



هيئة الأشغال العامة

PUBLIC WORKS AUTHORITY

شؤون البنية التحتية

INFRASTRUCTURE AFFAIRS

(DRAINAGE NETWORKS PROJECTS DEPARTMENT)

PREQUALIFICATION DOCUMENT

FOR

DESIGN, BUILD, OPERATE AND MAINTAIN (DBOM) CONTRACT FOR INTEGRATED INDUSTRIAL WASTEWATER TREATMENT WORKS-CP798

PROJECT CODE: IA 14/15 C 133 G

SUMMARY

PART 1: PREQUALIFICATION PROCEDURES

PART 2: WORK REQUIREMENTS

Public Works Authority
PO Box 22188
Doha
State of Qatar

April 2018



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PART 1: PREQUALIFICATION PROCEDURES

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Part 1: Prequalification Procedures

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SUMMARY DESCRIPTION

The Public Works Authority of the State of Qatar wish to pre-qualify Contractors with experience in the construction of integrated industrial water treatment works mains for:

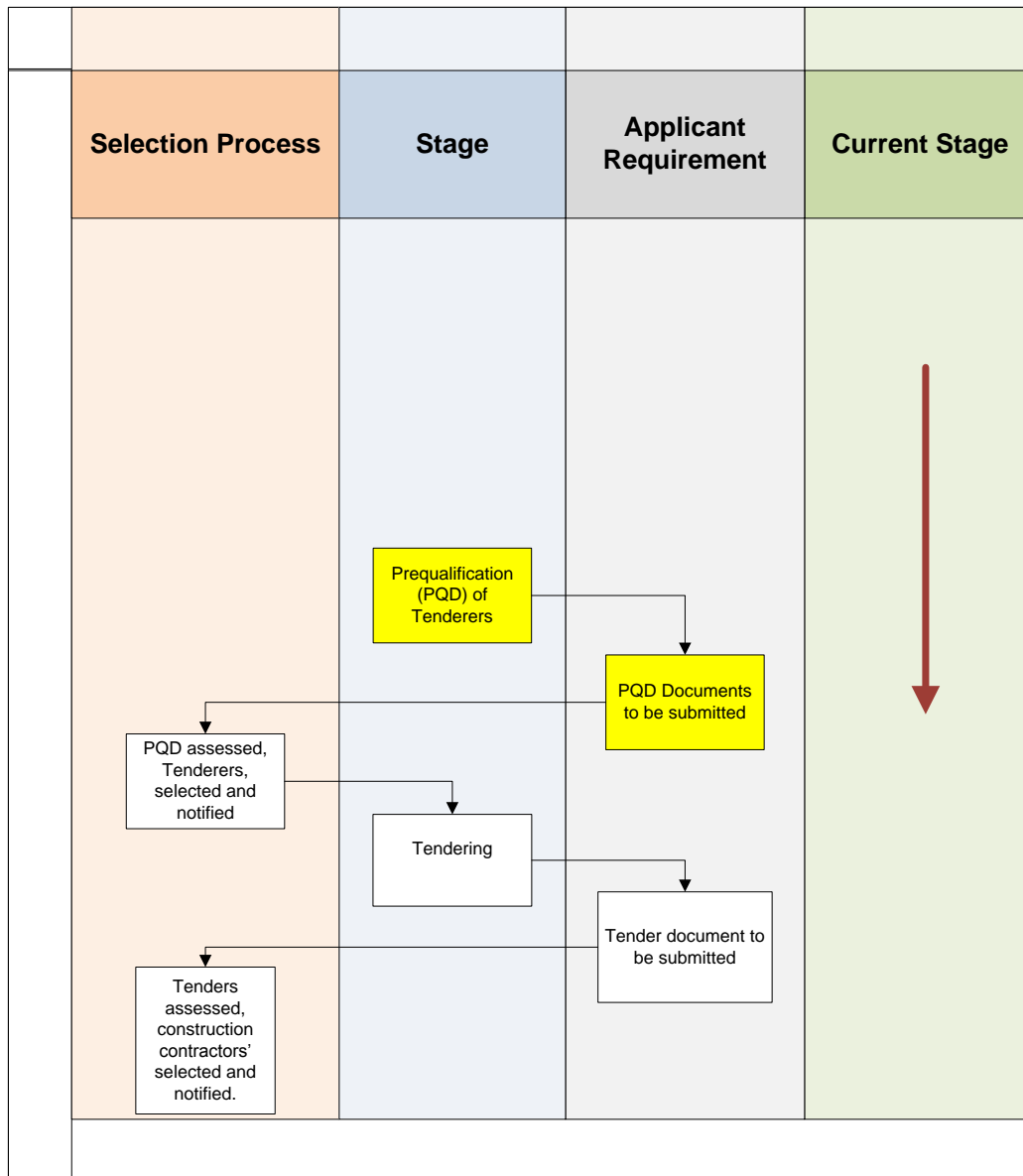
Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works
Civil Project: C798
Project ID: IA 14/15 C 133 G

This Prequalification Document consists of:

1. User's Guide; and
2. Prequalification Procedures and Work Requirements.

Prequalification is a step in the procurement route which shall ultimately lead to invitation to Tender.

Procurement is the stage in a project's lifecycle by which it progresses from inception and feasibility through to award and this project is following the process shown below:



The purpose of the prequalification process is to provide the basis for the Public Works Authority, (PWA), also known as ASHGHAL, to select a short-list of competent companies or joint ventures for invitation to tender for the project.

Prequalification centres on evaluation of the applicants:

1. Eligibility;
2. Licenses & Registration;
3. Declaration of Pre-Tendering Agreement for Joint Venture;
4. Historical Contract Non-performance record;
5. Financial stability and status;
6. Experience in relation to the size, type and complexity of the Works / services being procured;
7. Personnel Capabilities;
8. Health, Safety, Quality & Environment;
9. Management Approach; and
10. Resources, Plant and Equipment.

Consequently previous prequalification for PWA's projects shall not guarantee automatic prequalification for this project.

The Work Requirements in Part 2 of this document provides the scope of works including a drawing showing the main components of the project.

CHECKLIST

(To be completed by individual companies and designated JV Partners)

Note: This checklist is important as it will serve as a checklist of submitted documents for evaluation purposes. Any missing information will have an impact on Applicant's Score. No other documentation, including brochures about your company, additional information etc. must be included in your submission other than what is requested. Submit the original and a further one (1) hard copy, and two (2) soft copies on CD.

Checklist for Prequalification	Applicant Name		
	Applicant Reference		
Documents submitted			√
		Form	Present
			X
			Not present
A	Date & Time Submitted		
Series no.	Category		
1	Eligibility Requirements		
1.1	Conflict of Interest		Application Submission Sheet
1.2	PWA Ineligibility		Application Submission Sheet
1.3	Government Owned Entity		Forms ELI- 1.1 & 1.2
2	Licenses and Registrations		
2.1	Company Registration in Qatar		Form REG – 2.1
3	Declaration		
3.1	Pre-Tendering Agreement for JV formation.		Form DC-3.1
4	Historical Contract Non-Performance		
4.1	History of Non Performance		Form - CON –4.1
4.2	Pending Litigation		Form - CON –4.1

5	Financial Situation			
5.1	Audited Accounts		Form FIN - 5.1 & FIN - 5.2	
5.2	Current Ratio			
5.3	Profit Margin			
5.4	Return on Assets			
5.5	Debt Ratio			
5.6	Annual Turnover			
6	Experience			
	Applicant Experience Requirements	Requirements Description		
6.1	General Experience. From Prequalification Document as per Section III Sub-section E.	See Section III Sub-section E.	Forms EXP- 6.1, EXP – 6.2& EXP – 6.3	
7	Personnel Capabilities			
	Personnel Capabilities	Requirements Description		
7.1	Experience of key personnel From Prequalification Document as per Section III Sub-section F.	See Section III Sub-section F.	Forms EXP- 7.1& EXP – 7.2	
8	Health, Safety, Quality and Environment			
	Company Policies			
8.1	Safety Management System (SMS) Certified to ISO 18001:2007		Form HSE – 8.1	
8.1	Environment Management System Certified to ISO14001:2004			
8.2	Documented Quality Control / Assurance System		Form QM – 8.2	
9	Management Approach			
9.1	Management Approach		Form MA 9.1	
10	Resources, Plant & Equipment			
10.1	Resources, Plant & Equipment		Form RS - 10.1	

DOCUMENT USERS GUIDE

PART 1 – PREQUALIFICATION PROCEDURES

Section I. Instructions to Applicants (ITA)

This section specifies the procedures to be followed by applicants in the preparation and submission of the Prequalification Application. Information is also provided on opening of Prequalification documents and evaluation of applications.

The Section I provisions are to be used without modification.

Section II. Application Data Sheet (ADS)

This section identifies the data and provisions that are specific to each Prequalification Invitation and supplements of the information or requirements included in Section I: Instructions to Applicants.

Section III. Qualification Criteria

This section contains the qualification criteria; compliance requirements associated prequalification forms to be used to determine how applicants shall be prequalified and later invited to tender.

Section IV. Application Forms

This section contains the Prequalification Application Submission Sheet and the associated forms to be submitted with the Prequalification Application.

TERMINOLOGY

Prequalification Application:	Shall mean the documents submitted for evaluation and short-listing for Invitation to Tender.
Prequalification Application Submission Sheet:	Shall mean the form in Section IV of this document which shall preface the Prequalification Application.
Prequalification Invitation:	Shall mean the invitation by Public Works Authority, either via public or direct notice, to applicants to submit detailed particulars demonstrating capability in relation to the scope of supplies to be procured.

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Section I. Instructions to Applicants (ITA)

A. General

1. **Scope of Application**
 - 1.1 In connection with the Invitation for Prequalification indicated in Section II, Application Data Sheet (ADS), the Public Works Authority (PWA), as defined in the ADS, issues this Prequalification Document to Applicants interested in Tendering for the scope of works described in Part 2 – Work Requirements.
2. **Source of Funds**
 - 2.1 The scope of works is funded directly by the Government of the State of Qatar.
3. **Corrupt & Fraudulent Practices**
 - 3.1 The PWA requires that Applicants observe the highest standard of ethics during the procurement and execution of the scope of works. In pursuit of this policy, the PWA:
 - (a) Defines, for the purposes of this provision, the terms set forth below as follows:
 - i. **“Corrupt Practice”** shall mean the offering, giving, receiving, or soliciting of anything of value to influence the action of a Public Official in the procurement process or in contract execution; and
 - ii. **“Fraudulent Practice”** shall mean a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the PWA, and includes collusive practices among Applicants (prior to or after tender submission) designed to establish tender prices at artificial, non-competitive levels and to deprive the PWA of the benefits of free and open competition;
 - (b) May, at its sole discretion, reject a proposal for prequalification if it determines that the Applicant recommended for prequalification has engaged in Corrupt or Fraudulent practices in competing for the Contract.

4. Eligible Applicants

- 4.1 Applicant may be a private, public or government owned legal entity or any combination of them with the formal intent to enter into a joint venture agreement or under an existing joint venture agreement.
- 4.2 Prequalification will be based on a scoring system of the applicant's general and particular experience, technology offered, capabilities of personnel, financial position, litigation history and Quality Assurance specified in the Prequalification Procedures, as demonstrated by the applicant's responses in the attached Application Forms and other requested documentation. Specific requirements for joint ventures are also set forth in Section III, Qualification Criteria, Sub-section H. The Employer reserves the right to waive minor deviations from the criteria, if they do not materially affect the capability of an applicant to perform the contract.
- 4.3 Applicant that is under a declaration of ineligibility by PWA in accordance with ITA 3.1, at the date of submission of the Application or thereafter, shall be disqualified.
- 4.4 Government-owned entities in Qatar shall be eligible only if they can establish that they are legally and financially autonomous, and operate under commercial law, and that they are not dependent agencies of the PWA.
- 4.5 Applicants shall provide such evidence of their continued eligibility satisfactory to the PWA, as the PWA shall reasonably request.
- 4.6 Applicants shall not have a conflict of interest. If any conflict of interest or potential conflict of interest between Applicants, their advisers and those of the PWA becomes apparent, Applicants shall immediately inform the PWA, when the PWA shall, at its absolute discretion, decide on the appropriate course of action. If the PWA becomes aware of any conflict of interest or potential interest that the Applicant has not declared to the PWA, the PWA may at its absolute discretion disqualify the Applicant from consideration.
- 4.7 Where an applicant, its affiliates or parent company, in addition to consulting, also has the capability to manufacture or supply goods or to construct works, that applicant, its affiliates or parent company normally cannot be a supplier of goods or works on a project for which it provides consulting services, unless it can be demonstrated that there is not a significant degree of common ownership, influence or control.

**5. Eligible Goods
and Related
Services**

- 5.1 In preparation of the Prequalification Document Applicants shall be aware of and observe the Government of the State of Qatar's rules and regulations relating to the boycott of Israel.

B. Contents of the Prequalification Document

**6. Sections of
Prequalification
Document**

- 6.1 The document for the prequalification of Applicants (hereinafter "Prequalification Document") consists of parts 1 and 2 which comprise all the sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITA 8.

PART 1 - Prequalification Procedures

Section I. Instructions to Applicants (ITA)

Section II. Application Data Sheet (ADS)

Section III. Qualification criteria

Section IV. Application Forms

PART 2 - Work Requirements

Appendix A: Details of Scope of Works are included in this section as well as details of the contractor's key personnel that are required.

The type of contract will be Design-Build and Operate-Maintain as published by PWA.

Appendix B: Drawings showing main components of the project.

- 6.2 The PWA accepts no responsibility for the completeness of the Prequalification Document and its addenda unless they were obtained directly from the PWA.
- 6.3 The Applicant is expected to examine all instructions, forms, and terms in the Prequalification Document and to furnish all information or documentation required by the Prequalification Document.

**7. Clarification of
Prequalification
Document**

- 7.1 Applicants requiring clarifications of the Prequalification Document shall contact the PWA in writing at the address indicated in the ADS. The PWA shall respond in writing to any request for clarification provided that such request is received not later than two weeks before the deadline for submission of Applications. The PWA shall communicate to all Applicants full details of the clarification but without identifying its source.

Should the PWA deem it necessary to amend the Prequalification Document as a result of a clarification, it shall do so following the procedure under ITA 8 and in accordance with the provisions of ITA 17.2.

- 8. Amendment of Prequalification Document**
- 8.1 At any time prior to the deadline for submission of Applications, the PWA may amend the Prequalification Document by issuing addenda.
 - 8.2 Any addendum issued shall form part of the Prequalification Document and shall be communicated in writing to all Applicants.
 - 8.3 To give prospective Applicants reasonable time to take an addendum into account in preparing their applications, the PWA may, at its discretion, extend the deadline for the submission of Applications.

C. Preparation of Applications

- 9. Cost of Applications** 9.1 The Applicant shall bear all costs associated with the preparation and submission of its Application. The PWA shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Prequalification Process.
- 10. Language of Application** 10.1 The Application as well as all correspondence and documents relating to the Prequalification exchanged by the Applicant and the PWA, shall be written in the language specified in the ADS. Supporting documents and printed literature that are part of the Application may be in another language, provided they are accompanied by an accurate translation of the relevant passages in the language specified in the ADS, in which case, for purposes of interpretation of the Application, the translation shall govern.
- 11. Documents Comprising the Application** 11.1 The application shall comprise the following:
- a) Application Submission Sheet, in accordance with ITA 12;
 - b) Documentary evidence establishing the Applicant's eligibility to prequalify, in accordance with ITA 13;
 - c) Documentary evidence establishing the Applicant's qualifications, in accordance with ITA 14; and
 - d) Any other document required as specified in the ADS.
- 12. Application Submission Sheet** 12.1 The Applicant shall prepare an Application Submission Sheet using the form furnished in Section IV, Application Forms. This form must be completed without any alteration to its format.
- 13. Documents Establishing the Eligibility of the Applicant** 13.1 To establish its eligibility in accordance with ITA 4, the Applicant shall complete the eligibility declarations in the Application Submission Sheet and Forms ELI 1.1 and ELI 1.2, included in Section IV, Application Forms.
- 14. Documents Establishing the Qualifications of the Applicant** 14.1 To establish its qualifications to perform the scope of works in accordance with Section III, Qualification Criteria, the Applicant shall provide the information requested in the corresponding Information Sheets included in Section IV, Application Forms.
- 15. Signing of the Application and Number of Copies** 15.1 The Applicant shall prepare one original of the documents comprising the Application as described in ITA 11 and clearly mark it "ORIGINAL". The original of the Application shall be typed or written in indelible ink and shall be signed by a person duly authorised to sign on behalf of the Applicant. In the case of JV, all Parties must sign the documents.

15.2 The Applicant shall submit copies of the signed original Application, in the number specified in the ADS, and clearly mark them "COPY". In the event of any discrepancy between the original and the copies, the original shall prevail.

D. Submission of Applications

16. Sealing and Identification of Applications

16.1 The Applicant shall enclose the original and the copies of the Application in a sealed envelope that shall:

- (a) Bear the name and address of the Applicant;
- (b) Be addressed to the PWA, in accordance with ITA 17.1; and
- (c) Bear the specific identification of this Prequalification i.e. Project name as indicated in Section II ADS (ITA1.1).

16.2 In addition to the hardcopies, the Applicant shall submit a softcopy on a labelled CD enclosed to the original copy indicated in the ADS. The label should show the project title and the Applicant's name. No boxes, notebooks or leaver arch files are to be submitted.

16.3 The PWA shall accept no responsibility for not processing any envelope that was delivered unsealed or not identified in full accordance with the requirements of the Prequalification Document.

17. Deadline for Submission of Applications

17.1 Applications shall be received by the PWA at the address and no later than the deadline indicated in the Section II - ADS (ITA 17.1).

17.2 The PWA may, at its discretion, extend the deadline for the submission of Applications by amending the Prequalification Document in accordance with ITA 8, in which case all rights and obligations of the PWA and the Applicants subject to the previous deadline shall thereafter be subject to the deadline as extended.

18. Late Applications

18.1 Any Application received by the PWA after the deadline for submission of Applications prescribed in ITA 17 may, at the sole discretion of the PWA, be rejected as non-compliant and remain unopened.

