents to be submitted by the Consultant

Report/Document		No of Copies	Due Date/ Frequency
1	Inception Report ^{*1}	10	Within 1 month after commencement of the service
2	Monthly Progress Report	10	Every Month
3	Completion Report ^{*2}	5	Within 3 months after completion of the services
4	For Design and Tender Assistance for CP1		
	4.1 Conceptual Design Report and Drawings	10	At Appropriate timing
	4.2 PQ Document	10	At Appropriate timing
	4.3 Bid Document	10	At Appropriate timing
	4.4 PQ Evaluation Report	10	At Appropriate timing
	4.5 Bid Evaluation Report (Technical)	10	At Appropriate timing
	4.6 Bid Evaluation Report (Financial)	10	At Appropriate timing
5	For Design and Tender Assistance for CP2 and CP4		
	5.1 Detailed Design Report and Drawings ^{*3}	10	At Appropriate timing
	5.2 PQ Document ^{*3}	10	At Appropriate timing
	5.3 Bid Document ^{*3}	10	At Appropriate timing
	5.4 PQ Evaluation Report ^{*3}	10	At Appropriate timing
	5.5 Bid Evaluation Report (Technical) ^{*3}	10	At Appropriate timing
	5.6 Bid Evaluation Report (Financial) ^{*3}	10	At Appropriate timing
6	For Construction Supervision of CP 1		
	6.1 Contractor's Design Review Report ^{*4}	10	Within 1 month after submission of the contractor's design report
	6.2 Quality and Quantity Control Report [*]	10	Every Month
	6.3 Final Inspection Report [*]	10	At Appropriate timing
7	For Construction Supervision of CP 2		
	7.1 Quality and Quantity Control Report [*]	10	Every Month
	7.2 Final Inspection Report	10	At Appropriate timing
8	For Construction Supervision of CP 3-1 to CP 3-4		
	8.1 Quality and Quantity Control Report [*]	10	Every Month
	8.2 Final Inspection Report (CP 3-1, CP 3-2)	10	At Appropriate timing
	8.3 Final Inspection Report (CP 3-3, CP 3-4)	10	At Appropriate timing
9	For Construction Supervision of CP 4		
	9.1 Quality and Quantity Control Report [*]	10	Every Month
	9.2 Final Inspection Report	10	At Appropriate timing
10	Environmental and Social Safeguard		
	10.1 EIA Review Report for CP 1	10	Within 3 month after commencement of the services
	10.2 Environmental Monitoring Report [*]	10	Every Month
11	Progress Report and Project Completion Report		
	11.1 Progress Report (P/R)	1	Every Month



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Report/Document	No of Copies	Due Date/ Frequency
11.2 Project Completion Report (PCR)	1	Within 3 months after completion of the services
*1: Inception Report shall be submitted within 1 month after commencement of the Consulting Services. It should present the methodologies, schedule, organization, etc.		
*2: Completion Report of the consulting services shall be submitted before completion of the services. It should compile all activities done by the Consultant.		
*3: Reports and documents shall be compiled for the respective contract packages separately.		
*4: Contractor's Design Review Report shall be submitted within 1 month after submission of the contractor's design report.		
*5: Quality and Quantity Control Report can be compiled as a part of the Monthly Progress Report.		



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Appendix C – Expert Schedule

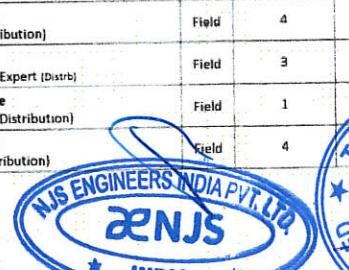


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EXPERTS SCHEDULE

TECH-7:

Form Tech - 7: Expert Schedule

Project Name: Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works.									
Professional Type	Sl No	Name of Expert/ Position/ Category [International or Local]	Description	Design Stage	Bid Document Management	Construction & Commissioning Stage	Defect Liability	Final	Duration in Months
For All Projects (CP1, CP2, CP3, CP4 & CP5)									
Common Expert Staff for all the Packages									
IE	1	Dr. Pararajasegaram (Dharma) Dharmabalan, Project Manager	Field	70	70				
LE	2	Siddappaswamy S. Senior Civil Engineer	Field	72	72				
IE	3	Dr. Alok Kumar Environmental Specialist	Field	15	15				
IE	4	Rajesh Mishra Social Communication Specialist	Field	15	16				
LE	5	S.M. Karthikaeswaran Environmental Specialist	Field	30	30				
LE	6	Dr. M. Rajsekhar Reddy Social Communication Specialist	Field	72	72				
CP1 Desalination Plant					Design and Bid document preparation (9 Months)	Bidding and Selection of Contractor (12 Months)	Construction and Commissioning of Desalination Plant (42 Months)		
IE	1	Ghulan Mustafa Desalination Expert	Field	8	24	32			
IE	2	Shane Farquharson Water Supply Engineer	Field	2	0	2			
IE	3	Dr. D. Elancherian Civil and Structural Engineer (Desal)	Field	6	36	42			
IE	4	Michel Morillon Mechanical Engineer (Desal)	Field	5	10	15			
IE	5	Sergio de Bastos Vilar Magalhaes Paulo, Electrical Engineer (Desal)	Field	7	18	25			
IE	6	Manikandan Ganesh Shoranur Monitoring and Control Expert (Desal)	Field	3	8	11			
IE	7	John Goulee Pipeline Engineer	Field	1	3	4			
IE	8	Shanmuga Nathan I. Specification Specialist (Desal)	Field	3	1	4			
IE	9	Hemanth Chadda Financial Expert	Field	3	0	3			
IE	10	Roderick Mackenzie Contract Specialist (Desal)	Field	8	1	9			
IE	11	Santhosh Kumar Commissioning Engineer	Field	0	10	10			
LE	12	Surajit Debnath Mechanical Engineer	Field	0	15	15			
LE	13	G. V. K. Mohan Electrical Engineer	Field	0	15	15			
LE	14	Vinod M.K. Structural Engineer	Field	0	10	10			
LE	15	Kumar M. Architect	Field	2	4	6			
LE	16	K. Senthil Building Mechanical and Electrical	Field	2	4	6			
LE	17	Najas Thattakatte Abdulkareem Safety and Health Expert-1	Field	0	20	20			
LE	18	Vinod Chandra K.C Quantity Surveyor-1	Field	3	27	30			
CP2 - Pumping Stations and Reservoirs					Detailed Design and Preparation of Bid Documents for CP2 (15 Months)	Bid Process and Contractor Selection (9 Months)	Construction and Commissioning Phase (24 Months)	Defect liability (12 Months)	
IE	1	Shane Farquharson Water Supply Engineer	Field	3	0	3			
IE	2	Madhawa Delpachitra Mechanical Engineer (Distribution)	Field	4	0	4			
IE	3	Manfred Kurt (Meisner) Electrical Engineer (Distribution)	Field	4	0	4			
IE	4	Ashish Gosarif Monitoring and Control Expert (Distrb)	Field	3	3	6			
IE	5	Manish Chintamani Sane Specification Specialist (Distribution)	Field	1					
IE	6	Tharlaok S. Bhatt Contract Specialist (Distribution)	Field	4					
    Assistan+ Contracts Engineer C. M. W.S.S. Board Chennai-600 002.									



TECH-7:

EXPERTS SCHEDULE

Form Tech - 7: Expert Schedule

Project Name: Consultancy for "Design, Preparation of Bid Documents & Evaluation of Bids for the Proposed Construction of 400 MLD Capacity Seawater Reverse Osmosis Desalination Plant at Perur along East Coast Road, South of Chennai, Tamil Nadu and Construction Management & Supervision for the Proposed Desalination Plant and its Product Water Conveyance Pipeline from the Plant and upto Porur and all allied works.

CP3 - Product Water Transmission mains

Construction and commissioning of CP3 { CP- 3-1, 3-2 , 3-3 & 3-4} (50 Months)

Defect Liability (12 Months)

IE	1	John Goulee Pipeline Engineer	Field	0	51	51	Start of CP3	End of CP 3	
LE	2	Ramesh Senthil Civil Engineer	Field	0	51	51			
LE	3	Nagesh Chinna Senior Pipeline Engineer	Field	0	51	51			
LE	4	Hema Kumar S. Pipeline Engineer -3	Field	0	50	50			
LE	5	Prasanth Balan Safety and Health Expert-2	Field	0	50	50			
LE	6	V. S. Rajasekar Quantity Surveyor-2	Field	0	30	30			

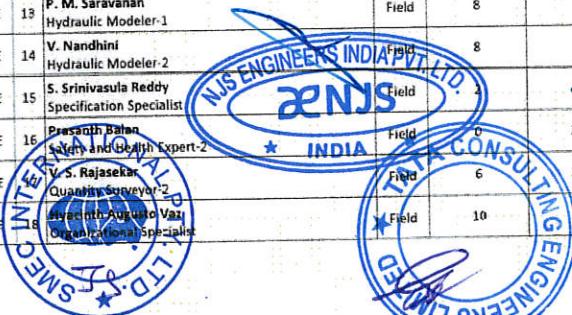
CP4 - Improvement of Distribution System

Design and Bid document preparation (27 Months)

Bidding and selection of Contractor (9 Months)

Construction and Commissioning (38 months)

**Defect liability period
{12 months}**

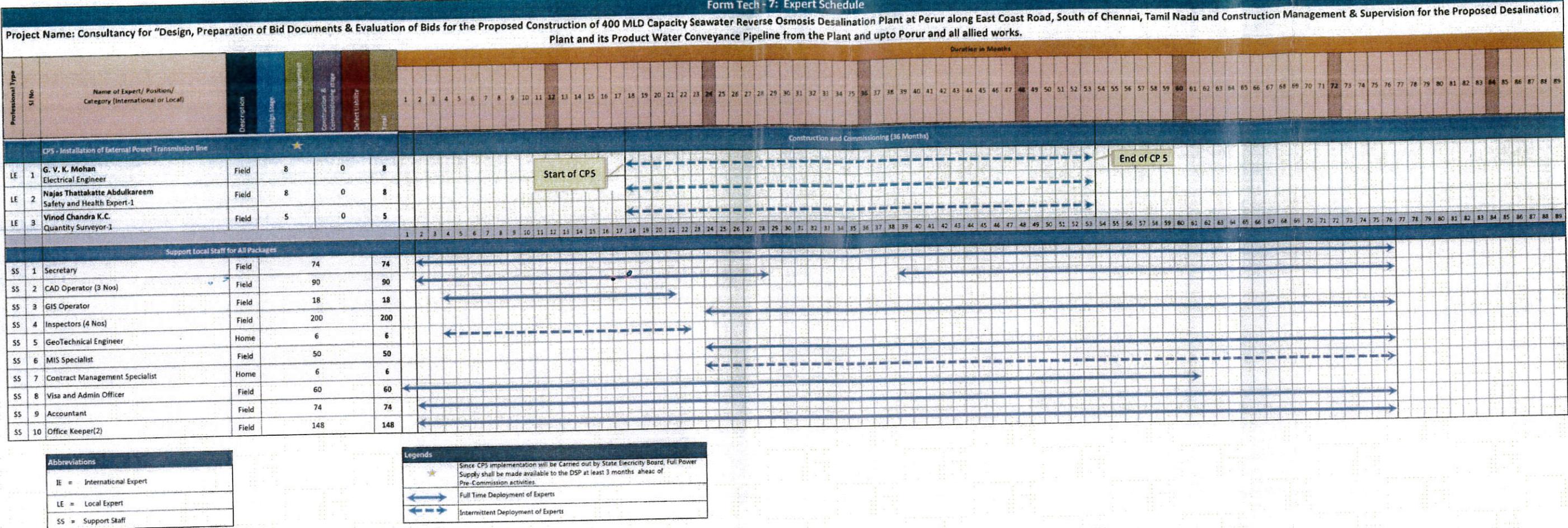


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TECH-7:

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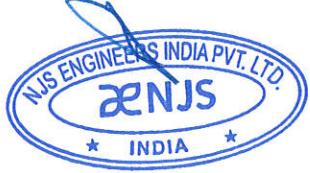


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Expert Schedule

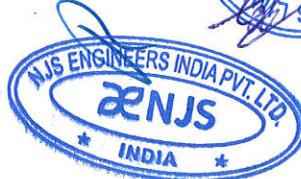
Note:

- 1 For Key Experts, the input should be indicated individually for the same position as required under Clause 14.2 of the Data Sheet; for Non-Key Experts it should be indicated individually, or, if appropriate, by category (e.g. economists, financial analysts, etc.).
- 2 Months are counted from the start of the assignment. For each Expert indicate separately the input for home and field work.
- 3 One (1) month equals twenty two (22) working days. One (1) working day shall be not less than eight (8) hours. National holidays and holidays are locally recognized days as per the CMWSSB observed holidays.
- 4 Field work means work carried out at a place other than the Expert's home office; i.e. normal place of business.



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Sl. No.	Name of Key Expert	Position Assigned	Key Qualifications / Task Assigned
1	DrPararajasegaram (Dharma) Dharmabalan	Project Manager- International Expert (No.1)	<u>Key Qualification:</u> <ul style="list-style-type: none"> • Dr.Dharma is a Doctorate in Water Systems having over 40 years of rich experience in water industry, of which more than 30 years in Australia working in the water sector for various utility organizations. The experience ranges from source to consumer point involving in design and Construction supervision & O&M of WTPs, Water Transmission and Distribution systems and assets management. Prior to that, he had worked in Sri Lanka for 10 years for National Water Supply and Drainage Board involved several external funded projects (ADB, USAID, WB, AFD funded).
2	Siddappaswamy S.	Senior Civil Engineer – Local Expert (No.2)	<u>Task Assigned:</u> <ul style="list-style-type: none"> • Shall take the overall responsibility, and shall represent the project Consultant's Team in all matters relating to the performance of services, communication between the Client and Consultant's Team, coordinating with all other consultant's staff to deliver excellent product during the stipulated time schedule. • Shall lead a team of Design, Tendering and Construction Management & Supervision (CM&S) staff involved in all the packages. PM will plan the resources, work distribution, monitor the quality of deliverables, implement the works as per the approved program and the priorities set. • Effectively coordinate with client and other departments/authorities, stakeholders, investigation agencies to deliver services for the project at all stages. Responsible for progress monitoring and program management.Timely interact with client and advise on appropriate measures to avoid delay/slippage in progress/project program. <u>Key Qualification:</u> <ul style="list-style-type: none"> • Mr.Siddappaswamy S is a Civil Engineer with 29 years of Experience in Water Supply projects, involving in process design, detailed design, construction supervision and commissioning activities of WTPs, Storage reservoirs, pumping stations, transmission and distribution systems. He has also worked in various Bilateral/ Multi-Lateral funding projects like JICA, ADB, World Bank, JBIC, UNOSP etc. in India & Iraq.

