



هيئة الأشغال العامة  
PUBLIC WORKS AUTHORITY

INFRASTRUCTURE AFFAIRS

**PREQUALIFICATION DOCUMENT FOR  
PROCUREMENT OF DESIGN, BUILD, OPERATE  
AND MAINTAIN CONTRACT  
FOR**

**MUSAIMEER PUMPING STATION &  
OUTFALL PROJECT**

**PROJECT ID: IA 14/15 C 015 G  
PART 2 – WORK REQUIREMENTS**

**Public Works Authority  
PO Box 22188  
Doha  
State of Qatar**

**May 2014 (Rev. 1)**

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**Note: The above documents are not final. The Authority reserves the right to make any changes to the documents that do not change the document philosophy, without incurring any liability to Applicants. The final documents will form of the Tender Documents.**

## **APPENDIX A: PROJECT BRIEF**

### **1. Project General Information**

#### **1.1. General Items**

All materials, equipment and facilities, unless otherwise stated in the Project Brief, shall conform to the relevant parts of the Employer's Requirements.

The Works shall be designed to modern best practice including all health and safety features that would be required in Europe or Northern America. Any specific health and safety requirements of this Specification shall override the previous general statement.

All equipment supplied shall be designed to meet the needs for satisfactory operation under all variations of operating loads, pressures and temperatures including variation at ambient temperature.

All materials shall be new and of the best quality and shall be designed to withstand the stresses imposed by the working and the ambient conditions without distortion or deterioration affecting the efficiency and reliability of the plant.

Each component or assembly shall have been proven in service in a similar application and under conditions no less arduous than those specified herein. The Engineer shall have the right to request the Contractor to justify his selection of equipment. Where it is shown that material and plant are of a standard lower than that necessary to meet compliance with the specification the Contractor shall modify or replace the equipment concerned at his own cost.

All equipment performing similar duties shall be of a single type and make and be fully interchangeable in order to limit the stock of spare parts required.

Equipment and instruments shall not be located in positions where they are vulnerable to falling objects or water drips. Sun and rain shields shall be provided where necessary to protect equipment and instruments. Instruments exposed to sun light shall be UV protected. Field instrument LCD displays shall be clearly visible during day light hours.

The Contractor is responsible for the full detailed design of the Works. All drawings of the proposed works provided with the Tender are only indicative of the minimum facilities, equipment, amenities and working space to be provided. The provision of these drawings and any other preliminary information or calculations supplied by the Employer shall not relieve the Contractor of any of his obligations under the Contract.

Reference Ground levels of the proposed site has been provided within the tender drawings. The Contractor may base his tender stage design on these levels; however the Contractor should verify they are accurate and adequate for their intended use. The Employer shall accept no liability for rework that may be required as a result of inaccuracies in any of the drawings provided.

Services (pipelines, cables and ducts) shall not be constructed beneath roads except at points where it is essential for such services to cross roads, in which case the crossing shall be perpendicular to the road and shall otherwise minimize the length of affected road. Sleeves

shall be provided with pull cords if applicable and the crossing shall be clearly shown by marker posts.

## 1.2. Project Narrative

The parameters for the preliminary design and drawings provided in these pre-qualification documents represent a workable layout and approach with preliminary dimensions and sizing of the facilities. The selected Contractor will have latitude to suggest alternative elements for design as part of the formal tender process and while performing the final detailed design for review. Most detailed specifications for equipment, manufactured materials and fixtures, piping, valves controls, coatings, etc. are not addressed in these documents but it's worth noting that the facility will be exposed to the severe Gulf Coast marine environment with a pumped storm and groundwater that will have some sewerage characteristics particularly during low flow and first flush storm conditions.

In accordance with Ashghal PWA approved parameters, the Musaimeer Pumping Station and Outfall Project will be designed and constructed to pump and discharge storm and groundwater flow collected from an upstream drainage catchment area encompassing approximately 190 km<sup>2</sup> for most of western and southern Doha. The proposed project includes a pump station with ancillary facilities and, marine outfall system extending into the Gulf for discharge. The pump station will be located adjacent to the coast line roughly bordered by the Hamad International Airport, also known as the New Doha International Airport (NDIA), to the north and the Ras Abu Fontas Desalination Plant 4 km to the south. The proposed alignment for the outfall tunnel will run due east from the pump station site for an approximate length of 10 km offshore. All catchment drainage will be collected and delivered to the pump station via the Abu Hamour Southern Outfall (Tunnel) which is under construction (See Exhibit 1).