19. Opening of Applications

19.1 The PWA shall prepare a record of the opening of Applications that shall include, as a minimum, the name of the Applicant. A copy of the record shall be available with PWA.

E. Procedures for Evaluation of Applications

- 20. Confidentiality**
- 20.1 Information relating to the evaluation of applications, and recommendation for prequalification, shall not be disclosed to Applicants or any other persons not officially concerned with such process until the notification of prequalification is made to all Applicants.
- 20.2 From the deadline for submission of Applications to the time of notification of the results of the Prequalification in accordance with ITA 28, any Applicant that wishes to contact the PWA on any matter related to the Prequalification Process, may do so but only in writing.
- 21. Clarification of Applications**
- 21.1 After the Application submission closing date, PWA may ask any Applicant for a clarification. The Applicant shall submit, to the address indicated in the ADS (ITA 17.1), its reply within seven (7) calendar days after the clarification date or by the date and time set in the PWA's request for clarification. Any request for clarification and all replies shall be in writing.
- 21.2 If an Applicant does not provide clarifications of the information requested within seven (7) days after the clarification date or by the date and time set in the PWA's request for clarification, its Application may, at the sole discretion of the PWA, be rejected as non-compliant.
- 22. Responsiveness of Applications**
- 22.1 The PWA may reject any Application which is not responsive to the requirements of the Prequalification Document.
- 23. Domestic Applicant Price Preference**
- 23.1 Unless otherwise specified in the ADS, a margin of preference for domestic Applicants shall not apply in the tendering process resulting from this prequalification.
- 24. Specialist Sub-contractors**
- 24.1 Applicants planning to sub-contract any of the key activities indicated in Section III, Qualification Criteria, shall specify the activity or parts of the scope of works to be sub-contracted in the Application Submission Sheet and clearly identify such activities and the proposed specialist sub-contractor(s) in Form ELI-1.2 in Section IV. Such proposed specialist sub-contractor(s) shall meet the corresponding qualification requirements specified in Section III, Qualification Criteria.
- 24.2 The PWA does not intend to execute certain specific parts of the scope of works by contractors selected in advance by the PWA (Nominated Contractor) unless otherwise stated in the ADS.

F. Evaluation of Applications and Prequalification of Applicants

25. Evaluation of Applications

25.1 The PWA shall use all the factors, methods and criteria defined in Section III, Qualification Criteria to evaluate the qualifications of the Applicants and any specialist sub-contractors. The PWA reserves the right to consider other factors or waive minor deviations in the qualification criteria if they do not materially affect the capability of an Applicant to perform the scope of works.

25.2 Only the qualifications of specialist sub-contractors that have been identified in the Application may be considered in the evaluation of an Applicant. However, the general experience and financial resources of sub-contractors may not be added to those of the Applicant for purposes of prequalification of the Applicant.

25.3 Unless otherwise indicated in the ADS, this Prequalification shall be for the Design, Build, Operate & Maintain (DBOM) Contractor for the Integrated Industrial wastewater Treatment Works.

26. PWA's Right to Accept or Reject Applications

26.1 The PWA reserves the right to accept or reject any Application, and to annul the Prequalification Process and reject all Applications at any time, without thereby incurring any liability to Applicants.

27. Prequalification of Applicants

27.1 Applicants whose applications have met or exceeded the specified threshold criteria shall, to the exclusion of all others, be prequalified by the PWA. PWA will invite a short-list of qualified Applicants to tender.

28. Notification of Prequalification

28.1 Once the PWA has completed the evaluation of the Applications it shall notify Applicants in writing if they have been prequalified for invitation to tender or not.

29. Invitation to Tender

29.1 After the notification of the results of the prequalification the PWA shall invite tenders from the short-listed Applicants that have been prequalified.

29.2 Tenderers shall be required to provide Tender security acceptable to the PWA in the form and an amount as to be specified in the tender documents, also, the successful tenderers shall be required to provide a Performance security in the form and an amount as to be specified in the tender documents.

30. Changes in Qualifications of Applicants

30.1 Any change in the structure or formation of an Applicant after being prequalified in accordance with ITA 27 and invited to tender shall be subject to written approval of the PWA. Such approval shall be denied if as a consequence of the change the Applicant no longer substantially meets the qualification criteria

set forth in Section III, Qualification Criteria, or if in the opinion of the PWA, a substantial reduction in competition may result. Any such changes shall be submitted to the PWA not later than 14 days after the date of the Invitation to Tender.

31. Submissions

31.1 Applicants must not exceed the stated maximum permitted numbers of pages/words in their submissions. For this purpose, "page" means "side of A4 paper". Applicants should print on both sides of each sheet of paper and use only A4 sheets. Text must be only typed in "Arial" font and be no smaller than 10 point, single-spaced with the margins set at 2.5cm. Page header or footer information may be placed in the margin space. Where provisions are made for the answers, they must be typed in the relevant boxes/space provided in this document. No additional attachments are permitted other than what is requested.

31.2 All written submissions, questions, queries, communications and the like between Applicants and the PWA must be in English. Applicants must answer all questions accurately and concisely as possible and monetary values must be stated in QAR. Failure to furnish the required information, make a satisfactory response to any question or supply required documentation will have an impact on Applicant's score or Applicant may not be invited to participate further.

Note: Applicant's attention is drawn to the two hard copies (Original & a copy) and two soft copies on Compact Disk (CD) which must be included as part of the submission. No other documentation, including brochures about your company, additional information etc. should be included in your submission other than what is requested. No boxes, notebooks or leaver arch files are to be submitted.

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Section II. Application Data Sheet (ADS)	
A. Introduction	
ITA 1.1	The identification of the Invitation for Prequalification is: <i>Application to Prequalify for Integrated Industrial Wastewater Treatment Works Project (IIWWTW) C798</i>
ITA 1.1	The name of the Project is: Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) CP798
ITA 4.1	Multiple Partnerships (up to a maximum of three partners) of Local Commercially Registered Qatari Companies and JV are allowed. However the specific Joint Venture Requirements set out in Part 1: Prequalification Procedures, Section III Qualification Criteria, Part H: Joint Venture Requirements must be complied with.
B. Prequalification Document	
ITA 7.1	For clarification purposes only, the PWA's address is: As per the invitation letter
C. Preparation of Applications	
ITA 10.1	The language of the application as well as of all correspondence is: English
ITA 15.1 & 15.2	In addition to the original, the number of copies to be submitted with the application is: one hardcopy and two softcopies (on CD).
D. Submission and Opening of Applications	
ITA 17.1	For application submission purposes only, the PWA's address is: As per the invitation letter. The deadline for application submission is: As per the invitation letter.

E. Evaluation of Applications	
ITA 23.1	No price preferences for domestic tenderers shall be applied.
ITA 24.2	<p>The PWA does NOT intend to execute certain specific parts of the scope of work by Contractor selected in advance (Nominated Sub-Contractor) except for the following:</p> <p>Mechanical and Electrical Installation: Local Mechanical and Electrical Sub-contractors will require to be listed in PWA's Approved List of M&E Contractors.</p> <p>Design of Project Components: Local Design Consultants will require to be listed in PWA's Approved List of Design Consultants.</p>
ITA 25.3	If the prequalification is for multiple contracts, the methods and qualification criteria to determine the combination of contracts for which the Applicant shall prequalify shall be as specified in Section III, Qualification Criteria.

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Section III - Qualification Criteria

A. General

Section III identifies the:

- Qualification criteria;
- Compliance requirements; and
- Associated prequalification forms

that the PWA shall use to evaluate the prequalification applications.

To be prequalified an applicant firm or joint venture must demonstrate to the PWA that it substantially satisfies the requirements regarding experience, personnel, financial position and litigation history, specified below.

(The “Main Contractor” is defined as the chief contractor who has a contract with the Employer or Owner of a project, and has the full responsibility for its completion. A Main contractor undertakes to perform a complete contract, and may employ (and manage) one or more subcontractors to carry out specific parts of the contract.

The “Lead Partner” is the party nominated by the Joint Venture as the “Lead Partner”

NOTE: ‘nature and complexity similar to those of the Works in the proposed contract shall be interpreted as follows:

- **Similar nature** means wastewater treatment works treating wastewater
- **Similar complexity** means mixed process, civil, structural, mechanical, electrical, instrumentation and control works for industrial wastewater treatment works, including Final Detailed Design, Operations and Maintenance.
- **The minimum value** that will be taken into consideration is either the total contract value, when the Applicant was acting as sole contractor, or the share of the total contract value corresponding to its share of **the joint-venture** participation, when the Applicant was member of a joint-venture;
- **The last 10 years** shall be understood as the period: 1st January of the year – up to the deadline for submission of the Applications;
- **References from owners of all (DBOM) projects of a similar nature and complexity** to the proposed contract completed within the last ten years shall be attached.

The applicant firm or joint venture shall meet the following minimum criteria which supplement the compliance requirements listed in the Compliance Table in Sub-section H:

B. Licences and Registrations (Series No. 2)

- (a) Applicants should also be registered in one of the professional or trade registers in the country of their principal place of business and relevant to the nature of this contract.
- (b) Applicants should note that in addition to successful prequalification they will be required to meet Qatari Registration requirements in order to tender.

C. Historical Contract Non-Performance (Series No. 4)

Litigation History: The applicant shall provide accurate information on any current or past litigation or arbitration resulting from contracts completed or under execution by him over the last two years. A consistent history of awards against the applicant or any partner of a joint venture may result in failure of the application.

D. Financial Situation (Series No. 5)

- (a) Average annual turnover as Main contractor (defined as billing for works in progress and completed) over the last four years of Qatar Riyals 500,000,000 equivalent.
- (b) The applicant shall demonstrate by means of bank comfort letters or other financial references that it has access to, or has available, liquid assets, unencumbered real assets, lines of credit, and other financial means sufficient to meet the construction cash flow for the contract for a period of four months, estimated as not less than QAR 30,000,000 per month equivalent, taking into account the applicant's commitments for other contracts.
- (c) The audited financial statement for the last four years shall be submitted and must demonstrate the soundness of the applicant's financial position, showing long-term profitability. Where necessary, the Employer will make inquiries with the applicant's bankers.

E. General Experience (Series No. 6)

- (a) Applicant shall have minimum 10 years as a Main contractor in wastewater treatment.
- (b) Successful experience for each discipline in (i) process design of industrial waste water treatment works including sedimentation, bio-treatment, metals removal, advanced oxidation, oil recovery, tertiary filtration, odour control and waste sludge processing and /or treatment, (ii) civil design (including structural design), (iii) civil construction (including structural, building and water retaining structures construction), (iv) M&E, ICA & SCADA design and (v) M&E, ICA & SCADA installation on a minimum of two and a maximum of five wastewater treatment plants; each of minimum value Qatar Riyals 100,000,000 in the last ten years.
- (c) Successful experience in the execution of at least two and maximum five design and build projects of a nature and complexity comparable to the proposed Industrial WWTW contract within the last ten years; specifically, experience in Process Design of Industrial wastewater treatment works including sedimentation, bio treatment, metals removal, advanced oxidation, oil recovery, tertiary filtration, odour control and waste sludge processing and/or treatment.
- (d) Execution of at least two and maximum five Industrial wastewater treatment works of >10MLd capacity including; (i) advanced oxidation on at least a side stream (min 2, max 3), (ii) with integrated waste import and/or export transport management systems (min 2, max 3) in the last ten years

- (e) Operation of at least two and maximum five Industrial wastewater treatment works of greater than 10MLD in the last ten years.
- (f) Successful operation for a period of at least five years of minimum one maximum three advanced oxidation and nutrient removal SBR followed by tertiary filtration treating at least 10MLD average daily flow.
- (g) Experience in operating minimum two maximum five industrial wastewater treatment plant including sedimentation, bio treatment, metals removal, oil recovery and tertiary filtration systems with waste sludge processing systems for industrial wastewater treatment of at least 10MLD capacity for more than 5 years
- (h) Experience in operating minimum two maximum three industrial wastewater treatment plant including integrated waste import and/or export transport and transport management systems
- (i) Experience in operating minimum two maximum three industrial wastewater treatment plant including integrated full odour control for at least 5 years
- (j) Experience in operating minimum two maximum four integrated Industrial wastewater treatment with multiple streams and

F. Personnel Capabilities (Series No. 7)

The applicant shall provide suitably qualified personnel to fill the following positions. For each position the applicant will supply information (in Form 7.1 & 7.2) on a first choice candidate and an alternate, each of whom should meet the experience requirements specified below.

Successful applicants will be obliged to offer these personnel or equivalent in their tender.

Position	Total experience (years)	In similar works (years)	As Site Manager/ Operator of industrial treatment works (years)	Experience in the Gulf (Years)
Project Director	20	10	5	Not required
Civil Works Site Manager – Industrial WWTW	20	10	5	5
M&E Project Manager – Industrial WWTW	20	10	5	5
Lead Process Design Manager IIWWTW	20	10	5	5
Project Design Director	20	10	N/A	Not Required
Civil Design Manager	20	10	N/A	5
MEICA Design Manager	15	7	N/A	5
Hydraulic Design Manager	15	7	N/A	Not required
Process Design Manager	15	7	N/A	5
Operations Director	20	10	5	Not Required

Operations Manager	15	10	5	5
Maintenance Manger	15	10	5	5
Lead Process Controller	15	10	5	5

G. Management Approach (Series No. 9)

This series examines the Applicant’s approach to the management of similar contracts. The Applicant is therefore required to answer the management approach questions included on Form MAQ – 9.1.

Sections for the makeup of the document:

- General and Specific Experience
- Key Personnel
- Personnel Allocation

The Management Approach shall address the following:

General and Specific Experience:

- 1) The Scope of Services requires both interactions between differing elements of the overall treatment process and complex interactions between the design, construction, commissioning and operational phases. Describe your approach to effectively co-ordinate and manage these interactions and work flows.
- 2) The ability to amend, modify or augment the configuration of the GSW Treatment Facility is necessary to ensure that all viable process and operational options are explored. Provide examples of how you have planned the operational testing protocols and configured the treatment facilities to meet the needs of the testing protocols.
- 3) Please describe your view of the most critical elements of the Project. Please address how you will manage these elements with regards to logistic support, composition of the team, contribution and experience by Key Personnel.

Key Personnel Experience:

- 1) Key Personnel will need to effectively plan, manage and control all elements of the Project. The Key Personnel will also need to be fully responsive to changing circumstances and requirements. Describe how the core team members will manage the Project and why the Key Personnel are the best suited for the Project.
- 2) Coordination with all Stakeholders will be paramount to ensuring the success of the Project. Explain how your team will draw upon past experience to manage Stakeholder engagement, structure and execute the coordination of all interfaces and ensure successful delivery of the required Project outcomes.

Personnel Allocation:

- 1) To support the overall schedule, a wide array of resources and varying skills sets will be needed. Demonstrate your plan to ensure that these resources are identified and available when required.

H. Joint Venture Requirements (General)

The table provided below summarises the requirements for Joint Ventures and the parties within Joint Venture agreements, with reference to the Sub-sections above. Note that it is a requirement of this Prequalification that the Joint Venture should comprise a maximum of three partners, at least one of whom is a M&E Contractor specialised in Industrial Wastewater Treatment Plants and Wastewater Transfer Pumping Stations and at least one of whom is a Civil Engineering Contractor.

JV Requirements

Series/ Clause	Criteria	Partner's Discipline	Criteria Applicable to		
			Lead Partner Requirement	*(see below)	Joint Venture
5 a)	Average Turnover	Civil & M&E	> QR 500m	> QR 100m	> QR 500m
6 a)	Minimum Years as Main contractor	Civil & M&E	10 years	5 years	Not Applicable
6 b)(i)	Experience in Process Design of Industrial waste water treatment works including sedimentation, bio-treatment, metals, removal, advanced oxidation, oil recovery, tertiary filtration, odour control and waste sludge processing and/or treatment over QR 100M	M&E	1nr reference	1nr reference	2nr references
6 b)(ii)	Experience in Industrial WWTW Civil Engineering Design	Civil	Not Required	Not Required	2nr references
6 b)(iii)	Experience in Industrial WWTW Civil Engineering Construction over QR100M	Civil	1nr reference	1nr reference	2nr references
6 b)(iv)	Experience in Industrial WWTW M&E, ICA & SCADA Design	M&E	1nr reference	1nr reference	2nr references
6 b)(v)	Experience in Industrial WWTW M&E, ICA & SCADA Installation over QR100M	M&E	1nr reference	1nr reference	2nr references
6 c)	Execution of D&B projects of similar complexity		1nr reference	1nr reference	2nr references
		Civil & M&E	1nr reference	1nr reference	
6 d)(i) to (iii)	Execution of Industrial WWTW >10MLD(i); with Advanced Oxidation (ii), with integrated waste import and/or export transport management systems	Process or M&E	1nr reference	1nr reference	2nr reference
		Civil	1nr reference	1nr reference	
6 e)	Operation of Industrial WWTW >10MLD	Process Operator	Not eligible	Not required	2nr references

6 f)	Operation of >10MLD industrial wastewater treatment Nutrient Removal SBR and Advanced Oxidation	Process Operator	Not eligible	N/A	2nr reference
6 g)	Experience in operating an industrial wastewater treatment plant including sedimentation, bio treatment, metals removal, oil recovery and tertiary filtration systems with waste sludge processing systems for industrial wastewater treatment >10MLD	Process Operator	1nr reference	1nr reference	2nr references
6 h)	Experience in operating an industrial wastewater treatment plant including integrated waste import and/or export transport and transport management systems	Process Operator	Not Required	Not Required	2nr references
6 i)	Experience in operating an industrial wastewater treatment plant including integrated full odour control for at least 5 years	Process Operator	1nr reference	1nr reference	2nr references
6 j)	Experience in operating integrated Industrial wastewater treatment with multiple streams and record of ultimate successful training and handover for owners operating staff.	Process Operator	1nr reference	1nr reference	2nr references

***Partners undertaking more than 40% of the Project Value**

- a) For joint ventures, the Lead Partner within joint ventures, Qatari partners undertaking more than 40% of the contract value and other non-Qatari partners must satisfy the respective minimum qualification requirements, indicated in the table above.
- b) Qatari partners must be Grade A Civil Engineering Contractors.
- c) The partner responsible for the process design shall meet all the experience requirements under 6 b) (i) above.
- d) The joint venture must satisfy collectively the criteria for personnel capability and financial position stated above, for which purpose the relevant figures for each of the partners shall be added to arrive at the joint venture's total capacity.
- e) Individual partners must each satisfy the requirements for audited balance sheets and litigation.
- f) The full physical requirements for comparable nature and complexity shall be met by the joint venture.
- g) The requirements for Quality Assurance shall be met by the Lead Partner.