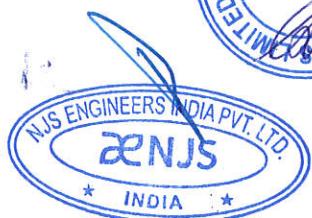


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Sl. No.	Name of Key Expert	Position Assigned	Key Qualifications / Task Assigned
			<p>Task Assigned:</p> <ul style="list-style-type: none"> • Shall lead all the national staff for carrying the works in various packages. • Shall assist Project Manager in communication with the Client and all other relevant local authorities • Shall assist all International staff in design of CP 1 and conduct civil design in CP 2 • Shall supervise civil construction works in CP 1, CP2, CP3 and CP4 and responsible for quality control of works. • Will direct the designers and experts, set out their specific tasks in consultation with the PM. Propose and discuss the concepts and prepare detailing with his team, check the proposals from his team members. • Shall guide and help his Engineers in accomplishing their individual tasks. Assist the Project Manager in monitoring the progress and timely completion of all works and in preparation of all deliverables. He will be in-charge of quality control of all civil works, documents/ drawings developed for the project.
3	Ghulam Mustafa	Desalination Expert-International Expert (No.3)	<p>Key Qualification:</p> <ul style="list-style-type: none"> • Dr.Ghulam Mustafa has Over 25 years of experience in design, construction, Commissioning, Tendering assistance and Operation of the RO plants and WTPs in India, Australia, Singapore, South East Asia and Middle East. The major RO plants involved are 100 MLD in Mekong in Vietnam, 100 MLD & 180 MLD in Queens land, Australia and 91 MLD in Saudi Arabia. <p>Task Assigned:</p> <ul style="list-style-type: none"> • Shall function as technical supervisor in design, tender assistance and construction supervision in CP1 • Shall conduct process design of the plant and coordinate with other engineers and specialists for design and bid documents for CP1 • Shall assist the Client in correspondence to clarifications from the bidders in technical aspects in CP1 and evaluate the bids regarding process aspect • Shall assist the Client in contract negotiation with the successful bidder in CP1 • Shall review detailed design by the contractor, supervise the construction on site in process aspect



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Sl. No.	Name of Key Expert	Position Assigned	Key Qualifications / Task Assigned
			<p>as well as coordination with other supervision engineers for CP1</p> <ul style="list-style-type: none"> • Shall monitor the construction supervision, Commissioning and Operation of the desalination SWRO plant. He will pass on the observations, findings to the other designers, so that suitable modifications can be brought in the preliminary design stage itself.
4	Shane Farquharson	Water Supply Engineer-- International Expert (No.4)	<p>Key Qualification: Mr. Shane is a Civil Engineer with over 32 years of experience in the water industry involving all project phases including planning, design and construction supervision. He has international experience, having worked in Australia, Philippines and India on water and sanitation sector projects as a water supply specialist. He has managed multi-disciplinary teams on a range of major water projects covering source selection, treatment, Transmission/Distribution, NRW, storage and conveyance assets. Also involved in training and capacity building activities.</p> <p>Task Assigned:</p> <ul style="list-style-type: none"> • Shall function as technical supervisor in design and tender assistance for CP 1, CP 2 and CP 4 • Shall study the improvement of the water distribution network and plan the scope of CP 4 • Shall evaluate the bids for CP 1, CP 2 and CP 4 in technical aspects • Shall assist the Organizational Expert in capacity development and organizational improvement in technical aspects • Shall be responsible for skill transfer to CMWSSB for establishment and maintenance of GIS database and hydraulic model.
5	Michel Morillon	Mechanical Engineer (Desal)- International Expert (No.5)	<p>Key Qualification: Mr. Morillon is a Mechanical Engineer with over 37 years of experience in Desalination, Water and infrastructures, Industrial facilities. He has more than 6 years in Developing and more than 28 years in Developed countries experience. He has over 15 years versatile experience in SWRO Desalination – project development, design, construction Supervision, Procurement, Training, Commissioning of Desalination projects.</p> <p>Task Assigned:</p> <ul style="list-style-type: none"> • Shall conduct mechanical design in CP1 including



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Sl. No.	Name of Key Expert	Position Assigned	Key Qualifications / Task Assigned
			<p>preparation of technical specifications</p> <ul style="list-style-type: none"> • Shall evaluate the bids for CP1 in mechanical aspect • Shall review detailed design by the contractor and supervise the construction in mechanical aspects. • In charge of CP1 mechanical equipment design review, specifications for bid document, assisting in equipment selection, construction Supervision, Procurement, Training, Commissioning of all the equipment and pumps for the SWRO plant and CP2.
6	Sergio de Bastos Vilar Magalhaes Paulo	Electrical Engineer (Desal)- International Expert (No.6)	<p>Key Qualification: Mr.Paulo holds a degree in Electromechanical Engineering with over 14 years of experience in Desalination, Water, Wastewater Treatment Plants (W&WWTP), Water and Power infrastructures, Industrial facilities engineering projects. He has good experience (4 nos.) in SWRO Plants related to Electrical and Control systems design, developing the equipment specification, construction management and commissioning. Worked in interdisciplinary team and also worked in Developed and developing countries.</p> <p>Task Assigned:</p> <ul style="list-style-type: none"> • Shall conduct electrical design in CP1 including preparation of technical specifications • Shall prepare technical requirement to CP5 and assist the Client in discussion and negotiation with CP5 contractor. • Shall evaluate the bids for CP1 in electrical aspects. • Shall design electrical items for CP2 and CP4 including the equipment specifications • Review and approve the equipment for all the packages • Shall review detailed design by the contractor and supervise the construction in electrical aspect. • Shall assess the power requirement for SWRO plant, pumping stations etc. • Shall involve in construction supervision, testing and commissioning of electrical items.
7	John Goulee	Pipeline Engineer- International Expert (No.7)	<p>Key Qualification: Mr.John GOULLEE is a Civil Engineer with 38 years of rich experience in various Water Transmission pipeline projects in developing and developed countries. Involving in Design and Supervision of projects in the capacity of Team Leader, Resident Engineer, Senior Pipeline Engineer including expertise in large diameter water pipelines of</p>



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Sl. No.	Name of Key Expert	Position Assigned	Key Qualifications / Task Assigned
			<p>more than 1000mm dia. of MS of 370kms. Has worked on multilateral funded projects on FIDIC contracts. He has experience in countries such as Australia, Qatar, Oman, Kuwait, Mozambique and South Africa.</p> <p>Task Assigned:</p> <ul style="list-style-type: none"> • Shall conduct hydraulic calculations for CP4 • Shall conduct detailed design of pipelines for CP4 including preparation of technical specifications. • Shall evaluate the bids for CP4 in pipe installation works. • Shall supervise pipe installation work in CP3 and CP4. • Shall assist in bid evaluation, selection of various equipment for the pipes in all packages. • Involve in supervision & quality control of laying, testing, commissioning of pipeline works for CP1, CP2, CP3 & CP4. Responsible for production of piping layout, alignment drawings and checking their quality.
8	NageshChinnam	Senior Pipeline Engineer- Local Expert (No.8)	<p>Key Qualification:</p> <p>Mr.NageshChinnam is Environmental / Civil Engineer with more than 13 years of Professional Experience in the field of environmental engineering and worked for various water supply and sewerage projects. His responsibilities includes preparation of the inception report, site visits, studying of existing water supply pattern, identification of strengthening requirements and tentative DMAs, Hydraulic design of raw water and clear water transmission mains,Designing of pump houses, rising mains, Preparation of BOQ,preparation of GFC (Good For Construction) of water supply networks etc. He has also worked in various Bilateral/ Multi-Lateral funding projects like JICA, ADB, World Bank in India.</p> <p>Task Assigned:</p> <ul style="list-style-type: none"> • Shall conduct detailed design in CP 4 including the hydraulic designs and reports. • Shall assist Project Manager in communication with the Client and all other relevant local authorities • Shall supervise pipe installation works in CP 3 and CP4. • Overall coordination of design, preparation of specifications, bid documents, bid evaluation.



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Sl. No.	Name of Key Expert	Position Assigned	Key Qualifications / Task Assigned
			<p>Responsible for supervision of all pipe linelaying, testing, commissioning works in all packages. Responsibility for production and review of drawings and checking their quality for submission to client.</p>
9	Roderick Mackenzie	Contract Specialist (Desal) - International Expert (No.9)	<p>Key Qualification:</p> <ul style="list-style-type: none"> Roderick Mackenzie is dual qualified as an engineer and lawyer, specialising in contract drafting and negotiation for major infrastructure projects with over 30 years of experience in developed and developing countries. He has extensive experience in leading the procurement of PPP projects (DBO, BOOT etc.) and has specific experience on negotiating high capital value contracts for major sea water reverse osmosis projects. He is familiar with various precedent forms including the FIDIC suite of contracts and SBDs of various funding agencies. <p>Task Assigned:</p> <ul style="list-style-type: none"> Shall prepare PQ documents and bid documents for CP 1 including invitation to tender, instructions to the tenderers, General and Particular (special) Conditions of Contract for SWRO plant as per the JICA SBD for "Design Build". Shall assist the Client in PQ evaluation in CP 1 Shall assist the Client in correspondence to clarifications from the bidders and evaluate the bids in contractual aspects in CP 1 Shall assist the Client in contract negotiation with the successful bidder in CP 1 Shall examine technical specifications if any, proposed by the client/contractor and suggest additions or deletions to the same if required. Prepare Special conditions pertaining to the project.
10	Tharloak S. Bhatt	Contract Specialist (Distribution)-International Expert (No.10)	<p>Key Qualification:</p> <ul style="list-style-type: none"> Mr.Tharloak Bhatt is Post Graduate in Water Engineering from Australia and B.Sc Civil Engineering from UK. He is having an overall 36 years of experience with 30 years International Experience in Water and Wastewater sector. He has handled 4 major Japanese ODA projects. He has handled some major water supply projects globally and in India including and not limited to BWSSP Phase II, Bangalore (500 MLD), Agra Water Supply Project (369 MLD), Semangar Water Supply Project, Malaysia (318 MLD) etc. <p>Task Assigned:</p> <ul style="list-style-type: none"> Shall prepare PQ documents and bid documents for



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Sl. No.	Name of Key Expert	Position Assigned	Key Qualifications / Task Assigned
			<p>CP2 and CP 4 including instructions to the tenderers, General and Particular (special) Conditions of Contract as per ICB requirements for product water transmission main and distribution network.</p> <ul style="list-style-type: none"> • Shall assist the Client in PQ evaluation in CP 2 and CP4 • Shall assist the Client in correspondence to clarifications from the bidders and evaluate the bids in contractual aspects in CP 2 and CP4 • Shall assist the Client in contract negotiations with the successful bidders in CP2 and CP4 • Will examine technical specifications, proposed by the client/contractor and suggest additions or deletions to the same if required. Will prepare Special Specifications pertaining to the project.



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Form TECH-6 Curriculum Vitae (CV)

1. General:

Position Title and No.	Project Manager-International Expert (No.1)
Name of Key Expert	Dr Pararajasegram (Dharma) Dharmabalan
Name of the Firm proposing the Key Expert	SMEC International Pty. Ltd.
Date of Birth	13/11/1949
Nationality	Jaffna, Ceylon (Sri Lanka)
Country of Citizenship/ Residence	Australia

2. Education:

- B.Sc. Engineering (Civil) Hon, from University of Ceylon, Peradeniya, Sri Lanka 1975
- Training in Integrated Hydrologic Techniques Applications at United States Geological Survey, in Quality of Water, Ground Water and Surface Water, in Denver, Colorado US 1981
- Master of Engineering in Environmental from University of Moratuwa, Sri Lanka 1984
- Post Graduate Diploma in Hydrological Engineering with Distinction (equivalent to MS in UK) at IHE Delft, Netherlands, 1985
- Graduate Diploma of Computing, Deakin University Australia 1993.
- Doctor of Technology in Performance Evaluation and Improved Risk Control Philosophies for Water Systems, Deakin University, Australia 2005

3. Employment record relevant to the assignment:

Dr. Dharma is a Doctorate in Water Systems having over 40 years of rich experience in water industry, of which more than 30 years in Australia working in the water sector for various utility organizations. The experience ranges from source to consumer point involving in design and Construction supervision & O&M of WTPs, Water Transmission and Distribution systems and assets management. Prior to that, he had worked in Sri Lanka for 10 years for National Water Supply and Drainage Board involved several external funded projects (ADB, USAID, WB, AFD funded). Team player with sound inter-personal skills and Excellent oral and written communication skills.

Period	Employing organization and your title / position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
Sept 2013 to present	<p>Employing organization: Tasmanian Water and Sewerage Corporation (TasWater)</p> <p>Position Held: General Manager-Systems Performance & Major Projects.</p> <p>Reference: Tel No: +61 418123229 Email: dan.norton@trinitas.com.au Name: Dr Dan Norton (Order of Australia) Designation: Former Deputy Chairman of TasWater and Chairman of TasNetworks</p>	Australia	<p>Major Projects: Optimisation, retrofitting and construction of three WTPs of maximum capacities in Tasmania:</p> <ul style="list-style-type: none"> 160 MLD WTP in Hobart 120 MLD WTP in Launceston 80 MLD WTP in Davenport <p>including transfer pipelines, storage reservoirs of various sizes and materials including recently completed 2x20ML with pre-stressed concrete panels</p> <p>As General Manager responsible for leading the large teams staff including consultants and contractors for the Delivery of capital projects encompassing design, procurement, construction management and commissioning.</p> <ul style="list-style-type: none"> In addition, externally undertaking annual auditing of Victoria desalination Plant (450 MLD) under a DBOO model operated by WaterSure (International) for the state Department of Environment Land and Water Planning (DELWP) and Melbourne Water.
Sept 2006 to Sept 2013	<p>Employing organization: Coliban Region Water Corporation (Coliban Water)</p> <p>Position Held: General Manager Planning & Infrastructure</p> <p>Reference: Tel No: +61 429 943 905 Email: nevillep@coliban.com.au Name: Mr Neville Pearce Designation: Acting Managing Director</p>	Australia	<p>Water security project for the City of Greater Bendigo during the millennium drought by the construction of:</p> <ul style="list-style-type: none"> 50 Km of long-distance gold field super pipe and associated intake structures, transfer pump stations and storages in record time lines. Upgrading, retrofitting, construction and optimisation of 125 MLD Ultrafiltration WTP. <p>As General Manger responsible for leading the team in planning and delivery of infrastructure projects for the authority encompassing design, procurement, construction and commissioning of project.</p>
Sept 2001 to	<p>Employing organization: Central Highlands Region Water</p>	Australia	<p>Improvement works for two large water treatments plants were delivered through the build own operate and transfer model</p> <p>P. Dharmabalan</p>

Aug 2006	Employing organization: Corporation (Central Highlands Water) Position Held: Manager – Quality Systems		(BOOT) at Lal Lal capacity of 80 MLD and White Swan 80 MLD, <ul style="list-style-type: none"> During the millennium drought, the water to White Swan WTP was delivered through a long-distance transfer pipeline (80 KM) from Coliban Water Storages. Concessionaire: Veolia Pty Ltd As a Manager responsible for the Quality Management Systems and evaluation of Key performance Indicators. <ul style="list-style-type: none"> Setting up teams to undertake to implement Integrated Management Systems. Monitor performance against contractual requirements. Management of internal and external audits. Follow up audit finding and report back to Board
2000 to 2005	Employing organization: Deakin University	Australia	Pursued Doctorate in Technology, in Performance Evaluation and improved risk control philosophies for drinking water Systems on a part time basis.
Aug 1989 to Aug 2001	Employing organization: Barwon Region Water Corporation (Barwon Water) Position Held: Senior Engineer Water Treatment	Australia	In charge of 13 WTPs varying from 2 MLD to <u>260 MLD</u> in Barwon region in the state of Victoria. As a Senior Engineer responsible for operations of water treatment facilities and transmission and distribution in the region. Key activities include: <ul style="list-style-type: none"> The Wurdee Boluc Water Treatment Plant of capacity 260 MLD was the 5th largest plant in Australia at that time. Involved in the designs, procurement, construction and finally in charge of the operations form 10 years. Setting up and leading an operational team to manage all WTP facilities. Hydrodynamic modelling of large storages (40,000ML) to improve circulation and minimise WQ issues for Algae and Taste and Odour in drinking water.
1986 to 1988	University of Technology in Lae, Papua New Guinea.	Papua New Guinea	<ul style="list-style-type: none"> Lecturer in Public Health Engineering Consultant to Water and Sewerage Board in Papua New Guinea. Conducted short courses to practicing engineers to improve their knowledge of water systems.
1984 to 1985	IHE Delft in the Netherlands	Netherlands	<ul style="list-style-type: none"> Post graduate studies in Hydrology completed with Distinction.
1983 to 1984	University of Moratuwa, Sri Lanka	Sri Lanka	<ul style="list-style-type: none"> Master's in engineering (Environmental)
1975 to date 1985	Employing organization: Water Supply and Drainage Board (NWS&DB) Positions Held: <ul style="list-style-type: none"> Assistant General Manager (R&D) Chief Engineer Design Engineer 	Sri Lanka	<p>As AGM responsible for development of "fit for purpose" solutions for WTPs and Wastewater Systems through applied research. Involved in design and Construction of the following new water treatment plants: As Chief Engineer responsible for the delivery of the Trincomalee Water supply system of WTP-100MLD, distribution system and associated pipelines (50 Km) and water storage tanks. This project was funded by the French Government (AFD). Since leaving the Water Board In Sri Lanka, I have been called upon to provide advice and assistance on number of water and wastewater projects. Notable one is the development of a project named Jaffa Water Supply Project funded by ADB stage-1, involving WTPs (30 MLD) including desalination, water storage expansion, long distance pipelines and pump stations and distributing water storage tanks. 20 ML</p>

4. Membership in Professional Associations and Publications:

- Fellow of the Institution of Civil Engineers UK, USA and Australia.
- Member of the Australian Water Association.
- Past Director of National Centre for Desalination in Australia (4 Years)
- Past Director of Water Research Australia (8 Years)
- Past Member of the Australian Company Directors.
- Holds adjunct Professorial roles with two leading Universities in Australia



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5. Language Skills (indicate only languages in which you can work):

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
Tamil	Excellent	Excellent	Excellent
Sinhalese	Excellent	Good	Fair

6. Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:

- Shall take the overall responsibility, and shall represent the project Consultant's Team in all matters relating to the performance of services, communication between the Client and Consultant's Team, coordinating with all other consultant's staff to deliver excellent outcome during the stipulated time schedule
- Shall oversee and supervise the Consultant's services in design, tender assistance, construction supervision, and capacity development

Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks:**I. Name of Project: Water Treatment plants in Hobart 160 MLD WTP, Launceston 120 MLD WTP and Davenport 80 MLD WTP**

Year: Sept 2013 to present, **Location:** Hobart, Launceston and Davenport in state of Tasmania

Client: Tasmania Water and Sewerage Corporation,

Main project features: List of projects

- Optimisation and Retrofitting, of 160 MLD Hobart WTP: The current treatment system does not meet the Health Based Targets (HBT) to protect the drinking water supplies to its customers. Hence needs to be optimised and retrofitted with additional unit new processes such as Ozonation, Ultrafiltration, Biological Granular activated carbon, Calcite filtration, water stabilisation with Carbon dioxide, Ultraviolet and chlorination with large clear water storage before using transfer pumps to supply into water networks. The WTP will ultimately have 260 MLD with stage 1 being 160 MLD. Clear Water Storage capacities of 2x20ML with prestressed concrete panels, able to be transferred through new transfer pipelines of 50 Km long to service a permanent population of 200,000 people with visiting population of more than 500,000 per year.
- Optimisation and Retrofitting Launceston 120 MLD WTPs: Similar to Hobart, the water treatment plants in Launceston region requires optimisation and retrofitting to meet the HBT requirements. Key project features include optimisation of all chemical systems increase the capacity to be able to meet peak day demands to 120 MLD, planning and designs of transfer systems to be able to move water from one zone to another by building interconnector pipes of lengths more than 20 Km, to serve the population of 60,000 people with an estimated cost AU\$40 Million
- Optimisation and Retrofitting Davenport 80 MLD WTP: Similar to Launceston, the water treatment plants in Devonport region requires optimisation and retrofitting to meet the HBT requirements. Key project features include optimisation of all chemical systems increase the capacity to be able to meet peak day demands to 80 MLD, planning and designs of transfer systems to be able to move water from one zone to another by building interconnector pipes of lengths more than 10 Km, to serve the population of 40,000 people with an estimated cost AU\$20 Million
- Providing drinking water to 24 Regional Townships. The work involved in design of Transmission and Distribution system including the house service connections, selecting the contractors, project management and deliver the outcome to 24 towns within 24 months at a cost of AU\$65 Million dollars.