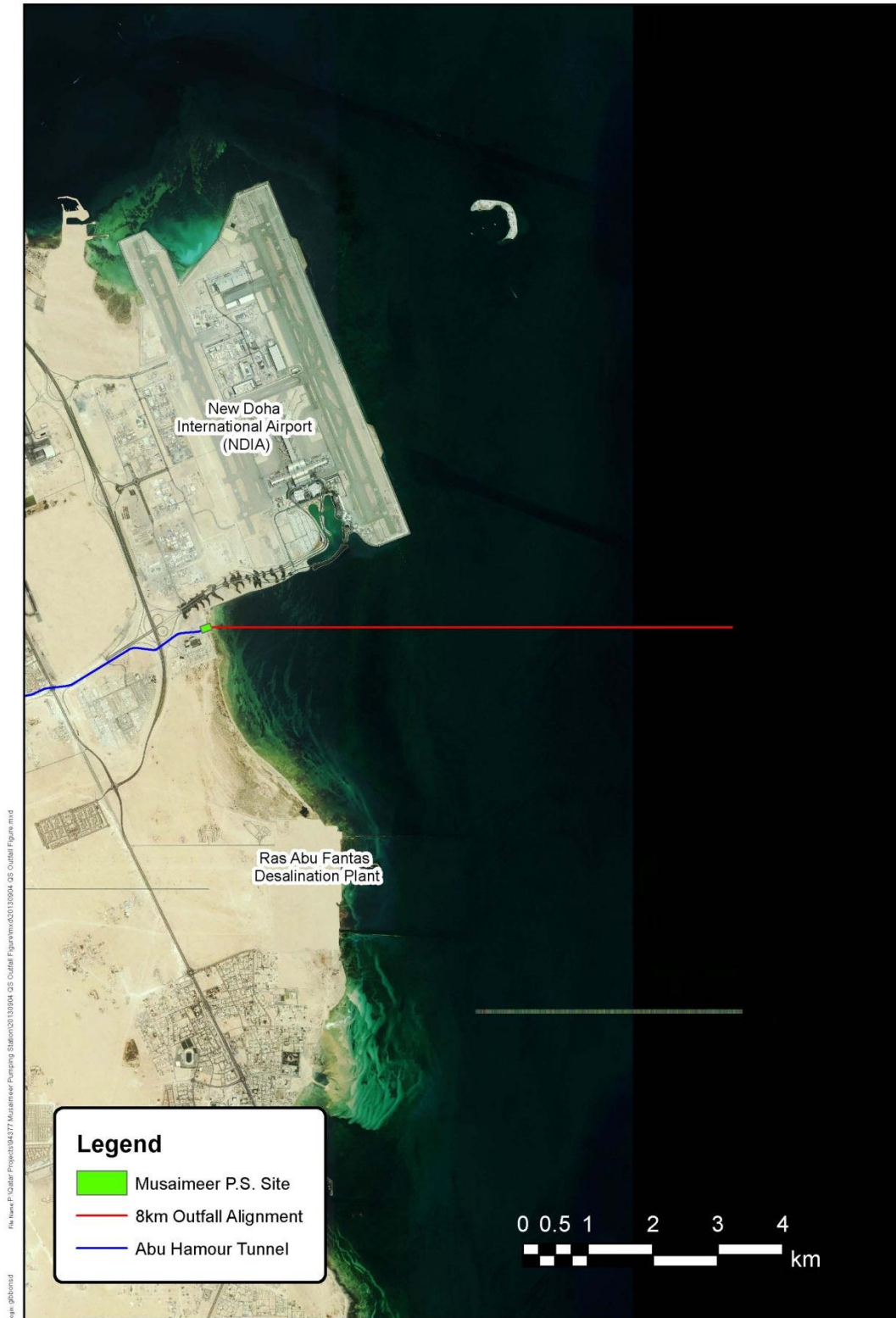
The Musaimeer pumping station facilities will be located within a site boundary having dimensions of 100 m x 160 m. Approximately 30 plus metres of the site, located along its eastern most boundaries, is thought to be partially located in a tidal area that's subject to regular inundation by gulf waters. Where site ground elevations begin to taper off rapidly towards the Gulf the preliminary design avoided locating any improvements that might be adversely affected by localised flooding.