I. Compliance Table

The following table summarises the:

- Qualification criteria;
- Compliance requirements; and
- Associated prequalification forms

that the PWA shall use to evaluate the prequalification applications.

Qualification Criteria			Compliance Requirements				Submission Requirements
Series No.	Subject	Requirement	Single Entity	Joint Ventures			
				Existing or Intended JV	Each Party	One Party	
1. Eligibility							
1.1	Conflict of Interest	No conflicts of interest, as described in ITA Sub-Clause 4.6	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Application Submission Sheet
1.2	PWA Ineligibility	Not having been declared ineligible by the PWA, as described in ITA Sub-Clause 4.3	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Application Submission Sheet
1.3	Government Owned Entity	Applicant required to meet conditions of ITA Sub-Clause 4.4	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Forms ELI – 1.1 and 1.2
2.Licenses and Registrations							
2.1	Local Commercial Registrations	Company must have commercial registration with the State of Qatar. In the case of Joint Venture a completed Declaration to Commit to Registration process.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form REG – 2.1

Qualification Criteria			Compliance Requirements				Submission Requirements
Series No.	Subject	Requirement	Single Entity	Joint Ventures			
				Existing or intended JV	Each Party	One Party	
3. Declaration							
3.1	Pre-Tendering Agreement for Joint Venture	Joint Venture Agreement	N/A	Must meet requirement	Must meet requirement	N/A	Form DC -.3.1
4. Historical Contract Non-Performance							
4.1	History of Non-Performing Contracts	Non-performance of a contract did not occur within the last two (2) years prior to the deadline for application submission based on all information on fully settled disputes or litigation.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON – 4.1
4.2	Pending Litigation in Qatar	All pending litigation shall not represent in total more than twenty five percent (25%) of the Applicant's net worth and must be treated as resolved against the Applicant.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form CON – 4.1

Qualification Criteria			Compliance Requirements				Submission Requirements
Series No.	Subject	Requirement	Single Entity	Joint Ventures			
				Existing or intended JV	Each Party	One Party	
5. Financial Situation							
5.1	Financial Performance	Submission of independently audited financial statements (in English) for the last four (4) years indicating the breakdown of local and international turnover.	Must meet requirement	N/A	Must meet requirement	N/A	Form FIN – 5.1 & Form FIN – 5.2
6. Experience							
6.1	General Experience	Experience in the design, construction, operation and maintenance of Industrial Wastewater Treatment Plants and associated works, which includes a representative portfolio of projects, as per the criteria in Section III, Sub-section E, prior to the applications submission deadline.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form EXP – 6.1, Form EXP – 6.2& Form EXP – 6.3

Qualification Criteria			Compliance Requirements				Submission Requirements
Series No.	Subject	Requirement	Single Entity	Joint Ventures			
				Existing or intended JV	Each Party	One Party	
7. Personnel Capabilities							
7.1	Experience in designing, construction, operating and maintaining Industrial Wastewater Treatment Plants, Wastewater Pumping Stations and Rising Mains.	Provision of suitably qualified personnel to fill the key positions as per Section III, Sub-section F.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form EXP – 7.1& Form EXP – 7.2
8. Health, Safety, Quality & Environment							
8.1	Company Health, Safety & Environment Plan	Health, Safety & Environment Qualification	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form HSE– 8.1
8.2	Company Quality Management Plan	A Quality Management Plan related to the work group of interest	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form QM - 8.2

Qualification Criteria			Compliance Requirements				Submission Requirements
Series No.	Subject	Requirement	Single Entity	Joint Ventures			
9. Management Approach							
9.1	Management Approach	Applicant shall provide details of its Management Approach. as identified under Section III Subsection B.2 of this document and Form MA – 9.1	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form MA - 9.1
10. Resources, Plant & Equipment							
10.1	Resources, Plant & Equipment	Provide details of Resources, Plant & Equipment available.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Form RS - 10.1

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Section IV. Application Forms

Application Submission Sheet

(to be completed by Individual Company or both parties of the JV Designated Personnel)

Date: _____

To: Public Works Authority

We, the undersigned, apply to be prequalified for the referenced project and declare that:

- (a) We have examined and have no reservations to the Prequalification Document, and all other documents issued in accordance with ITA Clause 8:
- (b) We, including any Sub-contractors for any part of the scope of supplies subject to this Prequalification do not have any conflict of interest, in accordance with ITA Sub-Clauses 4.6 and 4.7;
- (c) We, including any Sub-contractors for any part of the scope of supplies subject to this Prequalification, have not been declared ineligible by the PWA's nor State of Qatar's laws or official regulations;
- (d) We are not a government owned entity.
 We are a government owned entity and we meet the requirements of ITA Sub-Clause 4.4.
- (e) We, in accordance with ITA Sub-Clause 24.1, plan to subcontract the following key activities and/or parts of the Works:

Activities	Sub-contractor

(f) We understand that you may cancel the prequalification process at any time and that you are neither bound to accept any Application that you may receive nor to invite the prequalified Applicants to Tender for the Contract subject of this Prequalification, without incurring any liability to the Applicants, in accordance with ITA Clause 26.

Signed:.....

Name:..... in the Capacity of.....

Duly authorised to sign the Application for and on behalf of:

Applicant's Legal Name

Address

Dated on _____ day of _____, _____

Joint Venture Partner (2)

Signed:.....

Name:..... in the Capacity of.....

Duly authorised to sign the Application for and on behalf of:

Applicant's Legal Name

Address

Dated on _____ day of _____, _____

Joint Venture Partner (3)

Signed:.....

Name:..... in the Capacity of.....

Duly authorised to sign the Application for and on behalf of:

Applicant's Legal Name

Address

Dated on _____ day of _____, _____

Form ELI – 1.1

Applicant Information Sheet

*(to be completed by Individual Company or **all** JV parties)*

Date:

Project: Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798

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Applicant's legal name:....
In case of JV, legal name of each party:
Applicant's Actual or Intended country of constitution:
Applicant's Actual or Intended year of constitution:
Applicant's Legal Address in country of constitution:
Legal Status of the Company:
Parent Company (if the applicant is a subsidiary company, : give the name and address of the parent company or companies together with the details of affiliation status - % of shareholding)
Number of Years of experience of the Company: (in the State of Qatar, and in countries other than Qatar)
Number of Years of experience of the Parent Company: (in the State of Qatar, and in countries other than Qatar)
Market area covered: National / Regional / International If Regional or International, list countries of operation
Applicant's authorised representative information Name: Address: Telephone/Fax numbers: E-mail address:

Attached are copies of original documents of:

1. In case of single entity, Articles of Incorporation or Documents of Constitution of the legal entity named above (One A4 sheet only)
2. In case of JV, Pre – Tender Agreement in accordance with ITA 4.2.
3. In case of a government-owned entity, any additional documents not covered under 1 above required to comply with ITA 4.4. (One A4 sheet only)

Form ELI – 1.2

Applicant Information Sheet as per ITA 24.1
(to be completed by all JV Partners/Sub-contractors)

Project Name: Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798

Date: _____

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Note that in the case of a JV the evaluation committee will take into consideration the percentage of the joint venture individual JV Partners shall be undertaking.

Applicant's legal name:
JV's party/Sub-contractor legal name:
JV's party/Sub-contractor country of constitution:
JV's party/Sub-contractor year of constitution:
JV's party/Sub-contractor legal address in country of constitution:
JV's party/Sub-contractor authorised representative information Name: Address: Telephone/Fax numbers: E-mail Address:
Attached are copies of original documents of: <input type="checkbox"/> Articles of Incorporation or Documents of Constitution of the legal entity named above (One A4 sheet only) <input type="checkbox"/> In case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITA 4.4 (One A4 sheet only). <input type="checkbox"/> In case of JV, Pre – Tender Agreement in accordance with ITA 4.2.

Form REG – 2.1

Company Registrations

(For items 1 to 3, See ITA 4.1)

(to be completed by individual companies or designated JV Partner)

1 Registration in home country (evidence to be provided as supporting information in the submission – One A4 sheet only)				
Year established		Country/Area where registered		Registration/License No.
2 Registration in Qatar if already exists (evidence to be provided as supporting information in the hard copy submission – One A4 sheet only)				
Year established		Discipline of Registration		Registration/License No.
3 If not registered in Qatar, please provide details of working arrangement for delivering services in Qatar (One A4 sheet only):				
Prospective sponsor's name		Address and Contact Numbers		Type of Business
4 Sub-contractors, Overseas Representatives: (If applicable, please list out these other firms in regular participation with you for delivering works).				
Name		Specialisation	Base Location	Years in association
5 If the Company/Firm is already in, or intends to form, a Joint Venture with one or more other companies/firms for the provision of works, please provide the following information:				
Name of JV partner(s)		Specialisation	Current Address	Contact Person
				Contact Details
6 Fields of Specialisation of the Company/Firm/JV				
Major sector			List specific fields(s)	
a. Industrial Wastewater Treatment Projects				

7	Company or JV Structure: Detailed organization chart(s) to be provided as supporting information in the hard copy submission (One A4 sheet only):		
	(a) For the Company/JV submitting for pre-qualification showing the relationships with partners/sub-contractors. (b) For the parent company showing the relationship with the Company (if applicable).		
8	Working Languages(s)	Arabic	English
	Other (Specify):		
9	Firm's Membership of Professional Associations (if applicable):		
	Professional Association	Acronym	Type of Membership
			Member Since (year)

Form DC 3.1

PRE-TENDERING AGREEMENT FOR JOINT VENTURE

THIS AGREEMENT is entered into this ___ day of _____ 20__

BETWEEN:

- (1) **[NAME]** of [Address];
- (2) **[NAME]** of [Address]; and
- (3) **[NAME]** of [Address].

Each singly a "Party" and together the "Parties".

RECITALS:

- A. The Parties wish to co-operate in a joint venture (hereinafter the "Joint Venture") for the exclusive purpose of tendering for and performing a contract (hereinafter the "Contract") in connection with the **Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798** (hereinafter the "Project"), to be appointed by the **Public Works Authority (PWA)**(hereinafter the "Authority") in accordance with the following terms and conditions.

It is hereby agreed as follows:

Clause 1

The Parties hereby associate in Joint Venture exclusively for the purpose of jointly preparing a submission and tendering in the name ofJoint Venture or in the sole name of.....(as will be acceptable to the Authority) and to jointly perform the Contract in the event that the Tender is successful.

Clause 2

The Parties engage themselves to pursue the object of this Agreement on the basis of mutual exclusivity and undertake that they or their affiliated companies will not participate with any third parties in tenders for the execution of the Project. This clause shall survive the expiry or termination of this Agreement.

Clause 3

The Joint Venture will be backed by the full resources of the Parties who will be jointly and severally responsible for the proper fulfilment of the Contract, regardless of their respective shares in the Joint Venture. Notwithstanding the Parties' joint and several liabilities towards the Authority under the Contract, the Parties' liabilities as between themselves shall be in accordance with the participation percentage stated in Clause 6 hereto.

Clause 4

It is expressly agreed that the relationship constituted by this Agreement is that of a Joint Venture limited as herein stated, and not that of a partnership.

Clause 5

All decisions regarding the Tender, amendments thereof and execution of the Contract shall be taken by unanimity and recorded in writing between the Parties.

Clause 6

The governing principles of the Joint Venture referred to in Recitals A of this Agreement, which shall be reflected in the Joint Venture Agreement are:

- All rights, interests, liabilities, obligations and risks and all profits or net losses arising out of the Contract and Work Order(s) shall be shared or borne by the Parties in such proportion as is set out in the Joint Venture Agreement.

The participation of the Parties will be as follows:

..... percent (.....%)..... (Joint Venture Member (1))

..... percent (.....%)..... (Joint Venture Member (2))

..... percent (.....%)..... (Joint Venture Member (3))

- The Joint Venture Agreement may create a contractual, Non-Incorporated Joint Venture, or an Incorporated Joint Venture company. In the case of a contractual, non-incorporated Joint Venture, the Parties shall be jointly and severally liable to the Authority for the Joint Venture's performance of its obligations. In the case of a Joint Venture company, the Parties shall be obliged to provide the Authority with acceptable guarantees of the Joint Venture's performance of its obligations.

Clause 7

Immediately upon being awarded the Contract, the Parties shall enter into and sign a final Joint Venture Agreement in order to determine in detail the contractual stipulations governing their co-operation as joint ventures. The Authority reserves the right to audit how the Joint Venture is operating at any stage.

Clause 8

This Agreement shall terminate on any of the following occurrences:

- (a) Failure of the Parties to submit a bid to the Authority, or
- (b) The Tender is unsuccessful, or
- (c) Upon expiry of the validity period of the Tender unless extended by mutual agreement of the Parties, or
- (d) The conclusion of the Joint Venture Agreement as per Clause 9 hereof, or
- (e) The Contract is terminated by the Authority.

The termination of this Agreement in case of occurrence of any of items (a) to (e) of this Clause 8 will not become effective until all securities provided by the Parties for the Tender, if any have been paid to the Authority.

Clause 9

The Parties shall not be entitled to sell, assign, or in any manner encumber their interests or any part thereof in this Joint Venture, without obtaining the prior consent of the Authority.

Clause 10

Each of the Parties agrees to place at the disposal of the Joint Venture the benefit of its individual experience, technical knowledge and skill and shall in all respects bear its share of the responsibility and burden of performing the Joint Venture's obligations under the Contract including the provision of information, advice, personnel and any other required resources.

Clause 11

Each Joint Venture Member shall participate fully in the performance of the Joint Venture's obligations, whether as a Party to the Joint Venture Agreement in the case of a contractual, non-incorporated joint venture or as a shareholder in the case of a joint venture company.

Clause 12

Any bonds, guarantees or indemnities required by or arising out of the Contract or otherwise required for the business of the Joint Venture shall be procured by the Joint Venture and the cost of such bonds, guarantees or indemnities shall be borne by the Joint Venture.

Clause 13

Notwithstanding anything to the contrary, this Agreement shall not be considered as establishing an agency or partnership between the Parties or limiting the power or rights of the Parties each to carry on its separate business for its sole benefit. However, the Parties shall at all times act in good faith and to use their best endeavours to safeguard and further their common interests in relation to the Tender and the Contract.

Clause 14

This Agreement shall be governed by and construed in accordance with the Laws of the State of Qatar and shall be subject to the jurisdiction of the courts thereof.

This clause shall survive the termination or expiry of this Agreement.

AS WITNESS WHEREOF the parties have entered into this Agreement on the date first written above.

Authorised signature(s) of the Joint Venture Member (1)

Name _____

Title _____

In the presence of:

Name _____

Signature _____

Address _____

Authorised signature(s) of the Joint Venture Member (2)

Name _____

Title _____

In the presence of:

Name _____

Signature _____

Address _____

Authorised signature(s) of the Joint Venture Member (3)

Name _____

Title _____

In the presence of:

Name _____

Signature _____

Address _____

Appendix A – Definition

- *“Joint Venture Company”:- A company incorporated under Qatari law, formed for the purpose of entering into the Contract, in which the Joint Venture Members are shareholders.*
- *“A Contractual non-incorporated Joint Venture”:- Two or more companies acting in collaboration for profit without incorporation for the purpose of entering into the Contract.*
- *“Parties”:- The Parties to this Agreement.*

Form CON – 4.1

Historical Contract Non –Performance

*(to be completed by individual companies and **all** JV Partners/Sub-contractors)*

Applicant’s Legal Name: _____ Date: _____

Project:

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<input type="checkbox"/> No Non-Performing Contracts in accordance with Item 4.1 of Compliance Table in Section III, Sub-section H of Qualification Criteria			
<input type="checkbox"/> Non-Performing with No pending litigation in Qatar in accordance with Item 4.2 of Compliance Table in Section III, Sub-section H of Qualification Criteria			
<input type="checkbox"/> Non-Performing Contracts with Pending litigation in Qatar in accordance with Item 4.2 of Compliance Table in Section III, Sub-section H of Qualification Criteria, as indicated below			
Year	Outcome as Percent of Total Assets	Contract Identification:	Total Contract Amount (current value, QAR equivalent)
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	

Form FIN – 5.1

Financial Situation

(to be completed by individual companies and all JV Partners)

Applicant's Legal Name: _____ Date: _____

Project:

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To be completed by the Applicant and, if a JV, by each party. Use a separate sheet for each partner.

Financial Information in QAR*					
	Year 2015	Year 2016	Year 2017	Year 2018	Average
Total Assets (TA)					
Total Liabilities (TL)					
Net Worth (NW)					
Accounts Receivable (AR)					
Current Assets (CA)					
Current Liabilities (CL)					
Total Revenue (TR)					
Operating Profit (EBIT)					
Net Revenue (NR)					
Current Assets/Current Liabilities(Current Ratio)					
Operating Profit/Total Revenue (Profit Margin)					
Total Revenue/Total Assets (Return on Assets)					
Total Liabilities/Total Assets (Debt Ratio)					

Attached are copies of independently audited financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following conditions:

- a) Must reflect the financial situation of the Applicant or party to a JV, and not sister or parent companies;
- b) Historic financial statements must be audited by a certified accountant;
- c) Historic financial statements must be complete, including all notes to the independently audited financial statements;
- d) Historic financial statements must correspond to accounting periods already completed and independently audited (no statements for partial periods shall be requested or accepted);
- e) Note that in the case of a JV, the evaluation committee will take into consideration the individual financial standing of all JV Partners and the potential percentage of the joint venture they shall be undertaking.