Position Held: General Manager -Systems Performance & Major Projects

Activities Performed: As General Manager responsible for leading the teams for Delivery of the above projects encompassing design, procurement, construction and commissioning of the projects. Involved in guiding the design teams for the process optimization, hydraulic analysis; review and approval of the detailed design reports; reviewing bid documents and contract agreements. Oversaw the procurement process for appointing the contractor and consultants. Progress Monitoring and Contract management during the Construction period. Reviewing the variations and recommending to Management for payments; Guiding the commissioning and O&M team in takeover of the above WTPs post construction. Training and Capacity building of the O&M teams. Attending the board meetings at regular intervals.

II. Name of Project: Water supply to the City of Greater Bendigo with capacity of 125 MLD Ultrafiltration Technology WTP

Year: Sept 2006 – Aug 2013 (6 years 11 months), **Location:** Bendigo city in Coliban region

Client: Coliban Region Water Corporation,

Main project features: Optimisation and Retrofitting of 125 MLD WTP and new raw water transfer pipeline and storage facilities and the Distribution system for Bendigo city.

- Long-distance pipe line 50Km to secure a new raw water supply from Reservoir of Waranga Dam capacity 432,360 ML. The pipeline makes up of 50 Km MS concrete lined pipe of diameter 1200 mm
- Two large pumping station of capacity 170 Liter Per Second.
- The project serves to a population of 250,000 inhabitants in the region

The total cost of the project AUD \$150 Million

Position Held: General Manager Systems Planning and Infrastructure

Activities Performed: Responsible for leading senior team broadly involving planning, delivery of infrastructure projects on behalf of employer for design, procurement, construction and commissioning; Specifically setting up alliance working model for planning and delivery; use of integrated water management principles from source to consumer; review and approval of hydraulic design of "gold field superpipe" of 1200mm MSCL of 50Km; approve the specifications & procurement documents

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for selection of contractors; monitoring the construction progress along with internal team ; guiding the team for preparation of O&M manuals and training the staff for carrying out the same. Setting up Active Leakage control team and improving distribution network leakages through smart metering and setting up DMAs.

- III. Name of Project:** Optimisation, Development and Retrofitting of 2 WTPS on Design Build Own Operate & Transfer (DBOOT) basis at White Swan and Lal Lal of capacity 80 MLD and 80 MLD to be able to continually supply drinking water that meets the Australian Drinking Water Guidelines.

Year: Sept 2001 – Aug 2006 (4 years 11 months), **Location:** Ballarat, state of Victoria

Client: Central Highlands Region Water Corporation,

Main project features: Central Highlands Water (**Client**) appointed Veolia Pty Ltd as concessionaire for the development of WTPs. The project comprised 2 DAFF treatment plants of capacities 80 MLD including clear water reservoir of capacity 20 ML and transmission pipeline of 80 kms of dia 800 mm and pipe material is MS concrete lined.

Project cost was AUD \$ 50million and O&M cost of AUD \$ 6million /annum

Position Held: Manager Quality Systems

Activities Performed: As Manager (Central Highlands Water) was responsible for ensuring delivery of water of sufficient quantity with desired quality achieved as per Concession agreement(CA); Management of internal and external audits as per CA; reporting the audit outcome to the management Board; Cost control during operations; monitoring scope change /creep and variations to keep check on costs escalation; regular monitoring of what worked well and what improvements were needed as per CA. **Guiding Independent Engineer**, during operations phase to make sure the commercial contractual matters are adhered and the WTPs are managed adequately to meet the ISO 55,000 asset management standards and the product quality meets all the specified parameters in the contract.

- IV. Name of Project:** 13 WTPs varying from small scale plants of 2 MLD to large scale plant of 260 MLD in Barwon region in the state of Victoria

Year: 1989 – 2001 (12 years), **Location:** Geelong West, state of Victoria, **Client:** Barwon Region Water Corporation,

Main project features: Operation & Maintenance of 13 WTPs

The largest water treatment plant was 260MLD at Barwon and Clearwater reservoirs of Glass fused steel tanks on ground line and cover storages of capacity 40 ML and potable water transmission main length 20 kms of which MS of 1200mm to 900 mm diameter pipes.

Position Held: Senior Engineer

Activities Performed: Responsible for O&M of water treatment and conveyance facilities ensuring potable water to customers. Also involved ensured timely upgrades for the Treatment plants for improving efficiency and introduced advanced monitoring sensors, data collection and analysis for SCADA system; pioneered introduction of Artificial Intelligence for operations in water management that can be used for automatic facilities operations; reporting to Executives, Board on regular intervals on achieving objective of operations. Training the O&M and assets management team.

- V. Name of Project:** Design and construction of Water Treatment plants of

Year: 1977 to 1983 **Location:** Trincomalee, Ambatale Colombo and Jaffna Kilinochchi Water Supply Project Sri Lanka over my 10 years. **Client:** National Water Supply and Drainage Board

Main project features: Project -Trincomalee Drinking Water Project (Funded by French Government)) from 1979 -1982

Project cost: US\$ 50 Million

Position Held: Joined National Water Supply and Drainage Board as Design Engineer, promoted to Chief Engineer and final Asst General Manager (R&D) in 1982.

Activities Performed: Design and construction monitoring of Water Treatment Plant 100 MLD Water Treatment Solutions, 50 Km of pipe lines MS pipe diameter 1200 mm, high level water tanks of varying capacities from 2 ML to 20 ML within the water network.

Project -2 name of the project Ambatale Water Supply Improvement Program for Greater Colombo, Sri Lanka. From 1982-83

Scope: Optimisation and Retrofitting of existing treatment facilities and increase the capacity by 30MLD

Project cost: US \$ 30 Million, **Multilateral Funding Agency:** USAID and World Bank

Activities Performed: Planning, designs and construction of WTP upgrade, power supply improvements, interconnecting transfer pipelines, disinfection and communication and control functionalities.

Project -3 Jaffna – Kilinochi water supply Project 30 MLD WTP to serve a population of 500,000 people 1981-83

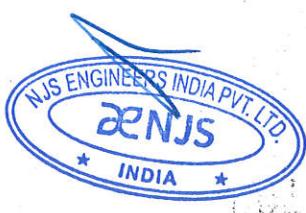
Scope: Planning and scoping the project for ADB funding stage-1 Cost--US\$ 30 mil (2018 rates is approx. US\$ 200 mil)

The project was stopped due to civil war and project has resumed in 2017-2018

Project cost: US \$ 200 M

Multilateral Funding Agency: NWS&DB and ADB with Denmark based consultants.

Activities Performed: Provided advice and guidance in the development of the project for ADB funding. Since the funding was approved on invitation from NWS&DB provided technical support to progress the project which is being under construction now.



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7. Certification:

I, the undersigned, certify to the best of my knowledge and belief that:

- (i) this CV correctly describes my qualifications and my experience;
- (ii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in the Expert Schedule in Form TECH-7 provided team mobilization takes place within the validity of this proposal or any agreed extension thereof;
- (iii) I am committed to undertake the assignment within the validity of Proposal;
- (iv) I am not part of the team who wrote the terms of reference for this consulting services assignment;
- (v) I am, pursuant to Clauses 3 and 4 of the ITC, eligible for engagement.

I understand that any misstatement described herein may lead to my disqualification or dismissal, if engaged.

P. Dharmabalan

Signature of Key Expert or authorized representative of the firm

Date: 08/03/2019

Full name of authorized representative: Mr. Gaurav Kumar Srivastava



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Form TECH-6 Curriculum Vitae (CV)

1. General

Position Title and No.	Senior Civil Engineer (Local Expert) (No.2)
Name of Key Expert	Siddappaswamy S.
Name of Firm proposing the key expert	TATA Consulting Engineers Limited
Date of Birth:	01/06/1968
Nationality	Indian
Country of Citizenship / Residence	India

2. Education:

- Bachelor of Civil Engineering from University of Mysore, Karnataka (1990)

3. Employment record relevant to the assignment:

Mr Siddappaswamy S is a Civil Engineer with 29 years of Experience in Water Supply projects, involving in process design, detailed design, construction supervision and commissioning activities of WTPs , Storage reservoirs, pumping stations, transmission and distribution systems. He has also worked in various Bilateral/ Multi Lateral funding projects like JICA, ADB, World Bank, JBIC, UNOSP etc. in India & Iraq.

Period	Employing organization and your title/position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
August 2012 to Till date	Employing organization: M/s. TATA Consulting Engineers Limited, Bangalore. Position Held: "Manager-Water" Reference: Mr. G N Virupaksha (Senior General Manager-TCE) Contact: 9341602291 Email: gnvirupaksha@tce.co.in	India	Major Projects: <ul style="list-style-type: none"> JICA assisted Delhi Water Supply Improvement Project. Improvement to Water Distribution System, Reduction and Control of UFW for Bangalore. Improvement in service level for water supply in Mehrauli and Vasant Vihar Project Area. PMC including Construction Supervision for water supply projects in Gujarat State. Actively involving in management of infrastructure projects particularly in Hydraulic designs, UFW management, Master planning, construction management of WTP (477 MLD), large size transmission mains (181 km of >1000 mm MSCL pipe), distribution system design, preparation of DPR, Tender document, evaluation of technical and financial bid documents and overall Team management, Authorities coordination etc.
January 2008 to 31 May 2012	Employing organization: M/S United nations for Project Services (UNOPS) Position Held: Project Manager	Iraq	Major Projects: <ul style="list-style-type: none"> Improvement to Water Supply system of Sidakan and Rawanduz Towns funded by various Multilateral agency fund. Strengthen Capacity for Management of Unaccounted-For Water (UFW) and other Infrastructure projects, Erbi. Funded by WB Improvement to Water Supply system of Takia Town funded by various Multilateral agency fund. Improvement to Water Supply system of Al-Bath & Al-Refai's Towns; funded by ITF (Iraq Trust fund is pool of fund collected from all the multilateral funding agencies). Strengthening the Capacity for Management of Unaccounted-For Water (UFW) for the Towns Water Authority. Also involved in design, preparation of bid documents, evaluation of bids, donor briefing, technical assistance during the construction supervision of the above water supply projects, namely Al-Bath & Al-Refai's distribution system improvements, Takia water system project, Sidakan & Rawanduz Towns water supply projects etc.
April 1994 to December 2007	Employing organization: M/s. TATA Consulting Engineers Limited, Bangalore Position Held: "Deputy Chief Engineer"	India	Major Projects: <ul style="list-style-type: none"> BWSSB Water Supply Project – Stage-IV, Phase-II Project (JICA Funded). Bisalpur - Jaipur Water Supply Project (Transfer System) JBIC funded. Bangalore UFW Reduction and Control and Water Distribution System Rehabilitation, Cauvery Water Supply Scheme, Bangalore Stage-IV, Phase-I. Rajasthan Urban Infrastructure Development Project, Jodhpur, Rajasthan (ADB funded). Integrated Rural Water Supply And Sanitation Project for Government of Karnataka for 280 Villages, (World Bank Aided) Involved in design, Preparation of DPRs, bid documents, bid evaluations, Construction supervision and coordination with client and internal team management.

From Sept.1 990 to June 1993	Employing organization: M/S SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING, MYSORE Position Held: "Design Engineer"	India	Tasks involves are Collection of field data, water quality and demand assessment study, computerised design and optimisation of water supply system, preparation of Project Report. Road improvement and low cost sanitation for the <u>rural area of Karnataka State.</u>
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4. Membership in Professional Associations and Publications:

- Life Member – MIE and 2. Life Member Indian Water Works Association

5. Language Skills (indicate only languages in which you can work):

Languages	Reading	Speaking	Writing
English	Excellent	Excellent	Excellent
Hindi	Fair	Fair	Fair
Kannada	Excellent	Excellent	Excellent

6. Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:

Shall lead the local staff and assist the Project Manager in communication with the client and authorities. Coordinate and assist in the design management, construction supervision, progress monitoring and contract administration of all packages including the defect liability period. Overall management of the assignment in close association with PM.

Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks:

I. Name of Project: Providing Consultancy Services for JICA assisted Delhi Water Supply Improvement Project in Chandrawal Water Treatment Plant Command Area.

Year: Feb 2017 to Ongoing Location: Delhi Client: DJB

Main Project Features: To achieve equitable and continuous water distribution in the Chandrawal Water Treatment Plant Command Area by improving the water supply network including service network to customers thereby reducing the NRW to 14%. The total number of consumer connections from all the three contracts are around 2,37,000. The total contract area is 96 Sq. Km.

Position Held: NRW Specialist (local)

Activities Performed: Involved in Construction supervision and commissioning of 477 MLD WTP. Laying of 81 Kms of transmission system varying from 700 mm to 1000 mm dia, MS Pipelines. Construction of Storage reservoirs of capacity of 228 ML. As part of project management responsible for review of designs, preparation of DPRs, preparation of specifications, PQ and tender documents, Review of PQ and bid evaluation, supervision of water distribution improvement in 41 DMAs and reduction of NRW level to target level, providing metered service connections to 2,37,000 customers. Preparation of progress reports to client and donors and attending progress review meetings with client and donors.

II. Name of Project: Bangalore Water Supply & Sewerage Project-II (BWSSP – II) - Improvement to Water Distribution System, Reduction and Control of UFW for Bangalore.

Year: Feb 2014 to March 2018 Location: Bangalore, Karnataka Client: Bangalore Water Supply and Sewerage Board (BWSSB)

Main project Features: Sourcing, conveying raw water (2600mm, 9.4 km and 3000 mm, 6.3 km) to WTP, treating with 500 MLD (WTP) water, pumping the treated water in three stages with each of 150m, pumping stations at T K Halli, Harohalli, Tataguni, clear water transmission system (2700 mm dia & 69 kms MS Pipelines length) to city, trunk system inside the city various from 600mm to 2250 mm, more than 45 km, clear water reservoirs inside the city and improvements of distribution and Reduction of UFW to target level, improvement of sewerage system (STPs and sewer system)

Position held: Consultant (UFW Expert)

Activities Performed: Working as a UFW Expert, responsible for following activities

- As part of project management consultant, responsible for review of Contractor's work related to water distribution improvement and reduction of leakage level in South, East and Central areas of Bangalore. Reviewed the design of distribution system and formation of DMAs (209 nos) and provided metered service connections to 1,20,000 customers.
- Reviewed PZTs result after the test and their reports to make sure that the DMAs are hydraulically discreet.
- Monitoring and reviewing the data related to UFW levels in the Contract area.
- Suggesting and providing technical input for management of UFW level.
- Preparation of progress reports for client and funding agency.
- Attending progress related meeting with all the stake holders and briefing them as needed.
- Replaced 628 km of pipeline from 100 to 700 mm with DI/MS pipes. Out of 628 Km of mains replaced, 24.2 Km is of MS Pipelines varying from 450 to 700mm. Rest is DI

III. Name of Project: Improvement in service level for water supply in Mehrauli and Vasant Vihar Project Area

Year: From August 2012 to Nov. 2015 Location: Delhi Client: Delhi Jal Board

Position held: Consultant (UFW Expert)

Activities Performed: Providing technical expertise to plan, design and implement the water distribution system improvement considering DMA concept for better management of UFW to achieve the project goal. The goal of the project is to achieve improved water supply towards achievement of 24/7 water supply to the two project areas namely Mehrauli and Vasant Vihar.

IV. Name of Project: *Project Management Consultants (PMC) including Construction Supervision for water supply projects in Gujarat State.*

Year: Aug. 2012 to March 2013 Location: Gujarat Client: GWSSB

Main project Features: Improvement of water supply infrastructures for the state of Gujarat

Position held: Water Supply Expert to monitor the water supply infrastructure projects

Activities Performed:

Project 1- Tapi Bulk Water Supply Project:

- As Water Supply Expert, monitoring the water supply infrastructure projects to plan, design and implementation. Providing expertise to prepare DPR, formulate the contracts documents, tendering, evaluation and supporting GWSSB to award the Contract.
- Involved in design of Transmission mains from Tapi River to different locations:
 - a. 1016 mm – 6.6 Kms, MS Pipelines
 - b. 700 to 900 mm – 23 Km, MS Pipelines.
- Involved in the sizing and Supervision of storage reservoir Capacity 27ML and the pumping system

Project 2 - Krakapar RWSS – Water supply pipeline from Chamardi to Porbandar.

- Involved in design of Transmission mains from Chamardi GSR to Porbandar :

a. 1110 to 2100 mm – 181 Kms, MS Pipelines.