Attached Additional Information:

- Auditor's name, address and fax number.
- Financing agency's (if any) name, address and fax number.
- Backlog of works, similar to that being proposed, at the end of the last 4 years and status to date.
- Bank guarantees issued and credit limits in the last 4 years and status to date.

* Based on the following exchange rates

Currency	Sum	Equivalent in Qatari Riyals
British Pound	£1	QR 5.63
Euro	€1	QR 4.46
US Dollar	\$1	QR 3.65

Form FIN – 5. 2

Average Annual Sales Turnover

(to be completed by individual companies and all JV Partners)

Applicant's Legal Name: _____ Date: _____

Project:

Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798

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Annual Turnover Data in Qatar (to be completed by individual companies of Qatar JV Partner)		
Year	Amount and Currency	QAR equivalent
2015		
2016		
2017		
2018		
*Average Annual Turnover		
Annual Turnover Data International (To be completed by Non Qatari JV Partner)		
Year	Amount and Currency	QAR equivalent
2015		
2016		
2017		
2018		
*Average Annual Turnover		

*Average annual turnover calculated as total certified payments received for work in progress or completed, divided by the number of years specified in Item 5.1 of Compliance Table in Section III, Sub-section H of Qualification Criteria. Both International Turnover and Local Qatar

Turnover should be provided if applicable. International Turnover should be based on the exchange rates in the following table.

Currency	Sum	Equivalent in Qatari Riyals
British Pound	£1	QR 5.63
Euro	€1	QR 4.46
US Dollar	\$1	QR 3.65

Form EXP – 6.1

Particular Experience Record

(to be completed by individual companies or lead JV Partner)

Applicant's Legal Name: _____ Date: _____

Project:

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To prequalify, the Applicant shall be required to pass the specified requirements set forth in this form, as set out in the Prequalification Data.

On a separate page, using the format of Form EXP – 6.2, the Applicant is requested to list all contracts which meet the criteria set out in Section III, Sub-section E, clauses (a) to (j). The partners of a proposed joint venture should provide details of similar contracts proportionate to their share in the joint venture. The value should be based on the currencies of the contracts converted into Qatar Riyals, at the rates given on Application Form FIN – 5.1. The information is to be summarised, using Form EXP – 6.2, for each contract completed or under execution by the Applicant or by each partner of a joint venture.

Form EXP – 6.2

Details of Contracts of Similar Nature and Complexity
(to be completed by individual companies or lead JV Partner)

Applicant's Legal Name: _____ Date: _____

Project: Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798

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Use a separate sheet for each contract.

1.	Number of contract	
	Name of contract	
	Country	
2.	Name of Employer	
3.	Address of Employer	
4.	Nature of works and special features relevant to the contract for which the Applicant wishes to prequalify. More than one box may be ticked for each project. Refer to Section III, Sub-Section E. a) <input type="checkbox"/> b)(i) <input type="checkbox"/> b)(ii) <input type="checkbox"/> b)(iii) <input type="checkbox"/> b)(iv) <input type="checkbox"/> b)(v) <input type="checkbox"/> c) <input type="checkbox"/> d) <input type="checkbox"/> d)(i) <input type="checkbox"/> d)(ii) <input type="checkbox"/> e) <input type="checkbox"/> f) <input type="checkbox"/> g) <input type="checkbox"/> h) <input type="checkbox"/> i) <input type="checkbox"/> j) <input type="checkbox"/>	
5.	Contract role (check one) <input type="checkbox"/> Sole Contractor <input type="checkbox"/> Management Contractor <input type="checkbox"/> Partner in a joint venture <input type="checkbox"/> Sub Contractor	
6.	(a) Total contract value (b) your subcontract value (c) your partner share in JV value (in Qatar Riyals at the rates given on Application Form DC 3.1. (a) (b) (c)	
7.	For sole/prime contractors, indicate the approximate Qatar Riyal amount and nature of substantial work (more than 20 percent in contract value) undertaken by subcontract, if any.	
8.	Date of award	Contract Duration
9.	Date of completion	

10	<p>Project Description – Either insert project description here or supply a data sheet. The data sheet shall be inserted immediately after this sheet.</p>
----	--

The Applicant should insert any specific contractual criteria required for particular operations, such as the population/industries served, dry weather flow, effluent consent, treatment process employed for wastewater treatment works and the peak flow capacity for wastewater transfer pumping stations.

Form EXP – 7.1

Personnel Capabilities

(to be completed by individual companies or lead JV Partner)

Applicant's Legal Name: _____ Date: _____

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*For specific positions **essential** to contract implementation, applicants should provide the names of at least two candidates qualified to meet the specified requirements stated for each position. The data on their experience should be supplied in separate sheets using one Form EXP – 7.2 for each candidate.*

Sl. No.	Position	Total experience (years)	In similar works (years)	As manager of similar works (years)	Experience in the Gulf (years)
1.	Project Director				
	Name of prime candidate				
	Name of alternate candidate				
2.	Civil Works Site Manager - WWTW				
	Name of prime candidate				
	Name of alternate candidate				
3.	M&E Project Manager - WWTW				
	Name of prime candidate				
	Name of alternate candidate				
4.	Lead Process Design Manager – (Contractor)				
	Name of prime candidate				
	Name of alternate candidate				
5.	Project Design Director				
	Name of prime candidate				
	Name of alternate candidate				
6.	Civil Design Manager				
	Name of prime candidate				
	Name of alternate candidate				
7.	MEICA Design Manager				
	Name of prime candidate				
	Name of alternate candidate				
8.	Hydraulic Design Manager				
	Name of prime candidate				

	Name of alternate candidate				
10.	Process Design Manager				
	Name of prime candidate				
	Name of alternate candidate				
12.	Operations Director				
	Name of prime candidate				
	Name of alternate candidate				
13.	Operations Manager				
	Name of prime candidate				
	Name of alternate candidate				
14.	Maintenance Manager				
	Name of prime candidate				
	Name of alternate candidate				
15.	Lead Process Controller				
	Name of prime candidate				
	Name of alternate candidate				

Form EXP – 7.2

Candidate Summary

(to be completed for each Candidate listed under Form EXP – 7.1)

Applicant's Legal Name: _____ Date: _____

Project: Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798

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Position		Candidate <input type="checkbox"/> Prime <input type="checkbox"/> Alternate	
Candidate Information	1. Name of Candidate		2. Date of Birth
	3. Professional Qualifications		
Present Employment	4. Name of Employer		
	Address of Employer		
	Telephone	Contact (manager / personnel officer)	
	Fax	E-mail	
	Job Title of Candidate	Years with Present Employer	

Summarise professional experience over the last 20 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the Project.

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

Form HSE- 8.1

Health, Safety and Environment

(to be completed by individual companies and all JV Partners)

Applicant's Legal Name: _____ Date: _____

Project: Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798

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Please tick in each box as appropriate.		YES	NO
1	Is your company Safety Management System (SMS) certified to OHSAS 18001:2007 If 'yes' provide a copy of your current certificate?		
2	If the answer is no, at 1 then describe your current safety management system and plan including any future plans to achieve certification. (Maximum 200 words).		Page 54
3	Is your company Environment Management System certified to ISO 14001:2004 If 'yes' provide a copy of your current certificate?		
4	If the answer is no, at 3 then describe your current Environment management system including any future plans to achieve certification. (Maximum 200 words).		Page 55
5	Does your company have personnel assigned the responsibility of HSE at the corporate level?		
6	Does your company have personnel assigned the responsibility of HSE at the project/site level?		
7	Does your company provide adequate personal protective equipment, induction training for new starters, tool-box talks, inspection, maintenance and replacement?		
8	Do you always have trained First-aiders on construction sites and keep documented medical records?		
9	Does your company have a process for identifying hazards and assessing/managing risks associated with identified hazards?		
10	Describe the level of site welfare facilities you would expect to provide on a similar project? (Maximum 200 words)		Page 56

11	Please provide the following safety performance data:				
		2014	2013	2012	2011
	Fatalities				
	Lost Time Injuries (LTI) (>3 days)				
	Total hours worked				
	Accident Frequency Rate (AFR) *				
	Medical Treatment Injuries				
	Prosecuted for any HSE related offences				
	Prohibition or improvement notices by an enforcement authority				
<p>*Accident Frequency Rate (AFR) = (Total of LTI >3 days) divided by (the total hours worked) divided by (100,000).</p>					

HSE – 8.1 Question 2: Maximum of 200 words.

HSE – 8.1 Question 4: Maximum of 200 words.

HSE – 8.1 Question 10: Maximum of 200 words.

|

Form QM – 8.2

Quality Management

*(to be completed by individual companies and **all** JV Partners)*

Applicant's Legal Name: _____ Date: _____

Project: Design, Build, Operate and Maintain (DBOM) Contract for Integrated Industrial Wastewater Treatment Works (IIWWTW) - CP798

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Tick as appropriate:

		Yes	No
1	Is your company Quality Management System (QMS) certified to BS EN ISO 9001:2008 If 'yes' provide a copy of your certificate?		
2	If the answer is no, at 1 then describe your current Quality Management System and plan including any future plans to achieve certification. (Maximum 200 words)		Page 58
3	Does your company provide technical training and or certification for your work force?		
4	Does your company provide job specific Quality training to your employees?		
5	Does your company have a process to control and monitor the quality of your workmanship?		
6	Does your company have a process to control and monitor the quality of your construction materials?		
7	Does your company have a process to control and monitor the quality of your equipment and plant?		
8	Does your company have a process to control and monitor the quality of your sub-contractors performance?		
9	Does your company have a system where knowledge, skills and experience gained by individuals is disseminated, shared and redeployed?		

QM – 8.2 Question 2: Maximum of 200 words.

Form QM – 9.1

Management Approach

(To be completed by individual companies and all JV Partners)

Applicant's Legal Name: _____ **Date:** _____

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Item	Management Approach	Evidence Attached

Form RS – 10.1

Resources, Plant & Equipment

*(to be completed by individual companies and **all** JV Partners)*

1. How many employees do you directly employ currently that are located in the State of Qatar?
2. How many employees do you directly employ currently that are located in GCC countries?
3. How many employees do you directly employ currently that are located internationally?
4. How many staff do you employ in Qatar at each grade, relevant to the work that is the subject of this application?

Management	
Professional	
Administrative/Clerical	
Construction Supervisors	
Skilled Trade Operatives	
Plant Operators	
General Labour	
Others	
TOTAL	

- 5. Briefly describe your company's material procurement process and explain how you will manage your supply chain to ensure security of supply both in terms of price and quantity. (Maximum of 200 words)

6. Please indicate the major construction plant and equipment (both fixed and mobile) currently in the company's ownership.
(no more than 20 entries)

Item No.	Plant and Equipment Type	Total Number of Units Owned	Currently Located in Qatar	Currently Located in GCC	Currently Located Internationally
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					



هيئة الأشغال العامة
PUBLIC WORKS AUTHORITY
شؤون البنية التحتية
INFRASTRUCTURE AFFAIRS
(DRAINAGE NETWORKS PROJECTS DEPARTMENT)

PREQUALIFICATION DOCUMENT

FOR

DESIGN, BUILD, OPERATE AND MAINTAIN (DBOM) CONTRACT FOR INTEGRATED INDUSTRIAL WASTEWATER TREATMENT WORKS-CP798

PROJECT CODE: IA 14/15 C 133 G

PART 2–WORK REQUIREMENTS

Public Works Authority
PO Box 22188
Doha
State of Qatar

April 2018

PART 2: WORK REQUIREMENTS

Table of Contents – Part 2

1. Appendix A – Scope of Works 65
3. Appendix B – Drawings Showing Main Components of Project 98

Disclaimer:

The Scope of Works and the Conditions of Contract specified in the appendices A and B are issued to the bidders for guidance only and, only in order to form the basis of this tender prequalification. These shall not be by any means, the exact Scope of Works and the Conditions of Contract, as such shall be included in the final tender documents. PWA shall reserve the right to make amendments to the Scope of Works and the Conditions of Contract as appropriate at the time of tendering.

APPENDIX A: SCOPE OF WORKS

1. QUALIFICATION CRITERIA

Refer to Part 1, Section III for further details.

It is a prerequisite that the Applicants are either registered with the Ministry of Finance and Ministry of Economy and Commerce or intend to apply and register within fifteen (15) days of Notice of Award Letter issue.

To prequalify, an applicant must demonstrate to the Public Works Authority that it satisfies the requirements regarding experience, financial position, litigation history, and personnel capabilities.

1.1 Replacement of Personnel

The Contractor shall provide 30 day notice of an intention to remove or substitute any key team members, and shall provide a replacement that is acceptable to the PWA.

The Contractor shall ensure the replacement is given a full project briefing and is in place not less than 5 days before end of the 30 day notice period to ensure continuity.

2. SCOPE OF WORKS

The information contained in the next section shall form Section C, Part 3 of the Tender Documents.

2.1 INTRODUCTION

- 2.1.1 The State of Qatar is a peninsula located on the northeast coast of the much larger Arabian Peninsula with a total land area of approximately 11,500 square kilometres. The population is approximately 1.7 million inhabitants (2009 census) with almost 83% of the inhabitants residing in Doha and its main suburb Al-Rayyan.
- 2.1.2 The State of Qatar has experienced rapid economic growth over the last several years. This economic growth has resulted in increased demand for the State to construct and provide first-class infrastructure such as government buildings (hospital, schools, and the like) transportation networks (harbours, airports, highways, roads etc.) and services (power, water, sewerage, waste disposal etc.).
- 2.1.3 This increased demand has consequently placed extraordinary requirements on the relevant government entities and their resources. It has become necessary to enhance the capacity of these government entities in order to deliver the required infrastructure.
- 2.1.4 The PWA (Public Works Authority), also known as Ashghal, is responsible for the planning, design, procurement construction, assets management, and delivery of infrastructure and building works in the State of Qatar.
- 2.1.5 PWA contributes to the economic and social development of the State of Qatar through implementing public projects in accordance with the approved plans of the State. In coordination with other agencies in the State, PWA implements and programmes the execution of public projects consistent with the approved State objectives and allocated budget.
- 2.1.6 PWA's tasks also include preparation of studies, designs, and technical specifications for the public projects; procurement of public projects and overseeing the work; implementing major maintenance projects according to the plans, programmes and studies developed; as well as implementation, management, operation and maintenance of drainage, groundwater, surface water and water treatment projects.
- 2.1.7 Through its major departments, PWA strives to develop the State's infrastructure and public amenities to the level of international standard achieved by developed countries and communities and in general it contributes to the overall sustainable development of the State in economic and social areas of the State.

- 2.1.8 The PWA consists of administrative units set out below:
 - 2.1.8.1 First: Administrative units under the Minister of Municipality and Urban Planning: The Internal Audit Unit.
 - 2.1.8.2 Second: Administrative units under the President including Office of the President, Public Relations and Communication Unit, Legal Affairs Department and Corporate Development & Planning Department.
- 2.1.9 PWA's major business unit consists of five major sectors as below:
 - 2.1.9.1 Buildings Affairs
 - 2.1.9.2 Infrastructure Affairs
 - 2.1.9.3 Technical Support Affairs
 - 2.1.9.4 Assets Affairs
 - 2.1.9.5 Shared Services Affairs
- 2.1.10 Buildings Affairs: This sector is subdivided into Designs Department and Projects Department dedicated to government building projects such as schools, ports, recreational facilities, healthcare facilities and other government buildings.
- 2.1.11 Infrastructure Affairs: This sector is subdivided into Local Roads and Drainage and Expressway departments.
- 2.1.12 Technical Support Affairs: this sector consists of three departments:
 - 2.1.12.1 Contracts Department, which is responsible for procurement, process and procedures in the delivery of PWA Projects.
 - 2.1.12.2 Engineering Business Support Department, which provides technical support for the Projects in terms of project planning, estimating, tracking and documentation.
 - 2.1.12.3 Quality and Safety Department, which is responsible for the quality control of projects and safety at work sites and offices.
- 2.1.13 Assets Affairs: This sector handles operation and maintenance of assets through two departments namely, Drainage Operation and Maintenance Department and Road Operation and Maintenance Department.
- 2.1.14 Shared Services Affairs: All other departments that deal with technical supports come under this sector including Administration and Finance Department, Human Resources Department, General Services Department and Information System Department.

2.2 PROJECT DESCRIPTION

The project comprises the following:

- I. New Integrated Industrial Wastewater Treatment Works, its operation and maintenance, and training of PWA O&M staff
- II. Industrial Wastewater treatment works integration with an existing treatment works (IASTW) and its extensions

2.3 USE OF REFERENCE DESIGN

IIWWTW reference design to be provided for DBOM tendering will not be a proscriptive design but rather an exemplary design to achieve the minimum outcomes required from DBOM tenderers for the proposed IIWWTW, in order to meet;

- I. final effluent (*i.e.* treated sewage effluent) quality
- II. intermediate discharges quality (to be consistent with final effluent)
- III. value engineering aspirations
- IV. plant resilience and operability requirements and,
- V. plant modularization to allow seamless expansions in future.

Consequently, any alternative designs to be tendered by DBOM bidders, which meets the full range of specified outcomes, may differ significantly from the reference design provided that the alternative design resides within the limitations and constraints to be prescribed at the time of tendering. DBOM bidders shall also be required to fully demonstrate the satisfactory achievement of the minimum outcomes through their alternative designs.

2.4 ALLOWANCE FOR FUTURE EXPANSIONS (CAPACITY AND CAPABILITY)

The reference design described herein is primarily aimed at modularization principles to allow seamless expansions in future, and to allow introduction of new technologies to treat currently unforeseen pollutants (hazardous and toxic) that may arise from future industries to be located in Qatar. Consequently, in this reference design, spacing between process units and associated equipment had been arranged to permit capacity expansions and technology enhancements within those footprints. Therefore, it is imperative that the DBOM contractor maintains (and adheres to) this principle throughout project lifecycle so that under no circumstances, plant modularization concept is to be compromised by the contractors' designs.

2.5 INTEGRATED INDUSTRIAL WASTEWATER TREATMENT WORKS (DESIGN-BUILD-OPERATE-MAINTAIN)

A new Integrated Industrial Water Treatment Works (IIWWTW) is to be constructed approximately 2 km Southwest of Doha Industrial Area adjacent to the existing Industrial Area Sewerage Treatment Works (IASTW). Public Works Authority (PWA) is mandated to complete the first Phase of IIWWTW (known as IIWWTW, PHASE I) by the end of year 2021 to provide 10,000m³/d treatment capacity of industrial wastewater/ trade effluent. At the completion of project IIWWTW PHASE

I, the plant will provide a fully integrated solution for treating industrial wastewaters arising from light to medium categories of industrial and trade establishments located (and to be located) in Qatar, in conjunction with the disposal of treated sewage effluent (TSE) emanating from existing IASTW.

The proposed IIWWTW PHASE I will handle tankered industrial wastewaters up to a capacity of 10,000m³/day generated within the Doha Industrial Area Catchment (DIA). These wastewaters comprise pollutant strengths typically exceeding PWA's Table 60 limits that control trade effluent discharges to public sewer network. The design of the proposed IIWWTW will be based upon a fully-integrated solution with multi-stream wastewater flow handling and multi-strength treatment capabilities all built-in to the plant as illustrated in Figures 1, 2, and 3. This concept will also allow seamless additions to both capacity and capability through its modularized design approach so that the plant can be expanded in future (PHASE II, PHASE III, etc.) beyond its current capacity of 10,000m³/day, when required.

During its design horizon and beyond, it is expected that IIWWTW will undergo further expansions and/or technological enhancements as described above (Section 2.4) to cater for the growth in Qatar industrial sector, particularly in relation to the planning of new Qatar Economic Zones (QEZ) that were initiated by the Ministry of Energy & Industries (MEI). At present, IIWWTW aims at providing a suitable facility to treat industrial wastewater originating from a range of light and medium industrial operations located within Doha Industrial Area (DIA) that in some cases (e.g. paper waste) contain elevated levels of recalcitrant soluble COD. However, as demands increase in future, IIWWTW will be modularly expanded (PHASE II, PHASE III, etc.) both in its capacity and treatment capabilities to match the growth in Qatar industrial sector and the types of industrial wastewater and trade effluent discharged to be treated at the plant.

2.6 INTEGRATION WITH THE EXISTING SEWAGE TREATMENT WORKS (IASTW)

Industrial Wastewaters received by tankers are to be treated within the proposed IIWWTW to Table 2 (see below) requirements and then discharged as split flows to PHASE 2A and PHASE 2B works of the existing IASTW. In order to achieve required dilutions, treated industrial effluent (TIE) should be aimed at discharging to existing secondary balancing lagoons (in both PHASE 2A and PHASE 2B), where it will be pre-blended with the secondary treated effluent produced from existing IASTW. All flows (*i.e.* TIE blended with secondary-TSE) will then be forwarded to existing tertiary treatment process units (Granular Media Filtration, Ultrafiltration, Chlorination, Ultraviolet Irradiation) to achieve the final treated effluent quality (*i.e.* TSE). In the existing IASTW, sufficient hydraulic headroom has been made available to receive treated industrial effluent (TIE) to undergo further tertiary treatment (refer to Figures 2 and 3 below). When flows from both IIWWTW and IASTW (existing) combine, full dilution of treated industrial effluent (TIE) will begin to meet the overall scheme quality standards (*i.e.* 90thile compliance with Table 1, Treated Sewage Effluent Quality Standards).

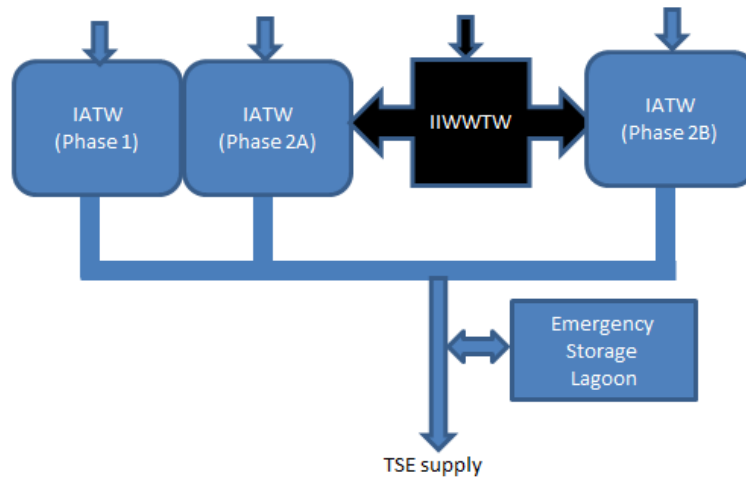


Figure 1: IIWWTW Design Concept.

2.7 TREATED SEWAGE EFFLUENT (TSE) EMERGENCY STORAGE LAGOON

The existing IASTW suffers from lacking emergency TSE storage on site. Therefore, Public Works Authority (PWA) is faced with seasonal TSE disposal problems during cold winters and rainfall events, as a direct result of diminishing TSE demands from end users. In order to resolve this problem, emergency TSE retention lagoon for a full three-day (3 day) storage at 60,000m³/d flow (*i.e.* 180,000m³) shall be provided on site as indicated on the proposed layout drawing shown in **Appendix B**. This TSE emergency storage lagoon shall also serve as a contingency measure for occasional Treated Industrial Effluent (TIE) storage in the event of process disruptions at the IIWWTW.

The proposed design criterion is as follows:

Design Criteria	Parameter
Capacity (m ³)	180,000
Base Construction	Reinforced Concrete with Impervious Membrane Underlay
Sides Construction	Earth-Bund Open Lagoon(s) with Rock Armour Protection
Inlet	Gravity Feed Pipelines
Outlet	Pumped Return Pipelines
De-Siltation	Provisions for Periodic Dredging

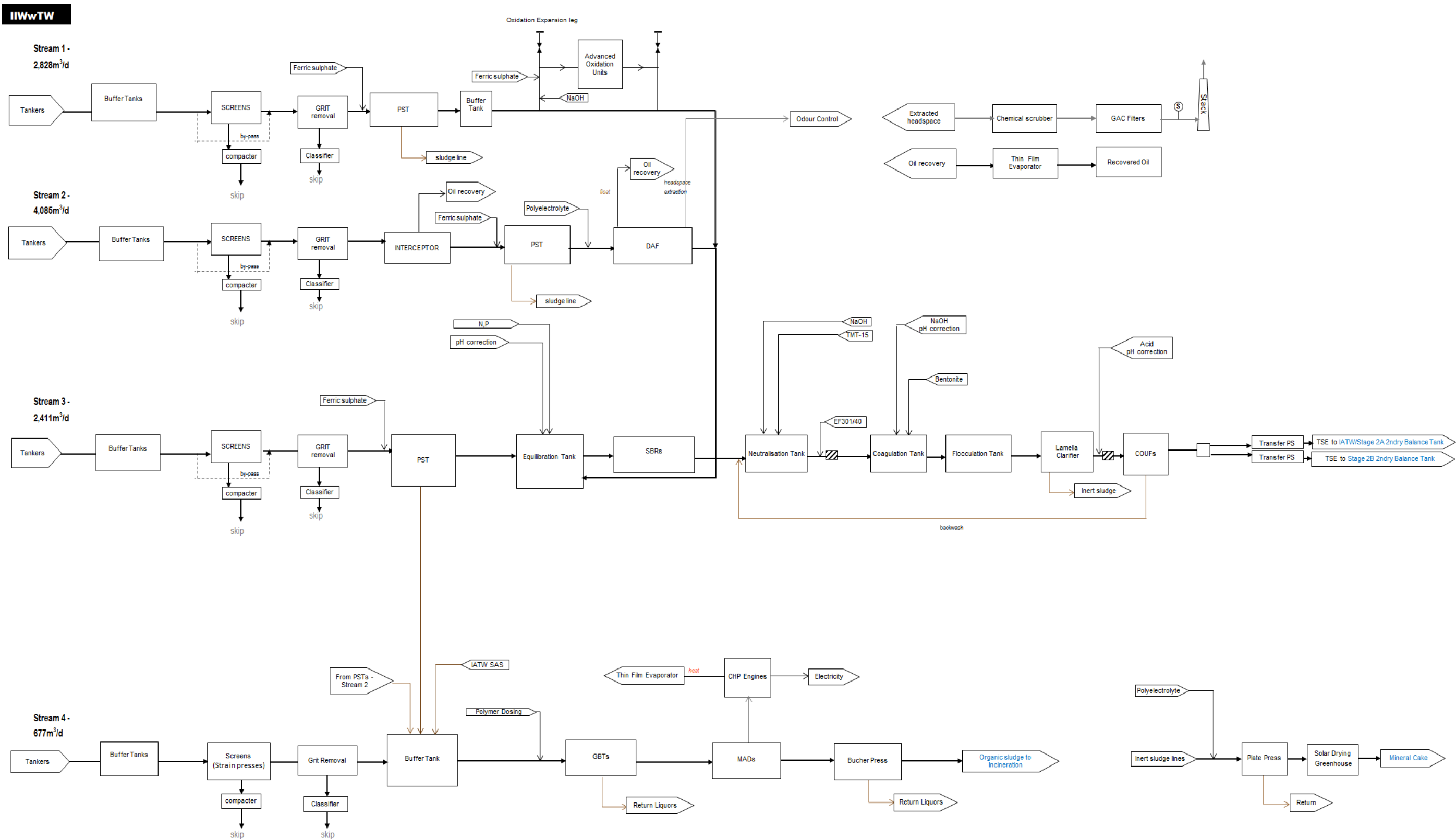


Figure 2: IIWWTW Reference Design Process Flow Diagram

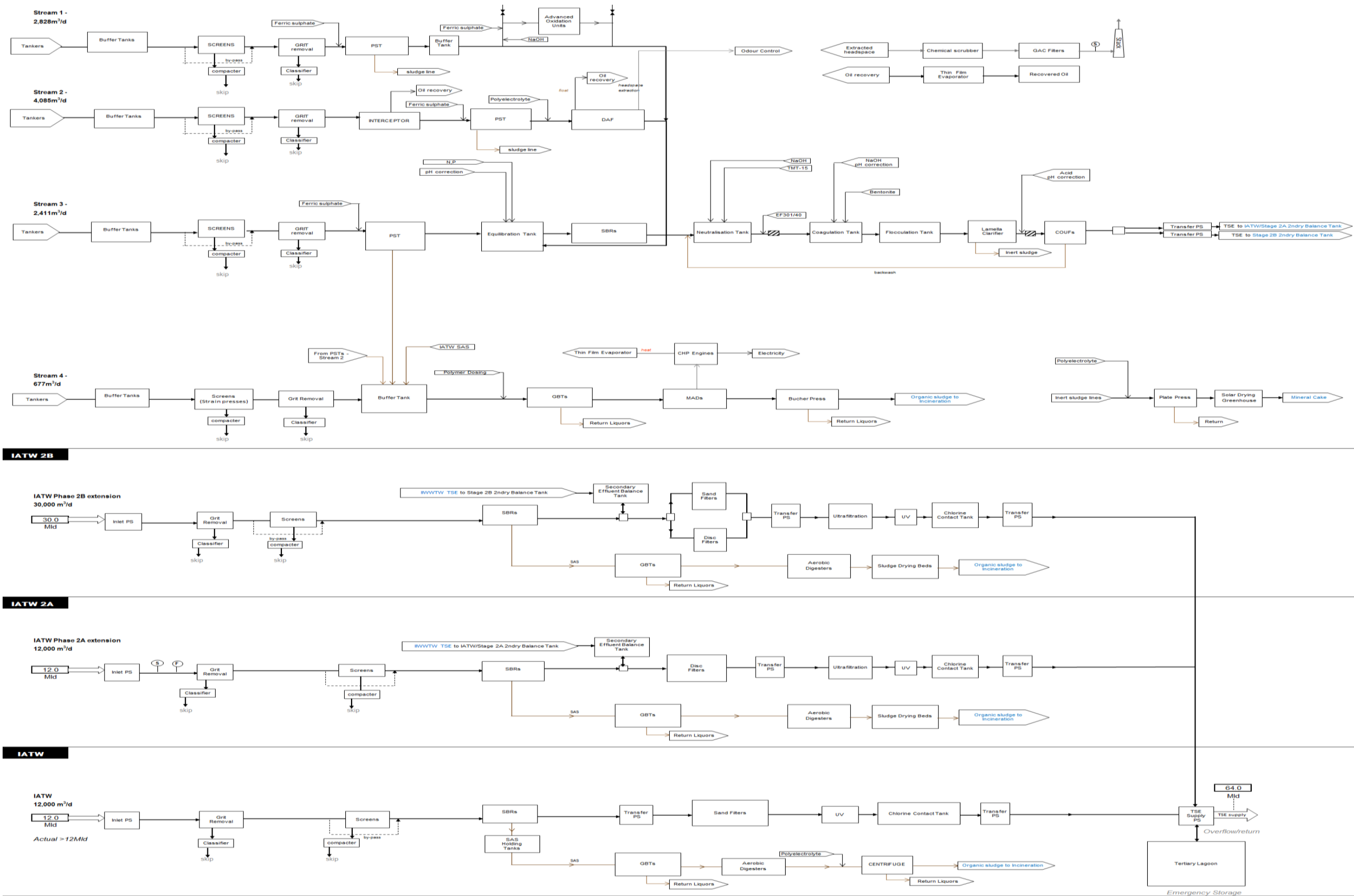


Figure 3: IIWWTW and IASTW Context: the integrated Design Concept (IIWWTW and IASTW PFDs)

*Table 1: Final Effluent Quality Requirements: Combined Facility Treated Sewage Effluent (TSE)
Quality Requirements after blending and dilution*

Parameter	Unit	Standard (Permissible Limit)	Basis Compliance
Chemical Oxygen Demand (COD)	mg/l	50	90 percentile
Biochemical Oxygen Demand (BOD ₅)	mg/l	5	90 percentile
Suspended Solids (SS)	mg/l	5	
Free and Saline Ammoniacal Nitrogen (NH ₃ N & NH ₄ N)	mg/l	<1	90 percentile
Total Nitrogen (TN)	mg/l	5	50 percentile
Total Phosphorus (TP)	mg/l	1	90 percentile
pH	Scale	6-9	90 percentile
Chlorine (Free Residual)	mg/l	0.5-1	90 percentile
Dissolved Oxygen (DO)	mg/l	2	90 percentile
Turbidity	NTU	2	
Fecal Coliforms (MPN)	(cfu/100 ml)	None	90 percentile
Intestinal Nematode Eggs	(egg/ltr)	0 per litre	95 percentile
Enteric Viruses	(PFU/40ltr)	<1.0 PFU/40 litre	90 percentile
Giardia	(Cysts/40 ltr)	<1.0 cysts per 40 ltr	90 percentile

Table 2: Final Effluent Quality Requirements: Treated Industrial Effluent (TIE) Quality Requirements before blending and dilution

Determinant	Unit	Maximum Limit
BOD	mg/l	20
COD	mg/l	80
TDS	mg/l	1200
TSS	mg/l	65
pH	pH	8.5
Total Alkalinity (as CaCO₃)	mg/l	100
Temperature	°C	20 to 35
Free Residual Chlorine	mg/l	0.5
Chlorides	mg/l	10.0
Cyanides as CN	mg/l	0.001
Total Kjeldahl Nitrogen	mg/l	15
Nitrogen-Ammoniacal	mg/l	2.50
Nitrates-Total	mg/l	2.50
Oil and Grease-TOTAL	mg/l	0.500
Tar and Tar Oils	mg/l	0.001
Total Petroleum Hydrocarbons	mg/l	0.001
Total Chlorinated Hydrocarbons	mg/l	0.001
Polycyclic Aromatic Hydrocarbons	mg/l	0.001
Poly-Chlorinated Biphenyls	mg/l	0.001
Gasoline Range	mg/l	0.001
Phenols	mg/l	0.001
Total Phosphorus	mg/l	0.500
Sulphates	mg/l	50.0
Surfactants	mg/l	5.00
Aluminium	mg/l	5.00
Arsenic	mg/l	0.001
Barium	mg/l	0.50
Beryllium	mg/l	0.10
Boron	mg/l	2.00
Cadmium	mg/l	0.001
Chromium	mg/l	0.10
Cobalt	mg/l	0.05
Copper	mg/l	0.20
Iron	mg/l	5.00
Lead	mg/l	5.00
Magnesium	mg/l	50.00
Manganese	mg/l	0.02
Mercury	mg/l	0.001
Molybdenum	mg/l	0.01
Nickel	mg/l	0.20
Selenium	mg/l	0.02
Silver	mg/l	0.01
Lithium	mg/l	0.01
Tin	mg/l	0.01
Zinc	mg/l	2.00
Vanadium	mg/l	0.10

2.8 WASTEWATER CHARACTERISTICS

The range of waste types to be tankered to the IIWWTW is listed in **Table 3** below.

Table 3: Table of Waste Types

Code	Description
CW	Car Wash (washwater)
CW/CH	Car wash (washwater)/ Chemicals
CMT	Cement washwater
CH	Chemical wastewater
CH/Dairy	Chemical wastewater/Dairy
CH/DTG	Chemical wastewater/Detergents
DTG	Detergents
Oil	Oil wastewater
Oil/CH	Oil wastewater/Chemicals
Oil/CW	Oil wastewater/car wash (washwater)
Oil/DTG	Oil wastewater/detergents
SL	Sludge (biotreatment plant waste sludge)

The waste types are organised into four (4) treatment streams for the reference design based on their characterisation. The four (4) streams generic character is presented in **Table 4** below.

Table 4: Waste Stream Allocation by Waste Category for Reference Design

Final Wastewater Stream Waste Assignments										
Final Assignments							Stream	Generic Character		
						CH	1	High COD, moderate FOG, moderate to high metals		
			Oil/CH	CW/CH	oil	CW	2	High COD, High FOG, High metals		
		Oil/CW	Oil/DTG	DTG	CH/Dairy	CMT	3	Moderate COD, TSS, FOG and metals		
						SL	4	Sludge		

Reference design individual stream compositions are as listed below in **Tables 5 to 8** below.