- Involved in the sizing and Supervision of storage reservoir Capacity 20 ML and the pumping system

V. Name of Project: *Improvement to Water Supply system of Sidakan and Rawanduz Towns; funded by ITF (Iraq Trust fund is pool of fund collected from all the multilateral funding agencies)*

Year: Jan. 2008 to May 2010 Location: Iraq Client: National Govt.

Main Project Features: Source development, design of transmission and distribution system, construction of service reservoirs etc.

Position Held: Project Manager and Office Head

Activities Performed:

- Design of transmission and distribution system, preparation of cost estimate and DPR.
- Prepared bidding documents, evaluated the technical and financial bids, award of contracts and prepared the contract documents.
- Involved in overall management of the construction supervision and Technical advise
- Chaired the co-ordination meeting with client, donors to brief the project progress
- Preparation of reports required for donors, and supervising & providing technical advice to the team.
- Laid 20 km of distribution system, DI and HDPE
- Constructed 0.75 MI capacity ground level service reservoir

VI. Name of Project: *Strengthen Capacity for Management of Unaccounted-For Water (UFW) and other Infrastructure projects at UNOPS, IQOC, Erbil*

Year: From January 2008 to 31 May 2012 Location: Iraq.

Client: Govt. of Iraq and funded by ITF (Iraq Trust fund is pool of fund collected from all the multilateral funding agencies).

Position held: Project Manager

Activities Performed: Worked as Project Manager and Head of Office at Erbil for UNOPS. Managed Regional Health Emergency Response Project funded by World Bank. Responsible for overall management of the project which includes chairing of co-ordination meeting with client, preparations reports required for donors, preparation of all contract documents and supervising & providing technical advice to the team. Also worked as Project Manager for implementation of Strengthen Capacity for Management of Unaccounted-For Water (UFW) and other Infrastructure projects at UNOPS, IQOC, Erbil. Involved in preparation of proposal and presentation of the same to donors/clients. In addition to above responsibilities, I was responsible for management of Erbil Office, Northern Iraq. This involves attending the Erbil Operation Group, ASMT, DHS meetings etc.

VII. Name of Project: *Improvement to Water Supply system of Takia Town; funded by ITF (Iraq Trust fund is pool of fund collected from all the multilateral funding agencies)*

Year: Jan. 2007 to May 2008 Location: Iraq Client: National Govt.

Main Project Features: Design of transmission and distribution system, construction of service reservoirs of 0.5 MIG etc.

Position Held: Project Manager and Office Head

Activities Performed:

- Design of transmission and distribution system, preparation of cost estimate and DPR. Prepared bidding documents, evaluated the technical and financial bids, award of contracts and prepared the contract documents.
- Involved in overall management of the construction supervision. Chaired the co-ordination meeting with client, donors to brief the project progress. Preparation of reports required for donors, and supervising & providing technical advice to the team.
- Laid 27.35 km of distribution system, HDPE

VIII. Name of Project: *Improvement to Water Supply system of Al-Bath & Al-Refal's Towns; funded by ITF (Iraq Trust fund is pool of fund collected from all the multilateral funding agencies)*

Year: Jan. 2007 to May 2008 Location: Iraq Client: National Govt.

Main Project Features: Design of transmission and distribution system, construction of service reservoirs etc.

Position Held: Project Manager and Office Head

Activities Performed: Design of transmission and distribution system, preparation of cost estimate and DPR. Prepared bidding

documents, evaluated the technical and financial bids, award of contracts and prepared the contract documents. Involved in overall management of the construction supervision. Chaired the co-ordination meeting with client, donors to brief the project progress. Preparation of reports required for donors, and supervising & providing technical advice to the team. Laid 25 km of distribution system, HDPE

IX. Name of Project: BWSSB Water Supply Project – Stage-IV, Phase-II Project (JICA Funded)

Year: Apr. 2007 to Aug. 2007 **Location:** Bangalore **Client:** Bangalore Water Supply and Sewerage Board (BWSSB)

Position held: Specialist Engineer - PMC

Main project Features: Sourcing, conveying of raw (2600mm, 9.4 km and 3000 mm, 6.3 km) water to WTP, treating of 500 MLD (WTP) water, pumping the treated water in three stages with each of 150m head, pumping stations at T K Halli, Harohalli, Tataguni, clear water transmission system (2700mm dia & 69 km length MS Pipelines) to city, trunk system inside the city various from 600mm to 2250 mm, more than 45 km, clear water reservoirs inside the city and improvements of distribution and Reduction of UFW to target level, improvement of sewerage system (STPs and sewer system)

Activities Performed:

- Design of transmission system of 2600 mm, 2700 mm & 3000 mm dia MS pipeline and Cost estimate
- Sizing of **Reservoirs 152 ML**, 7 nos. and the Pumping system
- Preparation of document seeking pre-qualification applications, evaluation of pre-qualification applicants and short listing,
- Finalization of scheme for bid purpose. Preparation of RFP document including instruction to bidders, design criteria, technical specifications, schedules, criteria for operational performance, scrutiny of bids, evaluation of bids, etc.
- Evaluated the technical as well as financial bid and prepared the report.

X. Name of Project: Bisalpur - Jaipur Water Supply Project (Transfer System)

Year: July 2006 to March 2007 **Location:** Jaipur **Client:** PHED, Jaipur, JBIC Funded

Position held: Water Supply Expert cum acting Project Manager

Main project Features: Work Involved are 400 MLD WTP planning and design of water supply components, design of distribution system, estimation, preparation of tender documents for all water supply components and evaluation of technical and financial bids.

Activities performed: As Project Manager, monitored all activities during design and implementations. Provided expertise for planning of water supply components including distribution system improvements, preparation of DPR, formulate the contracts documents, tendering, evaluation and recommendation for award of Contract. Construction Supervision of 400 MLD Water Treatment Plant work at Surajpura, Raw water pipe line (dia 2400mm) of length 8.4 Km, Clear Water Pipe Line (dia 2300mm) of length 97.4 Km. Distribution system improvement – 239 km of different diameters

XI. Name of Project: Improvement to Water Supply system of 6 towns water network; funded by ITF (Iraq Trust fund is pool of fund collected from all the multilateral funding agencies)

Year: Jan. 2006 to May 2008 **Location:** Iraq **Client:** National Govt.

Main Project Features: Design of transmission and distribution system.

Position Held: Project Manager

Activities Performed:

- Design of distribution system, preparation of cost estimate and DPR. Prepared bidding documents, evaluated the technical and financial bids, award of contracts and prepared the contract documents. Involved in overall management of the construction supervision. Chaired the co-ordination meeting with client, donors to brief the project progress. Preparation of reports required for donors, and supervising & providing technical advice to the team
- Laid 67.5 km of distribution system, HDPE
- Laid 0.56 Km of 800 mm DI trunk main.

XII. Name of Project: Bangalore UFW Reduction and Control and Water Distribution System Rehabilitation, Cauvery Water Supply Scheme, Bangalore Stage-IV, Phase-I.

Year: October 2002 to March 2005 **Client:** BWSSB **Location:** Bangalore

Position held: Project Coordinator

Activities performed: Worked as Project Coordinator and involved in preparation of document seeking pre-qualification applications, evaluation of pre-qualification applicants and short listing, finalization of scheme for bid purpose, preparation of RFP document including instruction to bidders, design criteria, technical specifications, schedules, criteria for operational performance, scrutiny of bids, evaluation of bids, etc. Evaluated the bids and sent to JBIC for their concurrent. Involved in Project Monitoring and reviewing of the documents prepared by the contractor. Our role was to monitor and advise the client of the works done by the contractor. This is one of the first projects of its kind in India where in MNF has been used to measure the Physical loses in the distribution system.

XIII. Name of Project: Rajasthan Urban Infrastructure Development Project, Jodhpur, Rajasthan (ADB funded).

Year: January 2002 to September 2002 **Location:** Jodhpur, Rajasthan **Client:** RUIDP

Position held: Water Supply Expert

Main Project Features: Improvements in Water Reservoirs and construction of 60 MLD WTP, Transmission main, 3 Ground Reservoirs of 1.5 ML & 5.5 ML, Elevated Reservoirs of 0.8 ML to 1.5 ML capacity at various zones. Improvement of Distribution system in the city.

Activities performed: Involved in preparation planning, designing of all the water supply components including design of WTP, sizing the reservoirs and distribution system, preparation of pre-qualification documents, evaluation of pre-qualification applicants and short listing, finalization of scheme for bid purpose, preparation of RFP document including instruction to bidders, design criteria,

technical specifications, schedules, evaluation of bids etc. Also involved in Construction and commissioning of new 60 MLD capacity WTP and 5.5 ML capacity Clear Water Reservoir (CWR) at Kailana.

XIV. Name of Project: BWSSB Water Supply Project – Stage-IV, Phase-I Project – JBIC Funded.

Year: Jan 1998 to Mar 2001 Location: Bangalore Client: Bangalore Water Supply and Sewerage Board (BWSSB)

Position held: Specialist Engineer - water supply

Main project Features: Sourcing, conveying of raw water to WTP (raw water main of 1900mm for 9.6 km), treating of 270 MLD (WTP) of water, pumping the treated water in three stages with each of 150m head, pumping stations at T K Halli, Harohalli, Tataguni, clear water transmission system of 1950 mm dia, 70 km, city trunk system various from 350 mm to 1600mm – 35 km, clear water reservoirs, improvements of distribution and Reduction of UFW to target level, improvement of sewerage system (STPs and sewer system).

Activities performed: Involved in preparation planning, designing of all the water supply components including design of WTP, sizing the reservoirs and distribution system, preparation of pre-qualification documents, evaluation of pre-qualification applicants and short listing, finalization of scheme for bid purpose, preparation of RFP document including instruction to bidders, design criteria, technical specifications, schedules, evaluation of bids etc.

XV. Name of Project: Integrated Rural Water Supply And Sanitation Project for Government of Karnataka for 280 Villages, World Bank Aided.

Year: Sept. 1990 to June 1993 Location: Karnataka Client: Govt. of Karnataka

Position held: Design Engineer

Activities Performed: Collection of field data, water quality and demand assessment study, computerised design and optimisation of water supply system, preparation of Project Report. Road improvement and low cost sanitation for the rural area of Karnataka State. Field studies, design of pumping mains, water distribution networks, drainage system, Cost estimates and preparation of drawings. Was associated in preparation of software designs for distribution and pumping mains.

7. Certification:

I, the undersigned, certify to the best of my knowledge and belief that:

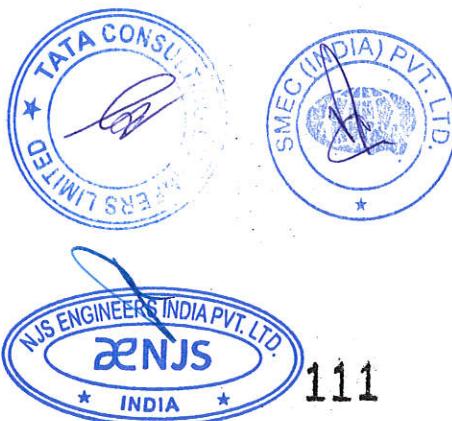
- (i) this CV correctly describes my qualifications and my experience;
- (ii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in the Expert Schedule in Form TECH-7 provided team mobilization takes place within the validity of this proposal or any agreed extension thereof;
- (iii) I am committed to undertake the assignment within the validity of Proposal;
- (iv) I am not part of the team who wrote the terms of reference for this consulting services assignment;
- (v) I am, pursuant to Clauses 3 and 4 of the ITC, eligible for engagement.

I understand that any misstatement described herein may lead to my disqualification or dismissal, if engaged.


Signature of Key Expert or authorized representative of the firm

Date: 10/10/2019

Full name of authorized representative: Mr. Gaurav Kumar Srivastava



DL
Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

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Form TECH-6 Curriculum Vitae (CV)

1. General

Position Title and No.	Desalination Expert-International Expert (No.3)
Name of Key Expert	Mr. Ghulam Mustafa
Name of the Firm proposing the Key Expert	NJS Engineers India Pvt Ltd.
Date of Birth	10/10/1963
Nationality	Australian
Country of Citizenship/Residence	Australia

2. Education:

- Ph.D. Chemical Engineering (Specialization in Pretreatment and RO Desalination), University of New South Wales (UNSW) Sydney, Australia, 2007
- Post Graduate Training in Nuclear Science and Engineering, Bhabha Atomic Research Centre (BARC) Training School, Mumbai, India, 1986
- Bachelor of Chemical Engineering, AMU, Aligarh India, 1985

3. Employment record relevant to the assignment:

Mr. Ghulam Mustafa has Over 25 years of experience in design, construction, Commissioning, Tendering assistance and Operation of the RO plants and WTPs in India, Australia, Singapore, South East Asia and Middle East. The major RO plants involved are 100 MLD in Mekong in Vietnam, 100 MLD & 180 MLD in Queens land, Australia and 91 MLD in Saudi Arabia.

Period	Employing organization and your title/ position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
Jan 2015 to till date	Employing organization: NJS Engineers India Pvt. Ltd / NJS Consultants Co Ltd, Japan Position Held: Principal Process Engineer/ Team Leader Reference: Name: Dr. Uday Kelkar Designation: Director – NJS Engineers India Ltd. Phone: +91 9822401962 Email: uday@njsei.com	India & Vietnam	<ul style="list-style-type: none"> • Leading the engineering team for the complete water/ wastewater membrane based project planning, design review report preparation, detailed design report preparation, bid documents preparation, bids evaluation and project execution. • Completed process design of 100 MLD Seawater Desalination Plant for Mekong Regional Water Security Project (MRWSP), Vietnam • Carried out rehabilitation works for two 144 and 225 MLD water treatment plants having conventional processes including settling tube clarification, media filtration, thickener and belt filtration for waste water management. • Responsible for solving plant operational issues, trouble shooting and smooth operation of the plants.
Nov 2011 to Dec 2014	Employing organization: GE Power and Water, Sydney, Australia Position Held: Lead Process Engineer mainly for RO Desalination projects Reference: Name: Gabor Kicsi Phone: +61 439690604 Email: Gabriel.Kicsi@suez.com	Australia, Indonesia, Thailand, Myanmar Vietnam and Singapore	<ul style="list-style-type: none"> • Responsible for the concept design, detailed process design, mass balance, PFD, PIDs, equipment specifications, MF/UF pretreatment and RO process/skid design based on seawater quality, safety plan, material selection, control strategy, and also HAZOP study and value engineering. • Responsible for process design of two RO Desalination Plant of 100 MLD each, Practical experience in corrosion and material selection for desalination plant equipment. Also designed demineralization processes such as EDI, EDR, IX and MB processes for ultrapure water.
April 2009 to Nov 2011	Employing organization: NJS Consultants Co. Limited, Japan Position Held: Water and Wastewater Expert / Principal Process Engineer	India	<ul style="list-style-type: none"> • Led the engineering team for the process design and work execution for the membrane based water treatment plant. • Conventional and advanced pretreatment process design including tubesettler, media filtration and MBBR processes.
May 2006 to Mar 2009	Employing organization: CH2M Hill Co. Sydney, Australia Position Held: Process Engineer	Australia & UAE	<ul style="list-style-type: none"> • Process design for intake works, pre-treatment, MF/RO processes, tanks and equipment design and specifications, control sequence development and design report preparation for 13.6 MLD Seawater RO Plant at Kalba, UAE, cost estimation, initial investigation, design criteria setting for RO desalination process, mass balance, PFD/PID preparation, plant layout. • Carried out feasibility study for 180 MLD UF/RO desalination plant for QGC, Australia • Involved in the process design for Advanced Water Treatment Plant at Luggage Point using 70 MLD MF/RO process. • Involved in the pilot testing of MF-RO system for the design criteria

Sep 2002 to Apr 2006	Employing organization: UNESCO Centre of Membrane Science and Technology, UNSW, Australia	Australia	verification and chemical optimization.
Dec 1993 to Sep 2002	Employing organization: Saline Water Conversion Corporation, Saudi Arabia Position Held: Senior Process Engineer/ Chemical Engineer	Saudi Arabia	<ul style="list-style-type: none"> • Design and improvement in pretreatment processes and RO membrane desalination (PhD degree was awarded to Mustafa on this work.) • Pilot testing of RO membrane on saline feed water with complex foulant concentrations and study on nature of scaling/fouling and its inhibition. • Comprehensive testing of Sydney Seawater on RO test setup to evaluate the performance of different RO membranes for Sydney Desalination Plant. The test was sponsored by Sydney Water.
Aug 1985 to Dec 1993	Employing organization: Bhabha Atomic Research Center / Nuclear Power Corporation of India Ltd. Position Held: Scientific Officer 'E'	Trombay, Mumbai	<ul style="list-style-type: none"> • Trial tests at pilot and commercial plants to improve the treatment processes (including tests with NF-RO, NF-MSF and NF-RO-MSF systems) • Pilot tests for the plant process validation and performance evaluation of different materials (chemicals, materials, membranes, etc.) employed in seawater thermal and membrane desalination processes • Comprehensive investigation on seawater quality, plant process, performance evaluation for 20 MIGD (91 MLD) Seawater desalination plant. • Installation, commissioning and operation experience for seawater treatment and desalination pilot plants, • Training of operators for seawater treatment/desalination processes. • Awarded with Al-Marai Research Awards in 2000 and 2001 for scientific innovations in desalination process improvement.