Table 5: Reference Design Stream 1 Characteristics

Flow	2,828	m ³ /day	
STREAM 1 concentrations	Means 2015	90%ile 2015	Max 2015
BOD	5,480.60	8,340.00	8,940.00
COD	17,150.83	26,625.00	26,700.00
Filtered (soluble) COD	6,639.00	11,315.00	12,250.00
TDS	5,705.50	8,938.00	9,350.00
TSS	6,147.67	11,695.00	13,760.00
VSS	3,315.33	6,745.00	9,350.00
Settleable Solids	5,852.67	11,205.00	13,240.00
pH	6.82	7.69	7.90
Total Alkalinity (as CaCO ₃)	4,156.43	6,525.00	7,125.00
TOC	4,961.17	7,431.50	7,880.00
Chlorides	527.57	864.40	1,030.00
Chlorine-Residual	0.00	0.00	0.00
Cyanides as CN	0.00	0.00	0.00
Detergents	0.00	0.00	0.00
Fluorides	1.04	1.50	1.60
Total Nitrogen	105.25	191.05	211.40
Total Kjeldahl Nitrogen	106.55	190.55	211.10
Nitrogen-Ammoniacal	40.22	89.30	142.80
Nitrogen -Organic	66.23	108.00	139.80
Nitrates-Total	1.94	3.76	4.39
Oil and Grease-TOTAL	284.45	839.00	1,580.00
Oil and Grease-Emulsified	0.00	0.00	0.00
Oil and Grease-Free Oil	0.00	0.00	0.00
Oil and Grease-Non-hydrocarbon	284.45	839.00	1,580.00
Tar and Tar Oils	0.00	0.00	0.00
Total Petroleum Hydrocarbons	3.10	6.83	8.06
Total Chlorinated Hydrocarbons	0.00	0.00	0.00
Polycyclic Aromatic Hydrocarbons	0.00	0.00	0.00
Poly-Chlorinated Biphenyls	0.00	0.00	0.00
Gasoline Range	0.00	0.00	0.00
Heavy Fraction Range	2.93	6.80	8.00
Diesel Range	0.17	0.51	0.96
Pesticides-Non Chlorinated	0.00	0.00	0.00
Organo-Phosphorus Pesticides	0.00	0.00	0.00
Organochlorine Pesticides	0.00	0.00	0.00
Phenols	0.08	0.18	0.25
ortho-Phosphate	7.18	17.15	21.80
Total Phosphorus	10.80	16.36	17.71
Sulphates	38.00	65.00	70.00
Sulphides as S ₂	64.75	158.70	285.60
Surfactants	2.28	5.15	8.65
Aluminium	133.28	295.80	298.30
Arsenic	0.00	0.00	0.00
Barium	2.67	5.68	7.19
Beryllium	0.00	0.00	0.00
Boron	12.13	18.38	18.80
Calcium	1,779.49	3,720.50	3,903.00
Cadmium	0.00	0.00	0.00
Chromium	0.50	1.07	1.15
Cobalt	0.09	0.17	0.17
Copper	1.94	4.88	5.00
Iron	123.92	301.20	326.40
Lead	0.55	1.30	1.34
Magnesium	120.43	213.65	243.10
Manganese	3.28	4.87	4.88
Mercury	0.00	0.00	0.00
Molybdenum	0.29	0.72	0.79
Nickel	0.30	0.72	0.75
Potassium	39.18	55.46	57.82
Selenium	0.00	0.00	0.00
Silver	0.01	0.02	0.04
Sodium	404.54	735.85	783.30
Lithium	0.33	0.55	0.63
Tin	0.00	0.00	0.00
Zinc	9.34	23.28	25.18
Vanadium	0.07	0.16	0.19

Table 6: Reference Design Stream 2 Characteristics

Flow	4,085	m ³ /day	
STREAM 2 concentrations	Means	90%ile	Max
	2015	2015	2015
BOD	1,686.32	4,355.00	7,224.00
COD	5,612.06	10,810.00	31,950.00
Filtered (soluble) COD	1,988.00	2,999.00	25,250.00
TDS	1,453.22	3,380.50	5,349.00
TSS	1,588.78	3,055.00	9,150.00
VSS	732.94	1,581.00	3,470.00
Settleable Solids	1,442.06	2,850.00	8,620.00
pH	7.63	9.45	12.54
Total Alkalinity (as CaCO ₃)	500.46	885.50	2,115.00
TOC	1,560.64	3,246.00	8,200.00
Chlorides	172.41	350.23	511.80
Chlorine-Residual	0.00	0.00	0.00
Cyanides as CN	0.00	0.00	0.00
Detergents	0.00	0.00	0.00
Fluorides	0.55	1.40	1.60
Total Nitrogen	153.87	286.49	471.60
Total Kjeldahl Nitrogen	151.93	285.93	471.50
Nitrogen-Ammoniacal	51.60	140.10	160.20
Nitrogen - Organic	104.94	172.13	339.30
Nitrates-Total	1.53	2.54	4.90
Oil and Grease-TOTAL	328.68	884.60	1,564.00
Oil and Grease-Emulsified	0.00	0.00	0.00
Oil and Grease-Free Oil	0.00	0.00	0.00
Oil and Grease-Non-hydrocarbon	328.68	884.60	1,564.00
Tar and Tar Oils	0.00	0.00	0.00
Total Petroleum Hydrocarbons	504.75	1,367.09	4,503.97
Total Chlorinated Hydrocarbons	0.00	0.00	0.00
Polycyclic Aromatic Hydrocarbons	0.00	0.00	0.00
Poly-Chlorinated Biphenyls	0.00	0.00	0.00
Gasoline Range	0.04	0.02	0.65
Heavy Fraction Range	478.93	1,357.40	4,088.00
Diesel Range	25.78	20.49	415.97
Pesticides-Non Chlorinated	0.00	0.00	0.00
Organo-Phosphorus Pesticides	0.00	0.00	0.00
Organochlorine Pesticides	0.00	0.00	0.00
Phenols	0.03	0.07	0.16
ortho-Phosphate	12.87	36.72	70.30
Total Phosphorus	18.02	46.14	92.90
Sulphates	49.83	98.00	140.00
Sulphides as S ₂ -	13.00	25.24	48.20
Surfactants	1.39	1.97	7.25
Aluminium	107.73	417.21	824.00
Arsenic	0.00	0.00	0.00
Barium	2.24	3.79	23.54
Beryllium	0.01	0.00	0.13
Boron	8.98	0.63	157.60
Calcium	1,340.24	2,895.50	11,900.00
Cadmium	0.00	0.00	0.00
Chromium	0.72	2.32	5.61
Cobalt	0.04	0.13	0.37
Copper	38.76	14.28	650.10
Iron	138.19	512.79	1,052.00
Lead	23.49	1.75	418.00
Magnesium	265.99	694.88	2,392.00
Manganese	2.26	7.03	15.46
Mercury	0.00	0.00	0.00
Molybdenum	0.68	1.25	8.88
Nickel	0.48	1.91	3.25
Potassium	31.44	83.61	134.30
Selenium	0.00	0.00	0.00
Silver	0.01	0.02	0.07
Sodium	91.30	142.96	359.20
Lithium	0.18	0.63	1.37
Tin	0.00	0.00	0.00
Zinc	9.20	29.71	62.92
Vanadium	0.13	0.46	1.07

Table 7 : Reference Design Stream 3 Characteristics

Flow	2,411	m ³ /day	
STREAM 3 concentrations			
	Means	90%ile	Max
	2015	2015	2015
BOD	1,012.09	2,574.00	5,138.00
COD	2,840.17	6,146.00	17,525.00
Filtered (soluble) COD	1,012.09	3,325.00	4,010.00
TDS	3,183.30	7,651.60	9,148.00
TSS	835.22	1,832.80	3,600.00
VSS	448.26	1,044.60	1,476.00
Settleable Solids	738.00	1,651.40	3,224.00
pH	8.60	12.37	12.66
Total Alkalinity (as CaCO ₃)	1,373.03	3,221.00	4,948.50
TOC	763.46	1,951.04	3,279.00
Chlorides	376.43	760.76	2,255.00
Chlorine-Residual	0.00	0.00	0.00
Cyanides as CN	0.00	0.00	0.00
Detergents	0.00	0.00	0.00
Fluorides	44.64	1.62	1,010.00
Total Nitrogen	85.07	231.88	370.80
Total Kjeldahl Nitrogen	84.80	231.16	370.70
Nitrogen-Ammoniacal	40.74	99.56	213.00
Nitrogen -Organic	44.06	112.20	212.80
Nitrates-Total	2.12	3.94	4.34
Oil and Grease-TOTAL	708.45	889.20	12,430.00
Oil and Grease-Emulsified	0.00	0.00	0.00
Oil and Grease-Free Oil	0.00	0.00	0.00
Oil and Grease-Non-hydrocarbon	708.45	889.20	12,430.00
Tar and Tar Oils	0.00	0.00	0.00
Total Petroleum Hydrocarbons	50.16	194.61	298.86
Total Chlorinated Hydrocarbons	0.00	0.00	0.00
Polycyclic Aromatic Hydrocarbons	0.00	0.00	0.00
Poly-Chlorinated Biphenyls	0.00	0.00	0.00
Gasoline Range	0.08	0.03	1.66
Heavy Fraction Range	47.20	192.88	294.00
Diesel Range	2.88	1.63	56.03
Pesticides-Non Chlorinated	0.00	0.00	0.00
Organo-Phosphorus Pesticides	0.00	0.00	0.00
Organochlorine Pesticides	0.00	0.00	0.00
Phenols	0.05	0.11	0.41
ortho-Phosphate	15.46	55.24	90.20
Total Phosphorus	37.53	173.40	224.40
Sulphates	59.26	120.00	190.00
Sulphides as S ₂	9.40	23.72	31.80
Surfactants	2.22	6.32	10.35
Aluminium	3.62	7.78	13.99
Arsenic	0.00	0.00	0.00
Barium	0.57	1.30	4.13
Beryllium	0.00	0.00	0.00
Boron	0.61	0.92	5.75
Calcium	239.68	470.60	1,549.00
Cadmium	0.00	0.00	0.03
Chromium	0.16	0.32	1.74
Cobalt	0.00	0.00	0.00
Copper	1.33	0.19	15.26
Iron	13.39	44.39	127.50
Lead	0.04	0.08	0.10
Magnesium	9.23	15.98	36.42
Manganese	0.24	0.49	1.36
Mercury	0.00	0.00	0.00
Molybdenum	0.02	0.07	0.16
Nickel	0.18	0.15	2.08
Potassium	27.27	76.12	114.60
Selenium	0.00	0.00	0.00
Silver	0.00	0.01	0.04
Sodium	629.81	2,840.40	2,894.00
Lithium	0.04	0.09	0.45
Tin	0.00	0.00	0.00
Zinc	1.04	0.73	9.40
Vanadium	0.01	0.03	0.05

Table 8: Reference Design Stream 4 Characteristics

Flow	677	m ³ /day	
STREAM 4 concentrations	Means	90%ile	Max
	2015	2015	2015
BOD	3,434.10	6,345.00	8,055.00
COD	9,300.00	17,160.00	20,300.00
Filtered (soluble) COD	807.20	1,537.60	1,666.00
TDS	1,505.20	2,048.40	2,318.00
TSS	4,622.00	10,416.00	14,040.00
VSS	3,452.00	8,196.00	10,940.00
Settleable Solids	3,575.80	8,800.80	13,528.00
pH	6.64	7.33	7.46
Total Alkalinity (as CaCO₃)	578.40	752.00	780.00
TOC	2,924.16	5,265.00	6,225.00
Chlorides	266.68	521.84	639.80
Chlorine-Residual	0.00	0.00	0.00
Cyanides as CN	0.00	0.00	0.00
Detergents	0.00	0.00	0.00
Fluorides	0.60	0.92	1.00
Total Nitrogen	674.56	1,351.72	1,408.00
Total Kjeldahl Nitrogen	667.72	1,338.20	1,406.00
Nitrogen-Ammoniacal	111.28	211.42	229.90
Nitrogen -Organic	563.52	1,150.18	1,222.30
Nitrates-TOTAL	5.03	10.44	12.20
Oil and Grease-TOTAL	590.82	1,568.92	2,176.40
Oil and Grease-Emulsified	0.00	0.00	0.00
Oil and Grease-Free Oil	0.00	0.00	0.00
Oil and Grease-Non-hydrocarbon	590.82	1,568.92	2,176.40
Tar and Tar Oils	0.00	0.00	0.00
Total Petroleum Hydrocarbons	3.05	8.48	12.14
Total Chlorinated Hydrocarbons	0.00	0.00	0.00
Polycyclic Aromatic Hydrocarbons	0.00	0.00	0.00
Poly-Chlorinated Biphenyls	0.00	0.00	0.00
Gasoline Range	0.00	0.01	0.01
Heavy Fraction Range	2.36	6.48	8.80
Diesel Range	0.69	2.04	3.33
Pesticides-Non Chlorinated	0.00	0.00	0.00
Organo-Phosphorus Pesticides	0.00	0.00	0.00
Organochlorine Pesticides	0.00	0.00	0.00
Phenols	0.16	0.27	0.28
ortho-Phosphate	50.28	133.44	192.00
Total Phosphorus	105.09	259.80	311.00
Sulphates	41.60	66.00	70.00
Sulphides as S₂	19.62	37.56	47.80
Surfactants	2.55	5.62	8.20
Aluminium	36.68	80.42	96.11
Arsenic	0.00	0.00	0.00
Barium	2.87	7.38	9.99
Beryllium	0.00	0.00	0.00
Boron	0.24	0.48	0.62
Calcium	470.53	1,168.00	1,677.00
Cadmium	0.00	0.00	0.00
Chromium	0.35	0.86	1.05
Cobalt	0.02	0.04	0.06
Copper	1.30	2.50	2.94
Iron	131.83	359.06	522.30
Lead	0.14	0.31	0.32
Magnesium	114.19	280.04	369.20
Manganese	1.38	3.42	4.29
Mercury	0.00	0.00	0.00
Molybdenum	0.05	0.10	0.10
Nickel	0.26	0.65	0.87
Potassium	82.48	141.27	185.50
Selenium	0.00	0.00	0.00
Silver	0.53	1.58	2.63
Sodium	133.40	225.86	298.50
Lithium	0.07	0.20	0.31
Tin	0.00	0.00	0.00
Zinc	3.72	8.82	10.19
Vanadium	0.04	0.10	0.16

2.9 REFERENCE DESIGN PROCESS DESCRIPTION

IIWWTW Tanker Reception Facility

A tanker reception facility is required to accept the tankered industrial wastewater. The wastewater flows have been categorised into four (4) streams depending on the composition of pollutants. The current observed industrial wastewater tanker flows and movements during a typical week are as follows:

Parameter	Units	Flow	
Flow	m ³ /d	10,000	Average Flow to the works over the week
	m ³ /d	11, 667	Flow Sunday - Thursday
	m ³ /d	5,833	Flow Friday & Saturday based on reduced flow at weekends
Tanker Movements	No	500	Average over the week based on 20 m3 tankers
	No	583	Sunday - Thursday
	No	292	Friday & Saturday based on reduced flow at weekends

Tanker Reception

The tanker reception area shall marshal the arrival of road tankers to the designated tanker off-loading bay. In the event that there are more tankers arriving than can be processed a holding area shall allow up to 8 tankers to wait.

Tanker Off-Loading Bays

The off-loading tankers are required to discharge into one of the four streams. The transport philosophy allows each off-loading tanker 30 minutes to connect, offload and disconnect at the appropriate stream, giving each off-loading bay a capacity of 2 tankers per hour. The number of tanker offloading points has been matched to the maximum hourly rate over the 3 hourly time intervals for each stream. A standby off-loading bay has been incorporated at each stream.

Each offloading bay shall incorporate a flowmeter to accurately monitor the volume of effluent discharged.

Stream 1: Flow and Load

Stream 1 receives industrial flows containing high COD, moderate FOG & metals. Typical industries include;

- Chemical wastewater

Parameter	Units	Value
Flow	m ³ /d	2,828
	kg/d	17,386

Parameter	Units	Value
	%DS	0.6

IIWWTW PROCESS Stream 1 Buffer Tank

The purpose of the buffer tank is to provide buffer storage of the tankered imports and to smooth flows throughout the week. Sufficient storage has been allowed for to provide a consistent flow 24/7 based on increased tanker imports during the week and reduced imports over the weekend.

Sludge is pumped from the tanker import facility to the buffer tanks

The raw trade waste is discharged into buffer tanks which operate on a fill and draw basis with one tank designated as a duty fill tank and the other operated as the duty draw tank. Fill or draw functionality is selected on the basis of a high level in the duty fill tank or a low level in the duty draw tank.

All filling operations are inhibited by high level levels in the receiving fill tank via the closure of the inlet valves. Draw from the tanks is via the fine screen pumps are inhibited by low level in the duty draw tank.

The tank is mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tanks are fitted with 1 No. mixer per tank. Electric drives operate rotational mixing within the tanks.

Odour Control will be provided.

IIWWTW PROCESS Stream 1 Fine Screens

The purpose of screening facility is to remove rag and other debris from the tankers, in order to prevent blockage of and operational problems associated with downstream equipment.

From the buffer tank effluent will be pumped to the screening facility. The type of screens shall be drum screens designed for 6 mm screening in 2 directions. Covers will be suitable for odour extraction.

Captured screenings are washed and dewatered before being discharges to skips for disposal. Screened effluent from the screens flows by gravity to the grit removal.

IIWWTW PROCESS Stream 1 Grit Removal

The purpose of grit removal is to reduce flow velocity to no less than 0.3 m/s to remove solid particles. A vortex grit separator will be utilised. Raw effluent is introduced tangentially into the side of the cylinder causing the contents to rotate slowly about the vertical axis. The flow spirals gradually down the perimeter allowing the grit and sand particles to settle out by gravity. This process is aided by the drag forces at the boundary layer on the wall and base of the vessel. An inverted cone, attached to the centre shaft, is mounted at the bottom of the vessel so that its edge is clear of the sloping base. A grit pot for the separated grit is located under the cone. A classifier will then be provided for dewatering to provide a grit quality with low organics content.