4. Membership in Professional Associations and Publications:

- Institute of Engineers, Australia
- International Desalination Association
- Indian Nuclear Society (Life Member)

Publications:

- Authored more than 30 technical papers published in International Journals/Conferences on Membrane desalination and water treatment.
- Received awards for Scientific Innovation, Post Graduate Research, Merit Scholarship and Best Paper Award

Other Training:

- Training in Desalination Process at University of New South Wales, Sydney
- Industrial safety training at University of New South Wales, Sydney

5. Language Skills:

Language	Read	Write	Speak
English	Excellent	Excellent	Excellent
Hindi	Excellent	Excellent	Excellent
Bengali	Excellent	Moderate	Moderate

6. Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:

Function as technical supervisor in design, tender assistance and construction and commissioning supervision in Desalination plant. Responsible for technical data review and develop the concept process design and coordinate with other engineers and specialists for design and bid documents for desalination plant. Assist the client in correspondence to clarifications from the bidders in technical aspects in desalination plant and assist in bid process management. Review detailed design by the contractor and coordination with other supervision engineers for Desal plant.

Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks

Listed only the sizable bigger RO and WTP plants experience:

- I. Name of Project: **Mekong Regional Water Security Project (MRWSP), Vietnam – RO Desalination**
Year: 2017 to 2018 Location: Vietnam Client: Ministry of Construction – Administration of Technical Infrastructure

Main project features: As part of Mekong Regional Water Security Project (MRWSP), Design a 100 MLD RO Desalination Plant for treatment of seawater to produce potable water for the arid coastal provinces of Vietnam. The process of the desalination plant includes pretreatment by chemical injection and dual media filtration followed by cartridge filtration and RO membrane filtration. Mustafa is the lead process engineer for the design of pretreatment and RO processes and the project costing. The project feasibility report for the MRWSP has been submitted to the Ministry of Construction – Administration of Technical Infrastructure.

Position held: Lead Process Engineer (Equivalent to the role of Desalination Expert)

Activities performed: Developed process mass balance, process design for pretreatment processes including dual media filter, design of RO process, process design reports, and reviewed the designs including PIDs for different processes, and process safety, and feasibility.

II. Name of Project: Rehabilitation of Two 225 MLD and 144 MLD Agra Water Treatment Plants, India

Year: 2015 to 2017 **Location:** Agra, India **Client:** Uttar Pradesh Jal Nigam

Main project features: Rehabilitation and upgrading of the two existing **225 MLD and 144 MLD Water Treatment Plants** under JICA funding. The treatment plants are based on conventional treatment processes and dilapidated condition of mechanical equipment, Tube Clarifier, Media filtration and civil structures. A comprehensive rehabilitation and upgrading scheme has been developed and implemented to rejuvenate the WTPs. The rehabilitation project is in progress now.

Position held: Principal Process Engineer (Equivalent to the role of Desalination Expert)

Activities performed: Leading the engineering team for the complete project planning, tendering, process design, rehabilitation strategy development, design review report preparation, project cost estimation, bid documents preparation, bid evaluation, contractor selection, review of detailed design and overall project execution.

III. Name of Project: 100 MLD Demineralized Water Package for CHII Power Project (IRPC), Thailand

Year: 2013 to 2015 **Location:** Thailand **Client:** IRPC Public Company Limited

Main project features: GE Water constructed a 100 MLD demineralization plant to provide complete water solution for the IRPC Power Plant. Major treatment processes include chemical pre-treatment, UF filtration and RO membrane desalination followed by EDI (Electro-deionization) processes. He was the lead process engineer for this project and so responsible for the process design of the plant.

Position held: Lead Process Engineer

Activities performed: Performed conceptual design and detailed design of UF/RO processes; prepared PFD, PIDs, design reports and reviewed the cost estimate, Involved in the Design input for Tender stage, responded the queries of the consultants regarding process design and progress strategy.

IV. Name of Project: Northern Reuse Plant, QGC, Australia - RO Desalination Project

Year: 2013 to 2015 **Location:** Australia **Client:** Queensland Gas Company

Main project features: Similar to the above Central Reuse plant, QGC commissioned GE Water to construct a second 100 MLD RO desalination and reuse plant to treat CSG associated saline water in Northern, Queensland. In this plant, the treatment processes involve pre-treatment by Lime Softening and UF processes followed by RO processes. Responsible as Lead Process Engineer on this project.

Position held: Lead Process Engineer

Activities performed: Performed concept design, lime treatment design, detailed UF/RO process design, mass balance, process reports preparation and review of the overall designs including PFD, Involved in the Design input for Tender stage, PIDs for different processes, and process safety and control reports.

V. Name of Project: Coca Cola Water Treatment Plants (Four plants at Hochi minh, Hanoi, Myanmar, and Singapore) – RO Desalination Plant

Year: 2012 to 2015 **Location:** Hochiminh, Hanoi, Myanmar and Singapore **Client:** Coca Cola Industries

Main project features: GE Water constructed four water treatment plants of varying capacity 2-6 MLD in Hochi minh, Hanoi, Myanmar and Singapore to treat well/ surface water for Coca Cola beverage. The treatment process for all the plants involves pre-treatment by Coagulation followed by UF-RO membrane filtration and then UV and polishing filters.

Position held: Lead Process Engineer

Activities performed: He was the Lead Process Engineer for the design and construction of the four water treatment plants of varying capacities 2-6 MLD in Hochi minh, Hanoi, Myanmar, and Singapore to treat well/surface water for Coca Cola beverages, Involved in the Design input for Tender stage.

VI. Name of Project: Derwent Park Stormwater Harvesting & Industrial Reuse Plants –Tasmania – RO Desalination Plant

Year: 2012 to 2013 **Location:** Tasmania, Australia **Client:** Glenorchy City Council

Main project features: Glenorchy City Council of Hobart commissioned the GE Water to construct two RO desalination plants of capacities 2.25 MLD & 4.5 MLD to treat blended brackish water from storm/ground water sources for industrial reuse. The design includes UF and RO processes with an approach to reduce capital cost and plant footprint area.

Position held: Lead Process Engineer

Activities performed: He was the Lead Process Engineer for the design and construction of the two plants with 2.25 MLD and 4.5 MLD for treating the blended brackish water from storm ground water sources for industrial reuse, Involved in the Design input for Tender Stage.

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Assistant Contracts Engineer
G.M.W.S.S. Board
Chennai-600 002.

VII. Name of Project: Central Reuse Plant, QGC, Australia - RO Desalination Project

Year: 2011 to 2013 **Location:** Australia **Client:** Queensland Gas Company

Main project features: GE Water in alliance with Laing O'Rourke completed design, supply and construction of a 100 MLD RO Desalination and water reuse plant for Queensland Gas Company (QGC) to treat Coal Seam Gas (CSG) associated saline water in Queensland. The treatment processes include pre-treatment by Disk Filter, Coagulation and Flocculation and UF membrane filtration followed by RO processes. He was responsible as Lead Process Engineer on this project.

Position held: Lead Process Engineer

Activities performed: Performed concept design, detailed UF/RO process design, mass balance, process reports preparation and review of the overall designs including PFD, PIDs for different processes, and process safety and control reports.

VIII. Name of Project: Kooragang Island Wastewater Reclamation Plant, NSW, Australia - Wastewater Reuse Plant - RO Desalination Plant

Year: 2011 to 2013 **Location:** Kooragang, Australia **Client:** Hunter Water, NSW

Main project features: GE Water completed construction of a 9 MLD RO desalination plant to treat secondary effluent for industrial reuse.

Position held: Lead Process Engineer

Activities performed: He was the Lead Process Engineer for the review of the RO process design and trouble shooting of a 9 MLD RO Desalination Plant.

IX. Name of Project: Feasibility Study for 180 MLD Water Treatment Plants, QGC – RO Desalination

Year: 2008 to 2009 **Location:** Queensland **Client:** QGC

Main project features: CH2M Hill was commissioned by QGC for feasibility study including the plant concept design and cost estimation using CH2M Hill's proprietary software for total 180 MLD (four 40 MLD and one 20 MLD) MF/RO treatment based WTPs with brine/salt management scheme. The scheme adopted for treatment of groundwater and brine management includes pretreatment by inline coagulation, membrane filtration and ion exchange, water thickening by reverse osmosis, concentration by mechanical vapour compression brine concentrator and drying by forced circulation crystallizer.

Position held: Process Engineer

Activities performed: He was responsible for raw water data analysis and developing the basis of design criteria for processes involved, process mass balance, PFD/PID, plant layout and salt management scheme.

X. Name of Project: Concept Design and Cost Estimate for 25 MLD, Australia – RO Desalination

Year: 2007 to 2009 **Location:** Melbourne, Australia **Client:** Loy Yang Power

Main project features: Conducted a feasibility study for desalination of the power station blowdown effluent to provide quality cooling water to Loy Yang A and B (Generation Cycle make-up). Mustafa was one of key process engineers involved in concept design and cost estimation for a 25 MLD RO desalination plant using the saline water effluent of Loy Yang power plant as feed.

Position held: Process Engineer

Activities performed: Involved in various areas of the Project including initial investigation, interpretation of collected data to form the basis of design criteria for desalination plant, process mass balance, PFD/PID preparation, plant layout, interconnection of existing assets and methodology for the disposal of associated concentrate streams. Also, estimated capital and operational costs for the water treatment plant, using CH2M Hill's CPES parametric estimating model.

XI. Name of Project: Salt Reduction Scheme at Lower Molonglo, Canberra, Australia – Zero Liquid Discharge Plant

Year: 2007 to 2008, **Location:** Canberra, Australia **Client:** ICON Water

Main project features: CH2M Hill was commissioned by ICON Water to carry out the brine management scheme design for zero liquid discharge (ZLD) of RO concentrate produced by a water purification plant. The processes opted were MF, RO, UV and Advanced Oxidation processes while the scheme designed for ZLD included chemical precipitation/ clarification and membrane filtration, and dewatering by RO process and brine concentrator, followed by salt drying in evaporation ponds.

Position held: Process Engineer

Activities performed: He was the Lead Process Engineer for the overall process design including ZLD process. As part of the ZLD process design and costing, developed two process design tools; these are Precipitation and Coagulation Model (PCOM) and Evaporation Pond Design (EPOD). ZLD included pretreatment by chemical precipitation/ clarification and membrane filtration, and dewatering by RO process and brine concentrator, followed by salt drying in evaporation ponds.

XII. Name of Project: 70 MLD Luggage Point Advanced Water Treatment Plant, Australia – UF/RO Desalination

Year: 2007 to 2008 **Location:** Luggage Point, Queensland, Australia **Client:** SEQ Water

Main project features: Western Corridor Recycled Water Scheme at Luggage Point is Australia's first indirect potable reuse scheme, using Ultrafiltration (UF) and Reverse Osmosis (RO), followed by advanced oxidation via ultraviolet irradiation and hydrogen peroxide. The plant is designed to produce total 70 MLD of purified water suitable for indirect potable reuse (IPR). The plant can purify secondary treated wastewater to exceed drinking water standards by passing it through seven barriers, including microfiltration, reverse osmosis and advanced oxidation by UV radiation.

Position held: Process Engineer

Activities performed: He was involved in the UF/RO process design including mass balance, PFD, PIDs and specifications preparation. He was also involved in the pilot testing of MF-RO system for the design criteria verification and chemical optimization.

XIII. Name of Project: 3 MIGD (13.6 MLD) Kalba Seawater RO Desalination Plant, SEWA, Sharjah

Year: 2007 to 2008 **Location:** Kalba, UAE **Client:** SEWA

Main project features: CH2M Hill conducted an EPC project for design, construction and commissioning of 3 MIGD (13.6 MLD) Kalba RO desalination facilities. The plant was designed with provision of interfacing with the existing MED-based desalination system but with independent operation. The scope of the works included process design for intake works, pre-treatment, UF/RO process, including tanks and equipment design and specification, control sequence development and design report preparation. A pilot study was also conducted on raw seawater to establish design criteria for pre-treatment using chemical injection and membrane filtration.

Position held: Process Engineer

Activities performed: He was the main process engineer for the complete process design of the Seawater RO desalination plant. His responsibility included the UF/RO process design including mass balance, PFD, PIDs and specifications preparation. The plant was designed and constructed by CH2M Hill. Mustafa was also involved in the pilot testing of MF-RO system for the design criteria verification and chemical optimization.

XIV. Name of Project: Study of Pretreatment Options for Composite Fouling of Reverse Osmosis Membrane

Year: 2002 to 2006 **Location:** Australia **Client:** UNESCO Centre of Membrane Science and Technology, UNSW, Australia

Main project features: Development / improvement of pretreatment processes to control RO membrane fouling

Position held: Research Scholar

Activities performed:

Design and improvement in pretreatment processes and RO membrane desalination (PhD degree was awarded to Mustafa on this work.), Pilot testing of RO membrane on saline feed water with complex foulant concentrations and study on nature of scaling/fouling and its inhibition, Comprehensive testing of Sydney Seawater on RO test setup to evaluate the performance of different RO membranes for final design of 500 MLD Desalination Plant at Sydney. The test was sponsored by Sydney Water.

XV. Name of Project: Thermal and Membrane Processes for Seawater Desalination

Year: 1993 to 2002 **Location:** Saudi Arabia **Client:** Saline Water Conversion Corporation, Saudi Arabia

Main project features: given below, **Position held:** Senior Process Engineer/ Chemical Engineer

Activities performed:

- Trial tests at pilot and commercial plants to improve the treatment processes (including tests with NF-RO, NF-MSF and NF-RO-MSF systems), Pilot tests for the plant process validation and performance evaluation of different materials (chemicals, materials, membranes, etc.) employed in seawater thermal and membrane desalination processes, Comprehensive investigation on seawater quality, plant process, performance evaluation for 20 MIGD (91 MLD) Seawater desalination plant, Installation, commissioning and operation experience for seawater treatment and desalination plants
- Commercial desalination plants process monitoring, power audit and trouble shootings, Water treatment process design, computation and computer simulation works, Training of operators for seawater treatment/desalination processes, Awarded with Al-Marai Research Awards in 2000 and 2001 for Scientific Innovations in thermal and membrane desalination process improvement.

7. Certification:

I, the undersigned, certify to the best of my knowledge and belief that:

- (i) this CV correctly describes my qualifications and my experience;
- (ii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in the Expert Schedule in Form TECH-7 provided team mobilization takes place within the validity of this proposal or any agreed extension thereof;
- (iii) I am committed to undertake the assignment within the validity of Proposal;
- (iv) I am not part of the team who wrote the terms of reference for this consulting services assignment;
- (v) I am, pursuant to Clauses 3 and 4 of the ITC, eligible for engagement.

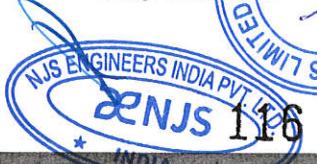
I understand that any misstatement described herein may lead to my disqualification or dismissal, if engaged.

Signature of Key Expert or authorized representative of the firm

Full name of Key Expert : Mr Ghulam Mustafa

Full name of authorized representative: Mr. Gaurav Kumar Srivastava

Date: 24/09/2019



Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

Form TECH-6 Curriculum Vitae (CV)

1. General

Position Title and No.	Water Supply Engineer-International Expert (No.4)
Name of Key Expert	Mr. Shane FARQUHARSON
Name of the Firm proposing the Key Expert	SMEC International Pty. Ltd.
Date of Birth	18/06/1966
Nationality	Australian
Country of Citizenship / Residence	Australia

2. Education:

- BE(Hons), Civil Engineering, University of Western Australia, 1984-1987
- Graduate Certificate in Engineering (Water & Wastewater), Deakin University, 2005

3. Employment record relevant to the assignment:

Shane is a Civil Engineer with over 32 years of experience in the water industry involving all project phases including planning, design and construction supervision. He has international experience, having worked in Australia, Philippines and India on water and sanitation sector projects as a water supply specialist. He has managed multi-disciplinary teams on a range of major water projects covering source selection, treatment, Transmission/Distribution, NRW, storage and conveyance assets.

Period	Employing organization and your title/ position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
11/2014 to till date	Employing Organization: Aqueous Consulting, Perth Position held: Director and Principal Engineer, Water Reference: Mr Anselm Boehl, BHP, Superintendent Non-Process Infrastructure, Governance and Technical Standards, Email – Anselm.boehl@bhp.com] Cont: +61 407178137	Australia	Worked on Water supply scheme planning (potable and non-potable/recycling), Design of Water conveyance (pipeline, water storage, Reservoir, pump station), treatment design of fresh water and Desalination Plant (Alkimos-320 MLD, Perth Seawater Expansion-160 MLD, Southern Sea Water-315 MLD, Newman-16.5 MLD), WTP (Neerabup-150 MLD). <ul style="list-style-type: none"> • Hydraulic design of and modelling of Transmission/Distribution network. Treatment plant process design (150 MLD WTP), technical writing for the bid, Assisting in Commissioning, O&M Manual, water production improvement and review vendor submissions.
10/2006 to 06/2016	Employing Organization: GHD, Perth Positions held: Principal Engineer, Water; Service Group Manager, Water Engineering Reference: Mr Noel Winsor, Water Corporation, Manager, Operations Contracts, Email – Noel.Winsor@watercorporation.com.au Cont: +61 894202315	Australia	Worked on Design/Design Review of various water related components, Reservoir (Ellenbrook-80 ML, Carabooda-60 ML, Margaret River-15 ML, Harvey Summit Tank- 32 ML) , Water supply scheme planning, design of Water conveyance (pipeline, water storage, pump station) (Southern Seawater -30 Km DN 1400 MS, SW Yarragadee-105 Km DN1200 MS pipe, Stirling upgrade-28 Km of DN1400 MS) , Sea water Desalination Plant Integration components (Southern Seawater-160 MLD, Port Hedland-30 MLD, Cape Preston-100 MLD), WTPs (Mundaring-160 MLD, South West Yarragadee-160 MLD). <ul style="list-style-type: none"> • Involved in the Pressure management, zoning/ district metering areas (DMAs) of network, NRW reduction program for project for Perth water improvement project. • Involved in detailed designs of 160MLD WTPs, Storage reservoirs, Pumping stations and Transmission systems
04/2003 to 10/2006	Employing Organization: Water Corporation WA, Perth Position held: Supervising Engineer, Water Planning	Perth, Australia	<ul style="list-style-type: none"> • Strategic level planning for water supply schemes, computer modelling (hydraulic and water quality) for water distribution network, operational advice, Design of Water conveyance (pipeline, water storage, pump station), design Water source/ treatment design, Transmission/ Distribution Design, periodic Supervision. Coordination with Client, various stakeholder and vendors
03/2005 to 10/2005	Employing Organization: Sinclair Knight Merz, Manila (now Jacobs) Position held: Water Supply Specialist (International)	Philippines	Water Supply Master Plan for Metro Manila (2005-2025). This World Bank funded project included all aspects of scheme development from major new water sources to bulk water distribution. <ul style="list-style-type: none"> • Involved in the developing the assets in GIS and development of mapping outputs for reporting and presentation purposes, Coordination with Client,

			various stakeholder and vendors, NRW reduction program, Capacity building of MWSS.
09/2001 to 03/2003	Employing Organization: Sinclair Knight Merz, Perth (now Jacobs) Position held: Senior Water Engineer	Australia	Design of trunk (transmission) systems (Serpentine-11 Km DN1400 MS pipe), WTP (Samson-120 MLD,), water source (Perth Yarragadee-60 MLD, Perth Yarragadee 2-60 MLD) • Involved in water main improvements for integration, computer modelling (hydraulic and water quality), engineering design, tender documentation (including bid evaluation support), Design water treatment plant, Review of control/monitoring system associated SCADA and control systems, commissioning support, Coordination with Client, various stakeholder and vendors.
07/2000 to 09/2001	Employing Organization: Sinclair Knight Merz, International (now Jacobs) Position held: Senior Water Engineer	India	Preparation of water supply component of Master Plan for Bangalore city, including various sub-reports building towards consolidated master plan. • Involved in development of a computer network model for city water transmission system, water service connections, Recommendations were made on potential operational, maintenance and system improvements, Rehabilitation Study, strategic planning for system rehabilitation, NRW (Bangalore Water Supply), Preparation of a strategic study report to address the expansion of the existing Bangalore City water supply system to service peripheral areas and satellite towns, Training of local personnel in basic hydraulics and computer modelling was also a major focus, Implementation of a project GIS and training of local personnel, Coordination with Client, various stakeholder and vendors
03/1998 to 04/2000	Employing Organization: Sagric International Position held: Water Supply & Drainage Engineer	Philippines	AusAID Preparation of master plans for water supply and drainage systems in the cities of Iligan and Cagayan de Oro. • Involved in development project, computer modelling of the drainage systems, Transmission and distribution system for water supply & water demand management.
1996 to 1998	Employing Organization: Water Corporation of WA Position held: Senior Engineer	Australia	Planning of water servicing strategy for new development area including water source and transmission & distribution assets (Amarillo-85 MLD); planning of raw water transmission system upgrades (Lexia Groundwater scheme-100 MLD);
1994 to 1996	Employing Organization: Sinclair Knight Merz (SKM) Position held: Project Manager	Australia	Engineering design for a saline effluent disposal pipeline for Collie Power Station (67 Km of DN400 GRP). Detailed design, tender and operating support documentation for oily wastewater collection and transmission system (Argyle Diamond Mine);
1987 to 1993	Employing Organization: Water Authority of WA Position held: Project Manager, Perth South Region.	Australia	Strategic planning for integrated source/supply options to add 240 MLD of new water production capacity to the Perth metropolitan supply system: Involved in water source concept development, water transmission/distribution planning and modelling (peak day demand of 500 MLD). Design and check activities for including intake tower works, treatment and pump station buildings, and various minor structures.

4. Membership in Professional Associations and Publications:

- Chartered Professional Engineer, Engineers Australia (No. 418765)
- Member, Australian Water Association

5. Language Skills (indicate only languages in which you can work):

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent

6. Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:

Shall function as technical supervisor in design and tender assistance for desalination plant (CP1) and Distribution system and lead the team for the improvement of the water distribution network. He involve in evaluate the bids for desalination plant and Distribution system in technical aspects and assist the Organizational Expert in capacity development, organizational improvement and skill transfer to CMWSSB for establishment and maintenance of GIS database and hydraulic model.

Reference to Prior Work/Assignments that Best illustrates Capability to Handle the Assigned Tasks

I. Name of Project: Southern Seawater Desalination Plant Integration Works.

Year: 2009 to 2011 Location: Australia Client: Water Corporation

Main Project Features: Integration works for Stage-1 of a new Seawater desalination plant of capacity 160 MLD including 30km of DN1400 mild steel cement mortar lined (MSCL) transmission pipeline, a 32ML ground level storage tank and a DN1200 regulating valve complex to integrate into the existing water supply network.

Positions Held: Project Director and Technical Advisor

Activities Performed: Involved in the integration works of seawater desalination plant. Integrated Water Supply System (IWSS) including design of pipeline between plant and header storage tank, ground level storage tank, regulating valve complex. Also worked with the Corporation's integration team to review SCADA control of the integrated system, including the completion of specialist hydraulic modelling to resolve detailed control issues, Handling design team, Coordination with client.

II. Name of Project: Ellenbrook 80 ML Tank and Pipelines

Year: 2013 to 2015 Location: Australia Client: Water Corporation

Main Project Features: Water storage project, which included 4.3 km of DN900 Mild steel cement mortar lined (MSCL) inlet main and 2.3 km of DN1200 MSCL outlet main. 80 ML tank/Reservoir is the largest water storage tank completed in Western Australia, and was constructed as a post-tensioned, pre-stressed concrete panel tank.

Positions Held: Project Director and Technical Review

Activities Performed: Detail Design of the pipeline, storage tank, re-chlorination plant and SCADA integration

III. Name of Project: Carabooda 60 ML Tank and Pipelines

Year: 2011 to 2012 Location: Australia Client: Water Corporation

Main Project Features: Water storage project, which included 3 km of DN1200 mild steel cement mortar lined (MSCL) combined inlet-outlet main. 60 ML tank/Reservoir was the largest steel tank constructed by Water Corporation at the time.

Positions Held: Project Director and Technical Review

Activities Performed: Owners engineer support during D&C phase including the hydraulic designs of tank sizing, detailed design of pipe work, re-chlorination plant.

IV. Name of Project: South West Yarragadee Groundwater Scheme

Year: 2007 to 2008 Location: Western Australia Client: Water Corporation

Main Project Features: 160 MLD WTP and groundwater production borefield, plus 105 km of DN1200 MSCL transmission pipeline connecting the water treatment plant into the existing IWSS network, including 25 ML water storage; conventional WTP for iron and manganese removal, with chlorine disinfection and fluoridation

Positions Held: Job Manager (for multi-disciplinary team) and Lead Engineer

Activities Performed: leading the team and involved in Preliminary Designs, Detailed Design for WTP, hydraulic designs of Storage reservoirs, pumping stations and water transfer main for Integrated Water Supply.

V. Name of Project: Bangalore Water Supply & Environmental Sanitation Masterplan Project (India) (AusAID)

Year: 2000 to 2001 Location: Bangalore, India Client: Bangalore Water Supply and Sewerage Board

Main Project Features: Development of a Master Plan for water supply and environmental sanitation for the city of Bangalore, including capability building and institutional strengthening within the BWSSB. The master planning horizon covered growth in the city's population from approximately 7 to 12 million.

Positions Held: Water Supply Engineer

Activities Performed: Preparation of an overview report on the existing Bangalore City water supply system, including development of a computer network model for the city trunk system (supplying 700 MLD and in excess of 300,000 water service connections and public fountains). Recommendations were made on potential operational, maintenance and system. Preparation of a strategic study addressing the needs and potential options for rehabilitation of the existing Bangalore City water supply system (2001-2025). The report also addressed strategic planning for system rehabilitation, NRW program, estimation of future financial requirements for rehabilitation and a thorough treatment of suitable technologies available for pipeline rehabilitation. Preparation of a strategic study report to address the expansion of the existing Bangalore City water supply system to service peripheral areas and satellite towns (2001-2025). The report included development of a water servicing strategy; a staging plan for future works; financial and environmental assessments. Training of local personnel in basic hydraulics and computer modelling was also a major focus. Implementation of a project GIS and training of local personnel.

VI. Name of Project: Water Supply Master Plan for Metro Manila (2005-2025) (World Bank funded)

Year: Mar 2005 to Oct 2005 Location: Manila, Philippines Client: Manila Water Supply & Sewerage Board

Main Project Features: This World Bank project involved a full master plan for sanitation and a partial update to an existing water supply master plan for Metro Manila, comprising a service area accommodating some 12 million people growing to a forecast population of 20 million over the planning horizon.

Positions Held: Water Supply Specialist

Activities Performed: Technical Assistance for the Strengthening of MWSS' Planning Capability in Water Supply and NRW program. Led various aspects of the water supply master plan update, including assessment of major new water sources options, bulk water distribution planning, involved in the implementation of a project GIS and development of mapping outputs for

reporting and presentation purposes.

VII. Name of Project: Samson Brook WTP (120 MLD)

Year: 2002 to 2003 Location: Australia Client: Water Corporation

Main Project Features: Direct filtration plant and integration pipelines for the treatment of a new surface water source Samson Brook Pipehead Dam, including coagulation/flocculation vessels, rapid gravity filter units, chemical dosing facilities, control systems, SCADA

Positions Held: Job Manager (for multi-disciplinary team) and Lead Design Engineer

Activities Performed: *leading the team in Engineering design, Design & Construction tender documentation (including bid evaluation support) for a 120 MLD direct filtration plant for the Samson Brook Pipehead Dam.*

VIII. Name of Project: Neerabup Ground Water Treatment Plant Upgrade (100 to 150 MLD.)

Year: 2016 to 2018 Location: Australia Client: Water Corporation

Main Project Features: Upgrade of an existing groundwater treatment plant from 100 MLD to 150 MLD including expansion of existing borefield infrastructure to incorporate four new confined groundwater production bores (up to 1.3 km deep). The WTP upgrade included new aerator and filter block, pump station upgrades, installation of 15 MLD cooling tower facility (to cool 50C bore water), chemical dosing system upgrades. Borefield upgrade included **5 Km of DN700 MSCL raw water pipeline**.

Positions Held: Water Supply Planning Specialist

Activities Performed: Design lead in Planning & Engineering. Technical support during the design development phases for the upgrades to the existing Neerabup GWTP from 100 MLD to 150 MLD, pumping station and integration of Transmission system.

IX. Name of Project: Perth Seawater Desalination Plant Expansion (or PSDP2) Investigations

Year: 2017 to 2019 Location: Australia Client: Water Corporation

Main Project Features: Planning, concept design and field investigations for the Perth Seawater Desalination Plant expansion project (**50 GL or 160 MLD**) to provide future source augmentation to the Integrated Water Supply System (IWSS), including **9 Km of DN1200 MSCL transmission pipeline duplication** and upgrade of distribution network pump station (to **400 MLD**) to link the expansion plant into the existing network. The plant site is located immediately south of the existing PSDP1. Brine discharge into semi-enclosed embayment was a significant issue for resolution on this project.

Positions Held: Planning Director

Activities Performed: Supervision and technical direction of investigation activities covering source and integration planning, metocean investigations, modelling of marine discharges (SDP projects), onshore geotechnical investigations, environmental and heritage field surveys, approvals strategy development, **concept design** of proposed water source and integration assets, land tenure investigations and external stakeholder consultation.

X. Name of Project: Mundaring Water Treatment Plant

Year: 2012 to 2013 Location: Australia Client: Helena Water

Main Project Features: Major WTP delivered under PPP contract, treating water from the Mundaring Weir supplied to the vast Goldfield & Agricultural Water Supply system. Process was based on DAFF/BAC, followed by chlorination. **This plant received the 2014 Engineers Australia Excellence award for Infrastructure (WA).**

Positions Held: Technical Advisor

Activities Performed: Technical input for the development of a successful PPP tender, bid evaluation assistance and subsequently design review, periodic construction supervision & commissioning activities, advising on operation and maintenance of 160 MLD surface water treatment plant for the Mundaring Weir source.

XI. Name of Project: Southern Seawater Desalination Plant

Year: 2008 Location: Australia Client: Aquamarine Alliance (Acciona / Clough / United utilities JV)

Main Project Features: New **50 GL seawater desalination plant** with provision for expansion to **100 GL ultimate capacity** located in Binningup, Western Australia. Included seawater intake, brine outfall, seawater pump station, membrane pre-treatment systems, RO systems, post-treatment with hydrated lime and CO₂, drinking water storage, drinking water pump station, chemical dosing systems, and plant ancillaries.

Positions Held: Engineering Manager for Balance of Plant (multi-disciplinary team)

Activities Performed: Preliminary and engineering design, plus tender bid documentation, for a **160 MLD seawater reverse osmosis desalination plant** (with provision to expand to double the capacity) to provide potable water to the Integrated Water Supply Scheme (Perth, Australia). The design and bid submission was prepared under a competitive alliance process.

XII. Name of Project: Philippine Regional Municipal Development Project (PRMDP) – Water Supply Master Plan for Iligan City (AusAID)

Year: 1998 to 1999 Location: Philippines Client: Local Government, City of Iligan (and Department of the Interior and Local Government)

Main Project Features: Development of inaugural water supply master plan for the City of Iligan, Philippines, working with and training a local task group of engineers and other GIS, economist, financial analyst specialists to deliver the study deliverables for a city of population 460,000.

Positions Held: Water Supply Engineer

Activities Performed: Computer modelling of the Iligan City water supply system including software selection and training of local

Assistant Contracts Engineer

staff. The network model covered a supply area serving 17,000 service connections. Included advice for the installation of bulk water metering equipment on major water sources; Preparation of Water Supply Master Plan for Iligan City for the long-term development of water supply infrastructure to meet projected demand growth in the city (2000-2015). Several water source options were examined including springs, rivers and groundwater, to meet 180 MLD of future demand. **Transmission and distribution of source water was assessed through computer modelling.** A report on water demand management was also completed, **Implementation of a project GIS and training of local personnel.**

XIII. Name of Project: Perth Pressure Management Project

Year: 2013 Location: Australia Client: Water Corporation

Main Project Features: Initial planning and hydraulic modelling for the establishment of District Metering Areas (DMAs) and Pressure Management Zones (PMZs) in the Perth metropolitan area, in areas supplied directly from transmission mains where high pressures had resulted in elevated consumption and leakage rates

Positions Held: Principal Water Engineer

Activities Performed: Guidance and early technical direction for planning and design of a pressure management program in Perth, Australia, involving the establishment of District Metering Areas (DMAs) and Pressure Management Zones (PMZs) to manage elevated leakage and consumption rates, including the development of concepts for pressure reducing valve installations in road reserves within residential areas.

XIV. Name of Project: Perth Yarragadee Contingency Planning

Year: 2001 to 2002 Location: Australia Client: Water Corporation

Main Project Features: Fast-tracked development of a 60 MLD groundwater scheme development to alleviate supply shortages to the Perth metropolitan area due to drought conditions. The project involved construction of three 20 MLD production bores, DN500 to DN1200 MSCL pipelines to convey raw water to a WTP and treated water to a reservoir, upgrades to WTP chemical dosing systems, planning for cooling tower installation, and associated SCADA and control.

Positions Held: Job Manager and Lead Engineer

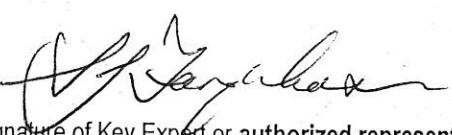
Activities Performed: Design, tender documentation and commissioning support for the project works.

7. Certification:

I, the undersigned, certify to the best of my knowledge and belief that:

- (i) this CV correctly describes my qualifications and my experience;
- (ii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in the Expert Schedule in Form TECH-7 provided team mobilization takes place within the validity of this proposal or any agreed extension thereof;
- (iii) I am committed to undertake the assignment within the validity of Proposal;
- (iv) I am not part of the team who wrote the terms of reference for this consulting services assignment;
- (v) I am, pursuant to Clauses 3 and 4 of the ITC, eligible for engagement.

I understand that any misstatement described herein may lead to my disqualification or dismissal, if engaged.