IIWWTW PROCESS Stream 1 Primary Sedimentation Tank (PST)

The purpose of primary sedimentation tank is to separate the wastewater into two main components; sludge and settled wastewater, which when treated separately are normally dealt with more efficiently and economically. Primary sedimentation is the process by which the

velocity of the wastewater is reduced below the point at which it can transport the suspended matter, so that this settles and can be removed as sludge.

The addition of ferric sulphate prior to the PST increases the performance of the PST in terms of enhanced removal rates.

Efficient primary sedimentation is essential to maximise the amount of primary sludge produced partly to maximise the efficiency of the sludge digestion process, and to minimise the load on the secondary biological treatment stage which minimises energy costs for aeration.

IIWWTW PROCESS Stream 1 Advanced Oxidation Process: AOP Buffer tank

The purpose of the buffer tank is to provide buffer storage of the PST effluent prior to treatment in the Advance Oxidation process. PST effluent flows by gravity from the PSTs to the buffer tanks

The PST effluent is discharged into buffer tanks which operate on a fill and draw basis with one tank designated as a duty fill tank and the other operated as the duty draw tank. Fill or draw functionality is selected on the basis of a high high level in the duty fill tank or a low level in the duty draw tank.

All filling operations are inhibited by high high level levels in the receiving fill tank via the closure of the inlet valves. Draw from the tanks is via the fine screen pumps are inhibited by low level in the duty draw tank.

The tank is mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tanks are fitted with 3 No. mixers per tank. The mixers shall be in the form of centrifugal pumps externally mounted from the tank with short lengths of suction and discharge pipe providing a recirculation action to generate the tank mixing.

Odour Control will be provided.

IIWWTW PROCESS Stream 1 Advanced Oxidation Process: Ozone Unit

An ozone generation system on a sidestream will provide the ability to crack recalcitrant COD and convert it to BOD for downstream removal in biotreatment (the SBR Plant).

The purpose of Advanced Oxidation is to pre-treat the industrial wastewater, i.e. breakdown the Recalcitrant COD into biodegradable BOD suitable for conventional biological treatment.

Stream 2: Flow and Load

Stream 2 receives industrial flows containing high COD, FOG & metals.

Typical industries include;

- Oil wastewater
- Oil wastewater/chemicals
- Car wash
- Car wash/chemical

Parameter	Units	AMP 5
Flow	m ³ /d	4,085
	kg/d	6,490
	%DS	0.16

IIWWTW PROCESS Stream 2 Buffer Tank

The purpose of the buffer tank is to provide buffer storage of the tankered imports and to smooth flows throughout the week. Sufficient storage has been allowed for to provide a consistent flow 24/7 based on increased tanker imports during the week and reduced imports over the weekend.

Wastewater is pumped from the tanker import facility to the buffer tanks. The raw trade waste is discharged into buffer tanks which operate on a fill and draw basis with one tank designated as a duty fill tank and the other operated as the duty draw tank. Fill or draw functionality is selected on the basis of a high high level in the duty fill tank or a low level in the duty draw tank.

All filling operations are inhibited by high high level levels in the receiving fill tank via the closure of the inlet valves. Draw from the tanks is via the fine screen pumps are inhibited by low level in the duty draw tank.

The tank is mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tanks are fitted with 1 No. mixer per tank. Electric drives operate rotational mixing within the tanks.

Odour Control will be provided.

IIWWTW PROCESS Stream 2 Fine Screens

The purpose of screening facility is to remove rag and other debris from the tankers, in order to prevent blockage of and operational problems associated with downstream equipment.

From the buffer tank effluent will be pumped to the screening facility. The type of screens shall be drum screens designed for 6 mm screening in 2 directions. Covers will be suitable for odour extraction.

Captured screenings are washed and dewatered before being discharged to skips for disposal. Screened effluent from the screens flows by gravity to the grit removal.

IIWWTW PROCESS Stream 2 Grit Removal

The purpose of grit removal is to reduce flow velocity to no less than 0.3 m/s to remove solid particles. A vortex grit separator will be utilised. Raw effluent is introduced tangentially into the side of the cylinder causing the contents to rotate slowly about the vertical axis. The flow spirals gradually down the perimeter allowing the grit and sand particles to settle out by gravity. This process is aided by the drag forces at the boundary layer on the wall and base of the vessel. An inverted cone, attached to the centre shaft, is mounted at the bottom of the vessel so that its edge is clear of the sloping base. A grit pot for the separated grit is located under the cone. A classifier will then be provided for dewatering to provide a grit quality with low organics content.

IIWWTW PROCESS Stream 2 Oil Interceptor

The purpose of oil interceptor is to separate gross amounts of oil from the wastewater of wastewater effluents containing high amounts of FOG. The design is a gravity separation

device designed by using Stokes Law to define the rise velocity of oil droplets based on their density and size and is based on the API design (American Petroleum Institute). The oil layer is skimmed off and processed in a thin film evaporator.

IIWWTW PROCESS Stream 2 Primary Sedimentation Tank (PST)

The purpose of primary sedimentation tank is to separate the wastewater into two main components; sludge and settled wastewater, which when treated separately are normally dealt with more efficiently and economically. Primary sedimentation is the process by which the velocity of the wastewater is reduced below the point at which it can transport the suspended matter, so that this settles and can be removed as sludge.

The addition of ferric sulphate prior to the PST increases the performance of the PST in terms of enhanced removal rates.

Efficient primary sedimentation is essential to maximise the amount of primary sludge produced partly to maximise the efficiency of the sludge digestion process, and to minimise the load on the secondary biological treatment stage which minimises energy costs for aeration.

IIWWTW PROCESS Stream 2 DAF Plant

The purpose of the Dissolved Air Flotation plant (DAF) is for the removal of suspended solids and oils. The removal is achieved by dissolving air in the wastewater under pressure and then releasing it in the DAF unit. The released air forms bubbles which adhere to the suspended matter in the wastewater causing it to float to the top of the tank where it can be removed by skimming. To improve removal rates a polymer is dosed upstream and mixed inline with a static mixer. A portion of the clarified effluent is recycled and injected with compressed air before being introduced back to the front end of the DAF unit.

Stream 3: Flow and Load

Stream 3 receives industrial flows containing moderate COD, TSS, FOG & metals. Typical industries include;

- Chemical wastewater

Parameter	Units	AMP 5
Flow	m ³ /d	2,411
	kg/d	2,014
	%DS	0.08

IWWTW PROCESS Stream 3 Buffer Tank

The purpose of the buffer tank is to provide buffer storage of the tankered imports and to smooth flows throughout the week. Sufficient storage has been allowed for to provide a consistent flow 24/7 based on increased tanker imports during the week and reduced imports over the weekend.

Sludge is pumped from the tanker import facility to the buffer tanks

The raw trade waste is discharged into buffer tanks which operate on a fill and draw basis with one tank designated as a duty fill tank and the other operated as the duty draw tank. Fill or draw functionality is selected on the basis of a high high level in the duty fill tank or a low level in the duty draw tank.

All filling operations are inhibited by high high level levels in the receiving fill tank via the closure of the inlet valves. Draw from the tanks is via the fine screen pumps are inhibited by low level in the duty draw tank.

The tank is mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tanks are fitted with 1 No. mixer per tank. Electric drives operate rotational mixing within the tanks.

Odour Control will be provided.

IWWTW PROCESS Stream 3 Fine Screens

The purpose of screening facility is to remove rag and other debris from the tankers, in order to prevent blockage of and operational problems associated with downstream equipment.

From the buffer tank effluent will be pumped to the screening facility. The type of screens shall be drum screens designed for 6 mm screening in 2 directions. Covers will be suitable for odour extraction.

Captured screenings are washed and dewatered before being transferred to skips for disposal. Screened effluent from the screens flows by gravity to the grit removal.

IWWTW PROCESS Stream 3 Grit Removal

The purpose of grit removal is to reduce flow velocity to no less than 0.3 m/s to remove solid particles. A vortex grit separator will be utilised. Raw effluent is introduced tangentially into the side of the cylinder causing the contents to rotate slowly about the vertical axis. The flow spirals gradually down the perimeter allowing the grit and sand particles to settle out by gravity. This process is aided by the drag forces at the boundary layer on the wall and base of the vessel. An inverted cone, attached to the centre shaft, is mounted at the bottom of the vessel so that its edge is clear of the sloping base. A grit pot for the separated grit is located under the cone. A classifier will then be provided for dewatering to provide a grit quality with low organics content.

IWWTW PROCESS Stream 3 Primary Sedimentation Tank (PST)

The purpose of primary sedimentation tank is to separate the wastewater into two main components; sludge and settled wastewater, which when treated separately are normally dealt with more efficiently and economically. Primary sedimentation is the process by which the velocity of the wastewater is reduced below the point at which it can transport the suspended matter, so that this settles and can be removed as sludge.

The addition of ferric sulphate prior to the PST increases the performance of the PST in terms of enhanced removal rates.

Efficient primary sedimentation is essential to maximise the amount of primary sludge produced partly to maximise the efficiency of the sludge digestion process, and to minimise the load on the secondary biological treatment stage which minimises energy costs for aeration.

IWWTW PROCESS Stream 3 Equalisation Tank

The purpose of the equalisation tank is to balance flows, loads and the wastewater pH for streams 1, 2 and 3 as they combine for downstream organic load removal in biotreatment (SBR) followed in turn by downstream metals removal. The tank itself takes in the role of a mixing vessel fitted with SBR integrated pH control.

IWWTW PROCESS Stream 3 Sequencing Batch Reactor (SBR)

Sequencing batch reactors (SBR) is a type of activated sludge process for the treatment of

wastewater. Oxygen is bubbled through the mixture of wastewater and activated sludge to reduce the organic matter (measured as biochemical oxygen demand (BOD) and chemical oxygen demand (COD)). The aeration and clarification can all be achieved in a single reactor.

A continuous type SBR capable of biological nutrient removal will be utilised. SBR shall be designed to achieve 90% compliance with 2mg/l ammonia. The influent flow to the basin is not interrupted during the settle and decant phases or at any time during the operating cycle. The SBR is divided into two zones, the per-react zone and the main reactor. Alternating periods of aeration during the react phase can produce aerobic/anoxic/anaerobic conditions to promote nitrification/de-nitrification and enhanced biological phosphorus removal.

IWWTW PROCESS Stream 3 Neutralisation Tank

The purpose of the neutralisation tank is pH control, to keep the pH at 8.5 to maximise the precipitation of metals as metal hydroxides and as metal sulphides precipitated by a modern organosulphide precipitant such as TMT-15 or similar, for their sedimentation and recovery in the downstream Lamella clarifiers. Precipitated metals will begin to coagulate into small, suspended particulate in the downstream coagulation tank. Further downstream, larger floc will be produced in the flocculation tank. The neutralisation tank has a by-pass for maintenance.

IWWTW PROCESS Stream 3 Coagulation and Flocculation Tanks

The purpose of the coagulation tank is pH control combined with upstream metal coagulant dosing (a modern metals –hydroxide/sulphide precipitate coagulant ferric salt such as EF301 or similar dosing, with the metal precipitant being a modern organosulphide precipitant such as TMT-15 or similar. The coagulation tank can also receive a bentonite dose to polish/increase oil and grease removal if any oil and grease remains downstream of the stream 3 SBR.

The purpose of the downstream flocculation tank is to grow and accumulate small precipitated flocs into larger flocs, following pH readjustment to 8.5 after coagulant addition upstream. This tank is slowly mixed by a flocculating paddle(s) to the G-value range ensuring optimum floc development with the reagents and pH specified.

Both tanks have a by-pass for maintenance purposes and have a minimum 30 minutes detention at maximum flow.

IWWTW PROCESS Stream 3 Lamella Clarifier

A lamella clarifier (inclined-plate clarifier) is designed to remove particulates from liquids. They are often employed in place of conventional settling tanks. Unlike conventional clarifiers they use a series of inclined plates. These inclined plates provide a large effective settling area for a small footprint. The inlet stream is stillied upon entry into the clarifier. Solid particles begin to settle on the plates and begin to accumulate in collection hoppers at the bottom of the clarifier unit. The sludge is drawn off at the bottom of these hoppers and the clarified liquid exits the unit at the top by weir.

The purpose of the Lamella Clarifier is for the removal of precipitated Heavy Metals and other precipitates and suspended solids.

IWWTW PROCESS Stream 3 Rapid Gravity Sand Filtration

The purpose of rapid gravity sand filters is for tertiary solids removal. The Filters shall be continuous operation upflow sand filters or equivalent.

Cleaning of the sand commences in the pump itself where impurities are separated from the sand grains by the turbulent mixing action. The contaminated sand spills from the pump outlet into the washer labyrinth in which it is washed by a small counter current flow of clean water.

The separated solids (brown arrow) are discharged through the wash water outlet, while the grains of clean sand (which are heavier) are returned to the sand bed. As a result, the bed is in slow, constant downward motion through the unit. Compressed air for the sand pump is provided by via the control panel. Thus, water purification and sand washing both take place continuously enabling the filter to remain in service without interruption.

Stream 4: Flow and Load

Stream 4 receives three principal input streams from indigenous IIWWTW waste sludge from primary tanks and SBR waste sludge and sludge imports from small package sewage treatment plants around Doha, plus waste mineral sludge from Stream 3 downstream of the Stream 3 Equilibration (equalisation) tank. The biological sludge's are organic and can be anaerobically biologically digested to create biogas and a cake which will be disposed of via incineration. The Stream 3 sludges are a minor mass fraction of the potential sludge load to incineration at Doha South and will also be transported to Doha South as cake for incineration.

IIWWTW sludges include

- Imported industrial sludges
- Primary sludges from streams 1 & 2
- Stream 3 Primary sludge from PSTs and SBR waste sludge (SAS)

Parameter	Units	Value
Biological sludge's	m ³ /d	2,462
	kg/d	37,507
	%DS	1.5

The inert sludge is from the lamella clarifier on stream 3, where chemical dosing has been employed upstream of the processes for removal of heavy metals.

Parameter	Units	AMP 5
Inert sludge's	m ³ /d	113
	kg/d	2,828
	%DS	2.5

IIWWTW PROCESS Stream 4 Biological Sludges

The purpose of the buffer tanks is to provide buffer storage of the tankered imports and to smooth flows throughout the week. Sufficient storage has been allowed for to provide a consistent flow 24/7 based on increased tanker imports during the week and reduced imports over the weekend. The indigenous biological sludges from streams 1-3 will also combine with the imported sludges in the buffer tanks.

Imported sludge is pumped from the off-loading road tankers to the buffer tanks

The imported sludge is discharged into buffer tanks which operate on a fill and draw basis with one tank designated as a duty fill tank and the other operated as the duty draw tank. Fill or draw functionality is selected on the basis of a high high level in the duty fill tank or a low level in the duty draw tank.

All filling operations are inhibited by high high level levels in the receiving fill tank via the closure of the inlet valves. Draw from the tanks is via the fine screen pumps are inhibited by low level in the duty draw tank.

The tanks are mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tanks are fitted with 3 No. mixers per tank. The mixers shall be in the form of centrifugal pumps externally mounted from the tank with short lengths of suction and discharge pipe providing a recirculation action to generate the tank mixing.

Odour Control will be provided.

IWWTW PROCESS Stream 4 Sludge Screens

The purpose of the sludge screening facility is to remove rag and other debris from the imported liquid sludges, in order to prevent blockage of and operational problems associated with downstream equipment.

From the buffer tank, raw sludge flows by gravity to the sludge screen feed pumping station, where variable speed sludge screen feed pumps pump the sludge forward to the strain presses (sludge screens).

The sludge screening facility consists of 2 No. sludge screens which operate on a duty/standby basis. Captured screenings are washed and dewatered before being transferred to skips for disposal. Screened sludge from the sludge screens flows by gravity to Buffer tank (b) where it combines with the indigenous primary sludge from Streams 1-3 and Stream 3 biological waste sludge (SAS).

Screened Sludge Holding Tank

The purpose of this tank is to provide a buffer prior to thickening.

The tank is mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tanks are fitted with 3 No. mixers per tank. The mixers shall be in the form of centrifugal pumps externally mounted from the tank with short lengths of suction and discharge pipe providing a recirculation action to generate the tank mixing.

Odour Control will be provided.

IWWTW PROCESS Stream 4 GBT (raw sludge thickening)

The purpose of the raw sludge thickening facility is to increase the solids concentration of the raw sludge in order to provide a thickened sludge which can be treated in the anaerobic digester

Raw sludge is transferred from the buffer tank (b) to 2 No raw sludge GBTs (duty/standby) using 2 No variable speed raw sludge dewatering feed pumps. Prior to thickening sludge is dosed with polymer solution from a powder polymer make up facility. Polymer is made up into a solution using potable water. Polymer dilution water (final effluent/potable water) is provided and is injected into the polymer dosing line on each stream.

The dewatering presses thicken the biological sludges prior to transfer to the anaerobic digester via a buffer tank

Return Liquor from the GBTs is pumped back to the SBR feed chamber. The GBTs will be enclosed and will be odour controlled. The building/kiosk which houses the GBTs will be mechanically ventilated.

IWWTW PROCESS Stream 4 Thickened Sludge Storage

The purpose of the thickened sludge storage tank is to provide one (1) days retention for the output from the GBT's prior to digestion.

The thickened sludge from the GBTs is discharged into the thickened sludge storage tank.

The tank is mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tank is fitted with 1 No. mixer. Electric drives operate rotational mixing within the tanks.

IWWTW PROCESS Stream 4 Anaerobic Digestion

The purpose of the mesophilic anaerobic digestion process is to break down the volatile organics contained within the thickened sludge, releasing an energy rich biogas for combustion in the CHP gas engines. The MAD unit's primary function is reduction in sludge mass for ultimate transport and disposal by incineration and sludge stabilisation to minimise organic sludge odour risk. Energy recovery and biogas yield is only intended as a secondary benefit for the IIWWTW.

Thickened sludge is augured towards AD digester tanks. The material within the tanks undergoes anaerobic digestion via a mesophilic pathway at temperatures circa 39°C. Following the 18 day HRT the solid digestate material is transferred to a secondary digestion unit.