Signature of Key Expert or authorized representative of the firm

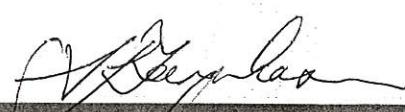
Date: 08/03/2019

Full name of authorized representative: Mr. Gaurav Kumar Srivastava



Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002

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Form TECH-6 Curriculum Vitae (CV)

1. General

Position Title and No.	Mechanical Engineer (Desalination)- International Expert (No.5)
Name of Key Expert	Michel Morillon
Name of the Firm proposing the Key Expert	SMEC International Pty. Ltd.
Date of Birth	19/04/1957
Nationality	French
Country of Citizenship/ Residence	France

2. Education:

- BE in Mechanical Engineering (Ecole Nationale Supérieure des Arts et Métiers: ENSAM, Engineering schools in France), Paris-Tech, 1981

3. Employment record relevant to the assignment:

Mr. Morillon is a Mechanical Engineer with over 37 years of experience in Desalination, Water and infrastructures, Industrial facilities. He has more than 6 years in Developing and more than 28 years in Developed countries experience. He has over 15 years versatile experience in SWRO Desalination – project development, design, construction Supervision, Procurement, Training, Commissioning of Desalination projects.

Period	Employing organization and your title/ position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
Feb 2018 to till date	Employing organization: DESALTIS (CEO and President) Main Roles, Clients/Partners: Position Held: International Party Expert Norton-Rose & Fulbright law office References: Paul J. Neufeld T: +1 713 226 1660 M: +1 713 855 2121 (USA) (paul.neufeld@lockelord.com)	Israel and UK (2016-2018)	South Tel Aviv (Israel) SWRO – 384 MLD and 624 MLD <ul style="list-style-type: none"> • International Arbitration in London between one top energy recovery device supplier and EPC company (one of the largest desalination plants in Israel): in depth review of design, installation and operation (performances) of ERD (6-8 Million USD at stake)
	Position Held: Chief Technical Officer 3EConseil & Eranove (guillaume.gilles@3econseil.com) (r.olaye@eranove.com) Contact: +33 611663459	France Gabon (Jul 2017-2018)	<ul style="list-style-type: none"> • BOOT development of 140 MLD surface water treatment plant + 53 km 1400/1600 mm pipeline. <ul style="list-style-type: none"> ➢ Feasibility study ➢ Design specifications for EPC contract ➢ EPC/O&M budget ➢ All technical parts in contractual documentation
	Position Held: International Mechanical expert for Desalination Plant	Senegal (Apr 2018-Jul 2018)	<ul style="list-style-type: none"> • BOOT project: 3 MLD emergency project
	Position Held: International Mechanical expert for Desalination Plant EGIS/VINCI marion.boucault@egis.fr	Mayotte (Indian Ocean) (Oct 2018 – Jan 2019)	<ul style="list-style-type: none"> • BOOT project: 3 MLD emergency project
2012 to 2017	Employing organization: Freelance: Consultancy Services for Water Projects Position Held: International Party Expert Company and contacts to be disclosed on specific request (still covered by NDA) References: Adam Kanarek Project Manager adamk@jvm-jv.com	Israel (located 10 months in 2017)	<ul style="list-style-type: none"> • International Arbitration in Israel between the SPV (Israeli body) and the Spanish EPC company (one of the largest desalination plants in Israel): in depth review of design, installation and operation (performances) of Intake (plugging system), pre-treatment (DF & UF), RO (extreme fouling, and CIP), extreme corrosion in most of seawater pumps (60-80 Million USD at stake)

	M: +972 50-550-9965 (Israël) (Irvicente@ivm-jv.com)		
	Position Held: Chief Technical Officer 3EConseil & Eranove (guillaume.gilles@3econseil.com) (r.olaye@eranove.com)	Ghana (2017)	Following collapse of one major Spanish desalination player, purchase of assets in Ghana (60 MLD SWRO plants) : • Responsible for all technical due diligence; risk assessment; all CAPEX & OPEX review
	Position Held: International expert for Desalination Plant Client to be disclosed on specific request	Oman (2013-2014)	Development of the Qurayyat Project (SWRO 200 MLD) : • Design review of EPC proposals including the CAPEX & OPEX review and advisory.
	Position Held: International Mechanical expert for Desalination Plant 3EConseil & Eranove	Morocco 2013	Project development of SWRO 100 MLD in Agadir : • Develop and optimization of process design, review of detailed designs, supervise the equipment erection, testing and commissioning; review of CAPEX & OPEX.
	Position Held: International Mechanical expert for Desalination Plant UG Consulting Gaza nmezaini.ug@gmail.com	2013-2018	Design of 3 plants in Gaza (6 to 14 MLD R) : • Preliminary design; technical specs for DB tender; technical review of Tender documents; bid/offer analysis.
	Position Held: Director of Training Middle East Desalination Research Center (Sultanate of Oman)	2012-2015 (Muscat)	• Implementation of a desalination training center in Oman from scratch: program definition with local players, partnership with famous training institute (DHP) and experts (N. Voutchkov), laboratory equipment, pilot plant design and installation operation and trouble shooting; spare equipment for hands on maintenance training.
2007 to 2011	Employing organization: Sharqiyah Desalination Co (SDC) Position Held: Chief Executive Officer (2009 till end of 2011) Position Held: Chief Technical Officer (2007 till 2009)	Oman	SDC is the project company (SPV) for the Sur Project (first SWRO BOOT in Oman) : 80 MLD Involved during all the project stages from design of the plant till the first 2 years of the operation period.
1983 to 2006	Employing organization: Management and Technical Positions in various locations VEOLIA (previously VIVENDI and Cie Generale Deseaux)	France	Several Water/ sewage projects and contracts

4. Membership in Professional Associations and Publications: IDA

5. Language Skills (indicate only languages in which you can work):

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
French	Excellent	Excellent	Excellent

6. Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:

Will be responsible for conducting mechanical designs of the DSP including preparation of technical specifications. Involve in the bid evaluation in mechanical aspects and review detailed design by the contractor. Supervise erection and commissioning of the plant.

Reference to Prior Work/Assignments that Best illustrates Capability to Handle the Assigned Tasks

Name of Project: *International Arbitration procedure between a Construction Company (EPC) and the Governmental Israeli project company 60-80 Million USD at stake in the framework of one of the largest desalination projects in the world)*

Year: 2017. **Location:** Israel, **Client:** Israeli-Spanish Consortium.

Main project features: 384 MLD SWRO plant (South Tel Aviv) developed under BOOT scheme.

Position Held: International Arbitrator.

Activities Performed: Technical assessment of Claim and Counter Claim. Elaboration of supporting reports within famous Israeli

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Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

- lawyer office. In depth review of design and contractual performances versus operating performances; main issues at stake: intake (pigging), pumping station (discharge flow), DF and UF (capacity), RO (fouling, telescoping, and capacity), control system and automation, corrosion of main seawater pumps. Assessment of maintenance and operating procedures.
- II. Name of Project:** International Arbitration procedure between an ERD equipment supplier and an Israeli Construction company 6-8 Million USD at stake in the framework of one of the largest desalination project in the world)
Year: 2016-2017, **Location:** Client: NRF (Norton-Rose-Fulbright as US Law Office for the Claimant).
Main project features: 624 MLD SWRO plant (South Tel Aviv) developed under BOOT scheme.
Position Held: International Party Expert
Activities Performed: Technical assessment of Claim and Counter Claim; Building supporting reports for the lawyers. In depth review of design and contractual performances versus operating performances; ERD as equipment at stake (misleading design guidelines, unproper installation, extreme corrosion and leaks, capacity). Assessment of maintenance and operating procedures.
- III. Name of Project:** *Project Development in Ghana (brownfield)*
Year: 2016-2017 **Location:** Ghana (Accra) **Client:** Eranove
Main project features: Purchase of a BOOT Project (SWRO 60 MLD) following collapse of one major Spanish desalination player.
Position Held: Mechanical Expert (part of the Investor development team).
Activities Performed: Technical and contractual due diligence, risk assessment, budget review. Issues at stake: intake configuration (one intake, no pigging system), UF capacity versus Raw water requirements. Supervise the mechanical works of the assignment.
- IV. Name of Project:** *Project Development / Qurayyat*
Year: 2013-2014, **Location:** Sultanate of Oman, **Client:** Omani Consortium (Muscat-Overseas- Al Barij).
Main project features: the SWRO 200 MLD plant is developed under a BOOT scheme
Position Held: Desalination expert.
Activities Performed: Involved Technical part of the project development (in **design specification, design review** and adjustments with EPC Co; Opex and Capex budgets for financial model).
 - Search for Omani partners/investors interested in water PPP partnership
 - Selection of Industrial Partner to build a "dream team"
 - Teaming process and MOU signature.
 - Support the qualifying process of the Consortium
 - Technical and economic (budget) advisory for the offer
- V. Name of Project:** *Project development / Agadir*
Year: 2013, **Location:** Morocco, **Client:** 3E Conseil.
Main project features: The SWRO Plant has an initial capacity of 100 MLD (expansion to 200 MLD to be anticipated by design); it is developed under BOOT scheme.
Position Held: Desalination Mechanical Expert.
Activities Performed: Involved in concept development and process optimization, Review of technical **designs** provided by EPC contractor. Supervision of erection of the plant, equipment Testing and commissioning, Specification development and review of contract for all Mechanical works.
- VI. Name of Project:** *Project Management / MEDRC desalination training Center*
Year: 2012-2015, **Location:** Sultanate of OMAN: Muscat, **Client:** Middle East Desalination Research Center.
Main project features: Implementation of a training dedicated to desalination (from plant operators up to engineers).
Position Held: Director of Training.
Activities Performed: Revision of business plan including new market survey, Implementation of small training scale plants (RO, UF, media filters) (**design, specifications, procurement, commissioning**). Training and certification program definition. Partnership with international training centers (DHP, DHME). training delivery for engineers (licensed trainer for DHP)
- VII. Name of Project:** *Project Management / Ntoum 7 WTP Project (Gabon).*
Year: 2017-2018, **Location:** Gabon, **Client:** 3E Conseil /Eranove.
Main project features: The Project is developed under a BOOT scheme; the WTP has a capacity of 140 MLD from Komo river; 53 km of abstraction piping diam. 1400/1600mm and associated pumping stations are part of the project.
Position Held: Chief Technical Officer.
Activities Performed: Feasibility study, selection of technical options, Capex and Opex budget, **design specifications** and requested performances for tendering packages (EPC contract),
- VIII. Name of Project:** *Three SWRO plants in Gaza Strip (6, 10 and 14 MLD)- Project Management / Support*
Year: 2013-2018, **Location:** South of Gaza City, **Client:** UGEC Gaza.
Main project features: The funding of the main SWRO plant (150 MLD), the Water Authority is developing small volume unit in the meantime (Unicef as funder).
Position Held: Desalination Expert.
Activities Performed: Preliminary design, Final design and technical specifications for DB tender, Tender document review, Bid

- review and assessment. Specific training related to tendering PPP project. Technical support to Palestinian Water Authority and Technical training for Palestinian RO operators.
- IX. Name of Project: *Designing, erection, commissioning and 20 year operation on a BOO project scheme for 18 MIGD (80 MLD)*** Year: 2007 to 2011, Location: Oman, Client: JV Bawhan/Veolia.
Main project features: Largest seawater beach well catchment in the world up to a capacity of 190 MLD. Reverse Osmosis Plant (650 Million USD)
Position Held: CEO/CTO.
Activities Performed:
 - Design review of the Plant, according to the Project specifications. Tender Assistance
 - In charge of controlling the EPC contractor; operation cost optimization.
 - Following up the construction (progress and costs). Organizing the Plant start up and taking over.
 - Supervising operation of 3 portable plants (3 MIGD)
 - All Contractual relations with Lenders and Off-taker consultants, Authorities representatives, EPC and O&M companies,
 - During the finalization of construction/erection, **commissioning** and start-up of commercial operation.
 - Liquidated Damages negotiation with Off-taker and third parties.
 - Permanent optimization of OPEX (several pilot plants implemented to decrease chemical consumption, permanent training of staff to improve their cost sensitivity).
 - Reporting to the Board of Directors regarding financial performances.
 - Initial financing model improved by 4.2 M OMR. (11 Million USD)
- X. Name of Project: *Water/sewage for Tetuan Governorate***
Year: 2004-2006, Location: Spain, Client: Tetuan Governorate. Project Description: 1400 Km network.
Position Held: Operation Director.
Activities Performed: Organizing operations for staff of 480 people, Reducing unaccounted water by 31 % in 3 years, Reducing operating cost by 2.7 M€/y in 3 years, SCADA and telemetry implementation, Finalizing master plant (water and sewage) and Implementation of sewage organization (70 M€ new Sewage capex to be operated).
- XI. Name of Project: *Water and sewage operations for Rabat district***
Year: 2002-2004, Location: Morocco, Client: Govt. of Rabat.
Main project features: 4800 km Network.
Position Held: Technical Manager.
Activities Performed: Implementation of a new Training Center (Veolia Campus); for water, sewage and electricity operation. Training organized for 5000 staff in Morocco. Implementation of Non-Revenue Water program (Reducing unaccounted water by 41 % in 3 years). Technical support for procurement, **design** and operation departments. Implementation of CPV pipe as sewage network material (engineering, internal and contractor training). Technical Review of all water and sewage plant projects. Tender board member (in particular in charge of technical evaluation of bids)
- XII. Name of Project: *Project Management / Support for implementation of desalination training Center in Muscat***
Year: 2012, Location: Muscat, Client: Middle East Desalination Research Center.
Main project features: Desalination plant in Muscat.
Position Held: International Desalination Expert
Activities Performed: Revision of business plan including new market survey, Implementation of small training scale plants (RO, MBR) (design, specifications, procurement, commissioning). Training and certification program definition.
- XIII. Name of Project: *Project Management / Support for the SWRO project in Agadir (Morocco)***
Year: 2013, Location: Morocco, Client: Government of Morocco
Main project features: The Plant has an initial capacity of 100 000 m3/d (expansion to 200 000 m3/d to be anticipated by design).
Position Held: International Desalination Expert
Activities Performed: Review/optimization of Process and **design** provided by EPC contractor. Main technical milestones to be controlled during conception/erection of the plant. Testing plan, Review of business model, **Tender assistance and supervision**.
- XIV. Name of Project: *Project Management / Support for the Accra WTP Project (Ghana)***
Year: 2013, Location: Ghana, Client: 3E Conseil as Project Company /O&M Company.
Main project features: The Plant has a capacity of 170 000 m3/d; Nano-filtration membranes are used for bottled water unit.
Position Held: Management and Technical
Activities Performed: Review/optimization of treatment process, Overall optimization of the project (BOO 20y), Review of business plan/model. Supervise the Mechanical works proposed under the assignment.

- 7. Certification:

I, the undersigned, certify to the best of my knowledge and belief that:

- (i) this CV correctly describes my qualifications and my experience;
- (ii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in the Expert Schedule in Form TECH-7 provided team mobilization takes place within the validity of this proposal or any agreed extension thereof;
- (iii) I am committed to undertake the assignment within the validity of Proposal;
- (iv) I am not part of the team who wrote the terms of reference for this consulting services assignment;
- (v) I am, pursuant to Clauses 3 and 4 of the ITC, eligible for engagement.

I understand that any misstatement described herein may lead to my disqualification or dismissal, if engaged.

Signature of Key Expert or authorized representative of the firm

Full name of authorized representative: Mr. Gaurav Kumar Srivastava

Michel MORILLON

Morille



Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.

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Form TECH-6 Curriculum Vitae (CV)

1. General

Position Title and No.	Electric Engineer (Desal) – International Expert (No.6)
Name of Key Expert	Sergio de Bastos Vilar Magalhaes Paulo
Name of the Firm proposing the Key Expert	SMEC International Pty. Ltd.
Date of Birth	17/04/1973
Nationality	Portuguese
Country of Citizenship/ Residence	Portugal

2. Education:

- Graduate in Electromechanical Engineering - Beira Interior University (U.B.I - Covilhá, Portugal - April 2004).
- Portuguese Engineering Order membership - Electrical department (since October 2007)

3. Employment record relevant to the assignment:

Mr. Paulo holds a degree in Electromechanical Engineering with over **14 years** of experience in **Desalination**, Water, Wastewater Treatment Plants (W&WWTP), Water and Power infrastructures, Industrial facilities Engineering projects. He has good experience (4 nos) in SWRO Plants related to electrical and Control systems design, developing the equipment specification, construction management and commissioning. Worked in interdisciplinary team and also worked in Developed and developing countries.