Biogas generated from the digestion process is stored in a membrane gas holder vessel for downstream clean-up and use by the CHP generation system.

IWWTW PROCESS Stream 4 Secondary Digestion

The secondary digestion process allows the sludge to settle and acts as a separation tank. It also allows for any remaining biogas to be released prior to dewatering. Secondary digesters are designed to achieve a batch hydraulic retention time of 14 days.

These tanks offer only a minor odour risk but will also be odour controlled independently of the main IIWWTW OCU by a high extraction rate GAC filters with a minimum extraction rate dictated by the LEL for methane.

IWWTW PROCESS Stream 4 Digested Sludge Storage Tank

The purpose of the digested sludge storage tank is to provide two (2) days retention prior to dewatering. The secondary digested sludge is discharged into the digested sludge storage tank. The tank is mixed to improve the homogeneity of the feed to the screens, to keep the effluent aerated and to prevent settlement of solids. The buffer tank is fitted with a mixer. Electric drives operate rotational mixing within the tanks.

IWWTW PROCESS Stream 4 High Efficiency Dewatering Process

The purpose of the sludge dewatering facility is to increase the solids concentration of the digested sludge to press is capable of up to 45% DS for a fresh mixed primary and biological 50%:50% waste sludge mixture.

Digested sludge is transferred from the digested sludge storage tank to 2 No presses (duty/standby) using 3 No (2No.Duty / 1No.Standby) variable speed raw sludge dewatering feed pumps. Prior to dewatering sludge is dosed with polymer solution from a powder polymer make up facility. Polymer is made up into a solution using potable water. Polymer dilution water (final effluent/potable water) is provided and is injected into the polymer dosing line on each stream.

The dewatering presses thicken the biological sludges prior to incineration. Centrate from the presses will be pumped upstream of the PSTs on Stream 3. A minimal size centrate tank will be required to hold liquors prior to pumping. The presses and conveyor system will be enclosed and will be odour controlled. The building/kiosk which houses the presses will be mechanically ventilated.

IWWTW PROCESS Stream 4 Biogas Cleaning

The purpose of the gas cleaning system is to treat the biogas to remove contaminants which may otherwise compromise the performance of the CHP engines.

IWWTW PROCESS Stream 4 CHP Engines

The primary purpose of the CHP engines is to burn the biogas in order to produce electricity.

IWWTW PROCESS Stream 4 Surplus Gas Flare

In the event that the produced gas cannot be burned using the CHP engines the gas shall be flared off in a controlled manner.

IIWWTW PROCESS Stream 4: Inert Sludge

The inert sludge from the lamella clarifiers, which are laden with heavy metals, will be dewatered by plate press and the cake mixed with waste organic sludge at Doha South for incineration.

IIWWTW PROCESS Stream 4 Inert Sludge Buffer Tank

The purpose of the inert sludge buffer tank is to provide 1 days retention prior to dewatering. The inert sludge is transferred from the lamella clarifier and discharged into the buffer tank. The tank is mixed to improve the homogeneity of the feed to the dewatering facility, to keep the effluent aerated and to prevent settlement of solids. The buffer tank is fitted with 1 No. mixer. The mixer shall be in the form of centrifugal pumps externally mounted from the tank with short lengths of suction and discharge pipe providing a recirculation action to generate the tank mixing. Odour Control will be provided.

IWWTW PROCESS Stream 4 Plate Presses

The purpose of the raw sludge dewatering facility is to increase the solids concentration of the raw sludge in order to provide a sludge cake which can be transferred to the solar dryer greenhouse via a conveyor system.

Raw sludge is transferred from the buffer tank to 2 No raw sludge plate presses (duty/standby) using 3 No (2No.Duty / 1 No.Standby) variable speed raw sludge dewatering fast feed pumps and 3 No (2No.Duty / 1 No.Standby) variable speed raw sludge dewatering pressure plate press feed pumps. Prior to dewatering sludge is dosed with polymer solution from a powder polymer make up facility. Polymer is made up into a solution using potable water. Polymer dilution water (final effluent/potable water) is provided and is injected into the polymer dosing line on each stream.

Centrate from the presses will be pumped upstream of the PSTs on Stream 3. A minimal size centrate tank will be required to hold liquors prior to pumping.

The presses and conveyor system will be enclosed and will be odour controlled. The building/kiosk which houses the presses will be mechanically ventilated.

IIWWTW PROCESS Stream 4 Solar Drying Greenhouse

The purpose of the solar drying greenhouse system is to dry mineral sludge to a DS content of approximately 90%.

Under the effect of solar radiation and the action of forced air movement, water evaporates from the sludge for subsequent removal from the greenhouse by a powerful air draft.

The inert sludge must be disposed of by the Contractor at the Qatar Petroleum (QP) Hazardous Waste Treatment Centre (HWTC) in Mesaimeer.

IIWWTW PROCESS sub-Stream: Emergency TSE Storage Lagoon

The combined final effluent from the IATW and Extensions 2A and 2B which incorporate diluted flows from the IIWWTW will pass to a Treated Sewage Effluent Supply Pump Station. The TSE final pump station wet well (or the equivalent facility) will be pumped to a 180,000m³ capacity Emergency Storage lagoon, when rainfall results in a lower demand for Treated Sewage Effluent, or demand for TSE periodically drops for any other reason.

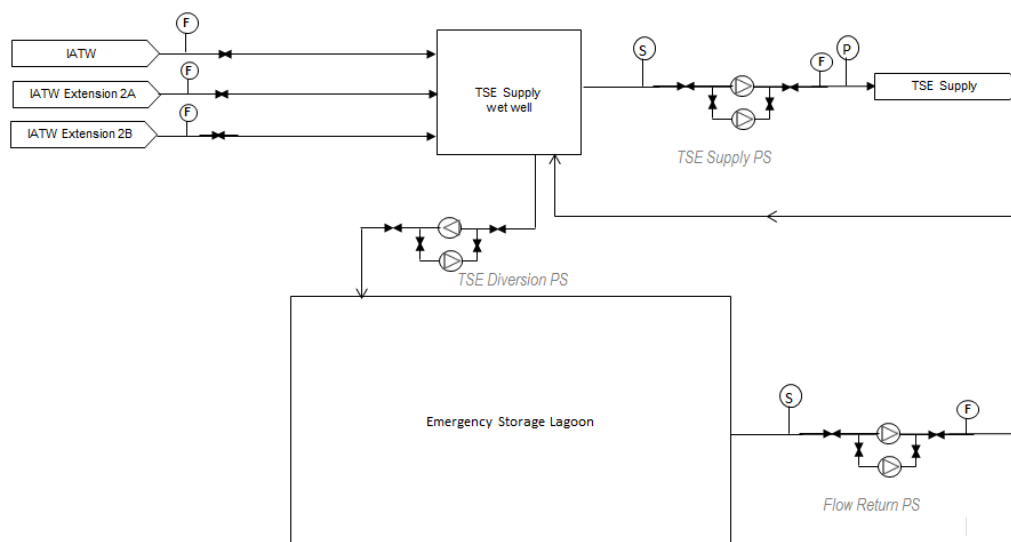


Figure 3: Emergency Lagoon function is storage of Treated Sewage Effluent (TSE) as a 3 day HRT reservoir when TSE demand falls.

The TSE Supply PS wet well or equivalent facility will be used to pump TSE to the TSE Emergency Storage Lagoon via the TSE diversion PS when TSE demand falls. The TSE Emergency Storage Lagoon Return PS will be used to pump stored TSE back into supply when normal levels of demand have resumed.

Odour Control Process sub-Stream: Odour Control Unit and OC System

The total system extraction rates are expected to be in excess of the 32,000 m³/h. The actual values used will depend on the tenderers own OCU design approach and equipment provision. These values are indicative of one design approach only.

The contaminant loads for the new OCU are presented in **Table 9** and are based on a series of assumptions and expected odour emissions resulting from industrial wastewaters. No factual

data is available at present and detailed sample analyses is expected to be carried out during the Odour Investigation Stage.

Table 9: New OCU Inlet contaminant design parameters (indicative design parameters)

Contaminant	Units	Avg	Peak
Hydrogen sulphide (H ₂ S)	ppm	800	2,000
Mercaptans	ppm	15	35
Ammonia	ppm	1.5	3.5
Volatile organic carbon (VOCs) ¹	ppm	35	50
Dimethyl sulphide (DMS)	ppm	1	2

¹ As part of the tender design, the tenderer shall undertake a detailed assessment of potential VOC emissions to atmosphere from the effluent reception, preliminary/primary/sludge treatment and disposal facilities using regulatory approved method/software such Water9, TOXCHEM or similar approved. The results of this assessment shall be used to confirm the basis of design/unit size of the proposed odour control/ventilation system.

Table 10: Minimum Expected Biotrickling Filter Performance

Process Parameter	Removal at average	Removal at peak
Hydrogen Sulphide	99%	99%
Mercaptans	90%	96%
Ammonia	-	-
VOC ¹	50%	80%
Dimethyl Sulphide (DMS)	20%	60%

¹ Dependant on VOC assessment

The activated carbon unit is required as a polishing stage to produce an outlet odour concentration of <1,000 ou_E/m³ and greater than 95% removal of all contaminants.

IIWWTW PROCESS sub-Stream for Thermal Oil Recovery

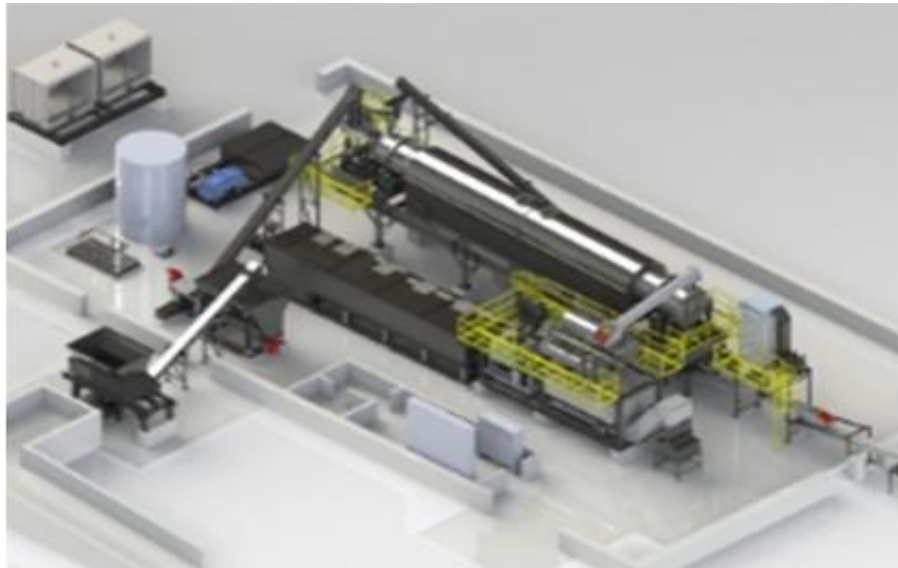


Figure 4: Indirect Thermal Desorption Unit for Oil recovery.

Recovered oil will be pumped to the recovered oil buffer tank and from there pumped to Thermal Oil Recovery, such as an Indirect Thermal Desorption Unit. The Indirect Thermal Desorption Unit will be heated by methane and/or biogas. The rotary drum of an Indirect Thermal Desorption Unit maintains an inert atmosphere, to avoid oxidation of the feedstock. Feedstock (i.e. waste oil recovered from the interceptor and DAF float) is passed into the drum which indirectly heated along its length. The feed material passes along the drum until the temperature causes it to volatilise.

Consequently, hydrocarbons partition into the gas phase and are removed by a forced gas recirculation through the drum headspace. The process gas is blown to a Vapour Recovery Unit, where the oil fractions are condensed and stored for recycling.

IIWWTW Outline Operational Control Approach

Doha IIWWTW will receive wastewaters typically exceeding PWA Table 60 discharge to foul sewer requirements and will provide an integrated, multi-stream, multiple industrial wastewater treatment plant for up to 10 MI/d. The proposed treatment facility will need to use the industrial waste permit system to facilitate management of waste reception and processing. Each tanker import will be directed to one of four streams depending on their load.

The IIWWTW will have a comprehensive SCADA system monitoring each process on each process stream, back up by local HMIs at main process units and with associated alarms and telemetry for out of hours staff call-ins and alerts. The entire IIWWTW will be monitored and controlled by a Applitek control system or a system of the same minimum capability. SCADA records will be automatically backed up in storage for at least 3 months. The plant electronic database will include in interface data from tankers and GPS tanker movements for up to one month of past storage.

Previous assessment has shown a design horizon daily allowance of 500 tanker movements per day. The process design has identified four process streams together with frequency of tanker movements during specific 3 hourly daily time intervals. The transport philosophy adopted allows each offloading tanker 30minutes to connect, offload and disconnect at the appropriate stream, hence each tanker offloading point has a capacity of 2 tankers per hour.

The number of tanker offloading points has been matched to the maximum hourly rate over the 3 hourly time intervals.

Each offloading bay shall incorporate a flowmeter to accurately monitor the volume of effluent discharged. Other analytical instruments can be incorporated as appropriate to each stream and are the subject of ongoing design.

In addition to the process streams there shall be a tanker reception area and tanker waiting/parking area. Details of tanker weighbridge(s) onto and off site, if required, have not been determined. The tanker facility will incorporate a 'Drive through' philosophy into offloading connection facility with no tanker reversing.

Stream 1

Stream 1 is designed for the treatment of high strength industrial waste with moderate FOG and metals. All wastewater will be screened to 6 mm and pass through grit treatment prior to primary settlement. Chemical dosing will increase the performance of the PST in terms of enhanced removal rates. Chemical dosing will be in the form of ferric sulphate and will be controlled on the incoming flowrate. A portion of the process flow will then be treated in an advanced oxidation unit to breakdown the Recalcitrant COD into biodegradable BOD suitable for conventional biological treatment. The effluent from stream 1 will be combine with Stream 3 in the equilibrium tank.

Parameters to be monitored include;

- Flow

Online automated sampling points will be provided; post buffer tanks, post PST and post advanced oxidation unit.

Stream 2

Stream 2 is designed for the treatment of high strength industrial waste with high FOG and metals. All wastewater will be screened to 6 mm and pass through grit treatment. An oil interceptor will remove a large portion of the FOG prior to primary settlement. Chemical dosing will increase the performance of the PST in terms of enhanced removal rates. Chemical dosing will be in the form of ferric sulphate and will be controlled on the incoming flowrate. A DAF plant will be provided for further reduction in FOG and removal of heavy metals. A coagulant will be dosed upstream of the DAF plant and will be mixed via a static inline mixer and controlled on DAF influent flowrate. The effluent from stream 2 will be combine with Stream 3 in the equilibrium tank.

Parameters to be monitored include;

- Flow
- DO – in the DAF

Online automated sampling points will be provided; post buffer tanks, post interceptor, oil recovery line, post PST and post DAF.

Stream 3

Stream 3 is designed for the treatment of moderate strength industrial waste. All wastewater will be screened to 6 mm and pass through grit treatment prior to primary settlement. All liquors from the sludge stream will combine with the effluent upstream of the PST. Chemical dosing

will increase the performance of the PST in terms of enhanced removal rates. Chemical dosing will be in the form of ferric sulphate and will be controlled on the incoming flowrate. An equilibrium tank will allow the effluent to combine with effluent from Stream1 and 2. pH will be monitored downstream of the equilibrium tank with a feedback loop to automate dosing for pH correction if required. The combined effluent will be biologically treated in a SBR plant. A lamella clarifier will be provided with chemical dosing upstream for heavy metals removal this will be followed by a COUF for final tertiary solids removal. Chemical dosing for the lamella will be controlled on flowrate.

Parameters to be monitored include;

- Flow monitoring throughout
- pH downstream of the equilibrium tank and neutralisation tank with feedback control for chemical dosing for pH correction.
- DO, Redox and NH₃ – in the SBR
- Pressure monitoring in the COUFs.

Online automated sampling points will be provided; post buffer tanks, post PST, post SBR, post COUFs and final effluent from the tertiary lagoon.

Additional key operating parameters will include phosphorus, nitrate and nitrite, turbidity, salinity, (online temperature and pH monitored as indicated on the preliminary design P&IDs).

Stream 4

Stream 4 is designed for the treatment of industrial and indigenous sludges. All biological sludges will be thickened and treated by anaerobic digestion for pathogen kill. Digested sludge will be dewatered to reduce the volume requiring incineration of site. The inert sludge from the lamella clarifier will be processed separately. The inert sludge will be dewatered then stored in a greenhouse to reduce volumes requiring disposal.

2.10 CONTRACT DURATIONS

Design-Build:

The Design, Construction, Installation, Testing, Commissioning and Completion shall be carried out within a Twelve (12) month *Contract Period (D&B)* such that no delays will result to the commencement of IIWWTW plant operation.

Operate-Maintain:

The Contractor shall be required to Operate and Maintain IIWWTW and associated works for a *Contract Period (O&M)* of Ten (10) years.

2.11 TENDERING SCHEDULE

The provisional tendering schedule will be as follows:

Return of Prequalification Documents	As per the Invitation letter
Results of Prequalification	32 calendar days after return of Prequalification Documents
Invitation to tender	As per the Invitation letter

Submission of tenders	As per the Invitation letter
Contract Award	To be advised

2.12 TENDER SUBMISSION (INFORMATION)

The tender will comprise a Technical Submission and a separate Financial Submission.

For the Doha Integrated Industrial Waste Water Treatment Works (IIWWTW), the Technical Submission will include, completed pro-forma sheets, drawings and a process design. Public Works Authority (PWA) will provide an indicative site arrangement, indicative Process and Instrumentation Diagram (PI&D), indicative Process Flow Diagram (PFD), indicative Single Line Diagram and indicative IT/Telecom Block Diagram.

Prequalifying firms or JVs must expect to undertake and submit significant preliminary designs and drawings to demonstrate that they have fully considered all aspects of the requirements of the contract and that their tender is robust.

A programme encompassing all components of the project will be included in the Technical Submission for the tender.

The Financial Submission will be a Schedule of Prices, to be developed into a Bill of Principal Quantities upon Contract award. A lump-sum firm price will be required from Tenderers.