Period	Employing organization and your title / position. Contact information for references*	Country	Summary of activities performed relevant to the Assignment
Aug 2018 to till date	Employing organization: Prospectiva Sa - Portugal Position Held: Electrical, Control & Instrumentation Principal Engineer - Surveyor	Portugal	<ul style="list-style-type: none"> Alamos Water Pump Station – Alentejo – Portugal – 60/6kV 4 x 7 MW Water Pump Station Plant. Beirolas Wastewater Treatment Plant – Lisbon – Portugal Faro-Olhao Wastewater Pump Station System, Involved in Electrical, Control & Instrumentation design review and approval. Electrical HV, MV and LV Electrical, control, instrumentation (EC&I), telecommunications, small power & lighting, earthing and lightning, HVAC, CCTV, PA address, fire detection, fire deluge, fire extinguishing and security systems detail design & design packages engineering review & approval. Conducting EC&I Inspections at several Construction sites.
March 2018 to July 2018	Employing organization: Aquino Sa - Portugal Position Held: Special Installations Director Mr Emanuel Correia Reference: Ph. +351 218 162 555 (geral) Mobile: +351 965 052 623 emanuel.correia@accionaria.com	Portugal	<ul style="list-style-type: none"> Sal Island & S. Vicente Island SWRO (20 MLD) – Cape Vert Archipelago, Perform Electrical, Control & Instrumentation (MEC&I) detail engineering design review and approval. MEC&I Procurement and contracting management. Leading Construction and Commissioning teams.
May 2017 to Dec 2017	Employing organization: Independent Consultant Position Held: Freelancer	Portugal	Perform Desalination, Water and Wastewater Treatment Plants electrical HV and LV, instrumentation, control, automation detail design and develop procurement packages for awarded water treatment project contractors in Portugal and abroad.
April 2015 to September 2016	Employing organization: Acciona Agua S.A.U. - Qatar Position Held: Electrical, Control & Instrumentation (EC&I) detail engineering design review & approval. Procurement & contracting	Qatar	RAS ABU FONTAS RAFA3 SWRO of 164 MLD-Doha, QATAR Perform Electrical, Control & Instrumentation (EC&I) detail engineering design review & approval. Procurement & contracting

	<p>Control & Instrumentation Lead Engineer SENER - Resident Project Manager ICE/ISSE LRT Lusail Power & Systems Senior Electrical Engineer. PMP® Doha (State of Qatar) M: +974 50 68 43 44 SENER Int. Ext:73394 Email: aitorlander.iza@sener.es</p>		<p>management. Construction management and commissioning.</p>
March 2014 to March 2015	<p>Employing organization: Acciona Agua S.A.U. - Spain Position Held: Electrical, Control & Instrumentation Project Lead Design Engineer</p>	Spain	<p>i. Punta Cardón Oil Refinery- SWRO Plant (70 MLD) - Paraguana Complex at Punto Fijo, Venezuela. ii. La Chira Wastewater Treatment Plant (544 m3/day) - Peru iii. S. Vicente and Sal Islands Reverse Osmosis Desalination Plants - Cape Vert (20 MLD Ph -1) - Perform and develop Desalination, Water and Wastewater Treatment Plants electrical, instrumentation, control and automation detail designs, estimate and preparing the specifications and involved in procurement and contracting management.</p>
July 2011 to February 2014	<p>Employing organization: Acciona Agua Australia Pty Ltd Position Held: Lead electrical Engineer Mr Cliff Stone ACCIONA Australia S.A. - Business Development / Development Director (Acciona Agua)</p>	Australia	<p>Projects: Expansion of Mundaring WTP(160 to 230 MLD) & Vale da Telha WWTP - Perform EC&I detail engineering design review and approval. Manage all EC&I, motors, pumps procurement packages. Negotiation and contract management with manufacturers and suppliers. Perform risk assessment and EC&I safety management. Perform and manage all EC&I site commissioning activities.</p>
August 2005 to June 2011	<p>Employing organization: Acciona; Agua - Portugal Position Held: Electrical Project Manager & Lead Electrical Engineer Mr Emanuel Correia ACCIONA ÁGUA Portugal S.A.U – Acciona Água Portugal</p>	Portugal	<p>Involved in various Water and Wastewater Treatment Plants and pumping stations- electrical, control and instrumentation (EC&I) detail design for the bid and construction stages. Plan & perform site pre-commissioning, commissioning and performance test. Prepare and compile final EC&I documentation for facilities handover to the Client O&M team.</p>
December 2004 to July 2005	<p>Employing organization: Acciona Agua - Portugal Position Held: Mechanical & Electrical Field Engineer</p>	Portugal	<p>Involved in various Water and Wastewater Treatment Plants and pumping stations- Coordinate and supervise all site equipment, mechanical, electrical HV/LV, control, instrumentation (EC&I) and communications works during the construction and commissioning stages. Perform design detail review. Supervise all site electrical Perform mechanical and electrical commissioning. Provide site assistance during Water Treatment Plants performance test.</p>

4. **Membership in Professional Associations and Publications:** Portuguese Engineering Order membership

5. **Language Skills (indicate only languages in which you can work):**

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
Spanish	Excellent	Excellent	C.M.W.S. Excellent

Portuguese	Excellent	Excellent	Excellent
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6. Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:

- Will conduct electrical design in CP1 including preparation of technical specifications
- Will prepare technical requirement to CP5 and assist the Client in discussion and negotiation with CP5 contractor.
- Will evaluate the bids for CP1 in electrical aspect
- Will review detailed design by the contractor and supervise the construction in electrical aspect with Professional B4

Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks

I. Name of Project: *Alamos Water Pump Station – Alentejo – Portugal – 60/6kV 4 x 7 MW Water Pump Station Plant.*

Year: August 2018 to Currently **Location:** Alqueva – Alentejo Region – Portugal **Client:** EDIA. S.A.

Main Project Features: 60/6,3kV 4 x 7 MW Water Pump Station Plant for the Alqueva agriculture irrigation system and water transfer to the Sado River hydraulic system - 2200 MLD maximum capacity.

Position Held: Mechanical, Electrical, Control & Instrumentation Principal Engineer - Surveyor.

Activities Performed: Electrical HV, MV and LV Electrical, Control, Instrumentation (EC&I) **detail design review** and approval. Electrical, Control and Instrumentation equipment approval as per project and **specifications**. HV switching procedure review and approval.

II. Name of Project: *Beirolas Wastewater Treatment Plant – Lisbon – Portugal*

Year: August 2018 to Currently **Location:** Lisbon – Portuga **Client:** AdTA - Tagus & Atlantic Water, S.A.

Main Project Features: Wastewater Treatment Plant upgrade project - 240.000 m3/day maximum capacity.

Position Held: Mechanical, Electrical, Control & Instrumentation Principal Engineer - Surveyor.

Activities Performed: Electrical HV/LV, Control, Instrumentation (EC&I) and Mechanical equipment **detail design review** and approval. Electrical, Control, Instrumentation and Mechanical equipment approval as per project and **specifications**.

III. Name of Project: *Faro-Olhao Wastewater Pump Station System – Faro – Algarve – Portugal*

Year: August 2018 to Currently **Location:** Faro - Algarve – Portugal. **Client:** AdA – Algarve Water, S.A.

Main Project Features: 7 x Wastewater Pump Stations with primary treatment / 2160m3/h Largest Pump Station capacity. **Position Held:** Mechanical, Electrical, Control & Instrumentation Principal Engineer - Surveyor.

Activities Performed: Electrical LV, Control, Instrumentation (EC&I) and Mechanical equipment **detail design review** and approval. Electrical, Control, Instrumentation and Mechanical equipment approval as per project and **specifications**.

IV. Name of Project: *Sal Island & S. Vicente Island Reverse Osmosis Desalination Plants – Cape Verde Archipelago (Construction stage – Updated Project)*

Year: May 2017 – December 2018. **Location:** Cape Vert Archipelago. **Client:** Acciona Agua – Portugal / Electra S.A.

Main Project Features: 2x10 MLD RO Desalination Plants.

Position Held: HV, LV Electrical, Control & Instrumentation Designer - Independent Consultant.

Activities Performed: Electrical HV, MV and LV Electrical, Control, Instrumentation (EC&I) **detail design Project**. Electrical, Control and instrumentation equipment **procurement packages specifications for tender and construction stages**. EC&I **Construction schedule** and management Plan.

V. Name of Project: *RAS ABU FONTAS RAFA3 REVERSE OSMOSIS Desalination Plant - Doha, QATAR*

Year: April 2015 – September 2016 **Location:** Doha – Qatar. **Client:** KAHRAMAA - QEWC - Qatar General Electricity & Water Corporation - Owner / for the Mitsubishi Corporation - main sub-contractor.

Main Project Features: 164 MLD Reverse Osmosis Desalination Plant (US\$480.6 Million capital cost project).

Position Held: Electrical, Control & Instrumentation Lead Engineer.

Activities Performed: Perform Electrical HV/MV/LV, Control & Instrumentation (EC&I) **detail engineering design review** and approval. Procurement and contracting management. Construction management and Plant commissioning.

VI. Name of Project: Punta Cardón Oil Refinery Reverse Osmosis Desalination Plant - Paraguana Complex at Punto Fijo, Venezuela.

Year: March 2014 to March 2015 **Location:** Punto Fijo – Venezuela. **Client:** PDVSA - Venezuelan Petroleum National Company.

Main Project Features: 70 MLD Reverse Osmosis Desalination Plant.

Position Held: Electrical, Control & Instrumentation Project Lead Design Engineer.

Activities Performed: Perform and develop Desalination, Water and Wastewater Treatment Plants electrical, Instrumentation, control and automation detail design. Procurement and contracting management.

VII. Name of Project: S. Vicente and Sal Islands Reverse Osmosis Desalination Plants - Cape Verde (Initial Project)

Year: March 2014 to March 2015. **Location:** Cape Vert Archipelago. **Client:** ELECTRA - Cape Verde Water & Electricity Company.

Main Project Features: 2 x 10 MLD Reverse Osmosis Desalination Plants.

Position Held: Electrical, Control & Instrumentation Project Lead Design Engineer.

Activities Performed: Perform and develop Desalination, Water and Wastewater Treatment Plants electrical, Instrumentation, control and automation **detail design**. **Procurement** and contracting management.

VIII. Name of Project: La Chira Wastewater Treatment Plant - Peru

Year: March 2014 to March 2015. **Location:** Peru. **Client:** Proinversion.

Main Project Features: 544.320 m3/day Wastewater treatment Plant.

Position Held: Electrical, Control & Instrumentation Project Lead Design Engineer

Activities Performed: Perform and develop Water and Wastewater Treatment Plants electrical, Instrumentation, control and automation detail design. Procurement and contracting management.

IX. Name of Project: Los Tajos Wastewater Treatment Plant - Costa Rica

Year: March 2014 to March 2015. **Location:** Costa Rica. **Client:** AyA - Costa Rican Institute of Aqueducts and Sewers.

Main Project Features: 242.784 m3/day Wastewater treatment Plant.

Position Held: Electrical, Control & Instrumentation Project Lead Design Engineer.

Activities Performed: Perform and develop Water and Wastewater Treatment Plants electrical, Instrumentation, control and automation **detail design**. **Procurement** and **contracting management**.

X. Name of Project: S. Goncalo de Alcantara Waste Water Treatment Plant and Wastewater system Rio de Janeiro, Brazil.

Year: March 2014 to March 2015. **Location:** Rio de Janeiro, Brazil. **Client:** Rio de Janeiro State Environmental Department. **Main Project Features:** 103.000 m3/day Water Treatment Plant and Wastewater system - Rio de Janeiro, Brazil - €117.000.00 project capital cost.

Position Held: Electrical, Control & Instrumentation Project Lead Design Engineer.

Activities Performed: Perform and develop Water and Wastewater Treatment Plants electrical, Instrumentation, control and automation **detail design**. **Procurement** and contracting management.

XI. Name of Project: Mundaring Water Treatment Project – Western Australia

Year: July 2011 to February 2014. **Location:** Mundaring, Western Australia. **Client:** Water Corporation.

Main Project Features: Mundaring WTP and Helena river Pump Station C (PSC) - 165MLD expandable to 240MLD plant - AUD\$300 Million capital cost project / by ACCIONA TRILITY JOINT VENTURE (ATJV).

Position Held: Lead electrical Engineer.

Activities Performed: Perform EC&I detail engineering design review and approval. Manage all EC&I, motors, pumps procurement packages. Negotiation and contract management with manufacturers and suppliers. Manage EC&I project design, equipment documentation and ensure WTP Certification from the Client, Third Party Reviewer and Independent Certifier. Perform risk assessment and EC&I safety management. Plan and manage all EC&I works at site during the construction stage. Perform and manage all EC&I notices of energisation and isolation requests. Perform and manage all EC&I site commissioning activities. Manage EC&I team and assist the commissioning team during the Plant performance test. Prepare and manage EC&I final **design** and equipment documentation for WTP handover to the ATJV Maintenance and Operation team (O&M).

XII. Name of Project: Vale da Telha WWTP, Vale da Telha II Wastewater Pump Station and Arrifana Wastewater Pump Station

Year: October 2010 to May 2011. **Location:** Vale da Telha - Algarve - Portugal. **Client:** Algarve Waters S.A. (AdA)

Main Project Features: \approx 5.400m³/day Wastewater Treatment Plant and Sewage Pump Station system. **Position Held:** Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation **detail engineering design**.

Procurement packages. EC&I Procurement and contracting management. Construction works schedule and Planning. Plant commissioning and performance test.

XIII. Name of Project: *Vila Real WWTP*

Year: October 2009 to August 2010. **Location:** Vila Real – Portugal. **Client:** Trás-Os-Montes Waters S.A (ATMAD).

Main Project Features: \approx 19.000 m³/day Wastewater Treatment Plant.

Position Held: Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation **detail engineering design**.

Procurement packages. EC&I Procurement and contracting management. Construction works schedule and Planning. Plant commissioning and performance test.

XIV. Name of Project: *Albufeira-Poente WWTP*

Year: September 2009 to August 2010. **Location:** Albufeira - Algarve – Portugal. **Client:** Algarve Waters S.A (AdA).

Main Project Features: 24.000 m³/day Wastewater Treatment Plant.

Position Held: Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation **detail engineering design**.

Procurement packages. EC&I Procurement and contracting management. **Construction** works schedule and Planning. Plant commissioning and performance test.

XV. Name of Project: *Lapela Drinking WTP and Troporiz Pump Station*

Year: July 2008 to August 2009. **Location:** Lapela – Minho Region – Portugal. **Client:** Aguas Minho e Lima S.A (AdML).

Main Project Features: 17 MLD Drinking Water Treatment Plant and Pump Station.

Position Held: Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation **detail engineering design**.

Procurement packages. EC&I Procurement and contracting management. Construction works schedule and Planning. Plant commissioning and performance test.

XVI. Name of Project: *Pranchinha WWTP*

Year: September 2008 to August 2009. **Location:** S. Miguel Island – Azores Archipelago – Portugal. **Client:** Ponta Delgada Water Services - Azores (SMAS Ponta Delgada).

Main Project Features: 5.800m³/day Wastewater Treatment Plant.

Position Held: Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation **detail engineering design**.

Procurement packages. EC&I Procurement and contracting management. Construction works schedule and Planning. Plant commissioning and performance test.

XVII. Name of Project: *Balsemão Drinking WTP, Pinhão Drinking WTP, Pinhão Water Pump Station 1 and Pinhão Water Pump Station 3*

Year: May 2007 to May 2008. **Location:** Balsemão and Pinhão - Trás-Os-Montes Region – Portugal. **Client:** Trás-Os-Montes Waters S.A (ATMAD).

Main Project Features: 19.782m³/day and 12.600m³/day Drinking Water Treatment Plants and Pump Stations system.

Position Held: Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation **detail engineering design**.

Procurement packages. EC&I Procurement and contracting management. Construction works schedule and Planning. Plant commissioning and performance test.

XVIII. Name of Project: *Almargem WWTP*

Year: January 2006 to September 2007. **Location:** Almargem - Algarve – Portugal. **Client:** Algarve Waters S.A (AdA).

Main Project Features: 12.200 m³/day Wastewater Treatment Plant.

Position Held: Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation **detail engineering design**.

Procurement packages. EC&I Procurement and contracting management. Construction works schedule and Planning. Plant commissioning and performance test.

XIX. Name of Project: *Lagoa WWTP*

Year: August 2005 to March 2006. **Location:** Lagoa - Algarve – Portugal. **Client:** Algarve Waters S.A

(AdA).

Main Project Features: ≈ 3.700m³/day Wastewater Treatment Plant.

Position Held: Electrical Project Manager & Lead Electrical Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation detail engineering design.

Procurement packages. EC&I Procurement and contracting management. Construction works schedule and Planning. Plant commissioning and performance test.

XX. Name of Project: Ponte de Lima WWTP, Ponte da Barca WWTP and Arcos de Valdevez WWTP

Year: December 2004 to July 2005. **Location:** Minho Region – Portugal. **Client:** Minho e Lima Waters S.A (AdML).

Main Project Features: ≈ 11.200m³/day, 5.300m³/day and 3.400m³/day Wastewater Treatment Plants.

Position Held: Mechanical & Electrical Field Engineer.

Activities Performed: MV and LV Electrical, Control and Instrumentation Assembly and testing during the Construction stage works schedule and Planning. Plant commissioning and performance test.

7. Certification:

I, the undersigned, certify to the best of my knowledge and belief that:

- (i) this CV correctly describes my qualifications and my experience;
- (ii) In the absence of medical incapacity, I will undertake this assignment for the duration and in terms of the inputs specified for me in the Expert Schedule in Form TECH-7 provided team mobilization takes place within the validity of this proposal or any agreed extension thereof;
- (iii) I am committed to undertake the assignment within the validity of Proposal;
- (iv) I am not part of the team who wrote the terms of reference for this consulting services assignment;
- (v) I am, pursuant to Clauses 3 and 4 of the ITC, eligible for engagement.

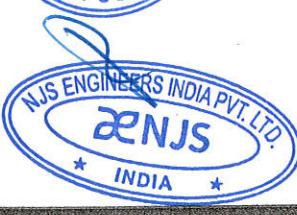
I understand that any misstatement described herein may lead to my disqualification or dismissal, if engaged.



Date: 08/03/2019

Signature of Key Expert or authorized representative of the firm

Full name of authorized representative: Mr. Gaurav Kumar Srivastava



Assistant Contracts Engineer
C.M.W.S.S. Board
Chennai-600 002.