The preliminary design will represent no more than a 30% level of detail, showing critical elements and features of the pump station, outfall system and ancillary facilities necessary for the operation and maintenance of the entire works. It will be the responsibility for all Tenderers competing for this project to provide acceptable bids with the assumption that, if selected, items listed below will be a part of the entire works for the project and included in the bid price:

- Complete a 100% detailed construction design package that would include but not be limited to; drawings in 3D CADD; associated technical specifications, traffic control plans, safety and environmental control plans; schedule of values and; work schedules. This information will be subject to review and approval by Ashghal and their assigned project Resident Engineer.
- Performing computational fluid dynamics (CFD) modelling of the pumping station wet well and outfall chamber followed by a physical model for the pump station wet well that confirms operational compliance based on the Contractor's detailed design approach.

- Performing hydraulic and surge modelling on pressure pipe lines and for the outfall that confirms proper controls are included in the design to meet desired flow characteristics for velocity, discharge and dispersion into the Gulf.
- Performing any additional project investigations, surveys, sampling, testing, evaluations and/or analyses deemed necessary by the Contractor in order to complete their detailed design.
- Acquiring a secure construction site(s) for administering the entire project, storing construction material and temporary spoils and equipment during the course of all operations. This would include developing and maintaining a proper road access, traffic and environmental controls both on and offsite and, between storage, administration and installation locations.
- Contractor must perform all work necessary to convert the approved Preliminary Environmental Impact Assessment (EIA) into a full report. The Contractor will also be responsible for submitting the Final EIA application to the Ministry of Environment (MoE) and achieve their approval. The Preliminary EIA created for the preliminary design will be provided both in hard copy and electronic format. MIKE3, CORMIX and 3D-SMART models and InfoWorks modelling datum will be available on request from Ashghal PWA. However, these documents will not be provided during the tender pre-qualification period.
- Achieve all necessary agency approvals/permissions for installation and operation the entire works. This would include but not be limited to approvals from; Ashghal PWA; the MoE; New Doha International Airport (NDIA); Civil Aviation Authority; Qatar Rail; Qatar Economic Zone (QEZ); Ministry of Municipal Utilities and Planning (MMUP); KAHRAMAA; Civil Defence; Qatar Coast Guard, MWANI and; Ras Abu Fontas Power and Water Desalination Plant.
- Achieve approval for all required building permits and Design Control (DC) documents, as needed, note that the DC-1 document will be provided by Ashghal.
- Make appropriate application and approval to install all required service connections for utilities that include; potable water, sewerage, power and, telecommunications.
- Note that the Contractor may be required to operate and maintain the facility for up to three years for Ashghal.

**Exhibit 1**



## 2. Basis Project Design

### 2.1 Design Parameters

InfoWorks modelling and Schlumberger groundwater recharge model for the total drainage catchment area provided a calculated base flow condition of 1.9 m<sup>3</sup>/sec with a peak storm water minimum design capacity of 19.7 m<sup>3</sup>/sec. Storm and groundwater will be collected from upstream sub-catchments by the 9.5 km Abu Hamour Southern Outfall Tunnel. The tunnel will have a 3.7 m internal diameter with the last tunnel shaft located approximately 14 m from the western most site boundary for the Musaimeer project. Part of the Musaimeer project's scope will include installation of at least some, if not all of the inter-connecting line between the last tunnel shaft and the station's screening facility. The invert elevation at the last shaft will be approximately -16.4 mQNHD, with an incoming modelled peak flow velocity of approximately 1.8 m/sec. This may be subject to change based on actual installation of the tunnel.

Outfall system requirements include storm and groundwater discharge at a distance of approximately 10 km from the shoreline. A series of in-line diffusers will be installed on each end of the outfall lines to discharge and disperse flow in a manner that provides the least amount of impact to the surrounding marine environment, Ras Abu Fontas Power and Desalination Plant and Banana Resort Island located off the east coast of the NDIA. The main structures for the pumping station include:

- Screening Chamber
- Wet Well Chamber
- Above Ground Operations Building
- Outfall Chamber
- Outfall Piping Discharge System
- Backup Generator Building
- Electrical Sub-Station
- Fuel Storage facilities
- Guard House and Security Wall
- Emergency Overflow

A number of technical resources were used in developing the preliminary design including current national standards for the State of Qatar and relevant international codes and standards including British Standards (BS), American Society for Testing and Materials (ASTM), Japan Industrial Standards (JIS), and German Industrial Standards (DIN). The list includes:

- Qatar Construction Standard 2010 (QCS 2010)
- Survey Manual prepared by the Survey Section of the Ministry of Public Works
- State of Qatar, Public Works Authority, Drainage Affairs, Drainage Design Manual for Drainage Systems Design
- Ministry of Public Works
- Environmental and Natural Resources Protection by the MoE
- ASHGHAL Pump Station Guidelines
- KAHRAMAA Regulations for electrical Wiring, Electrical and Air Conditioning Equipment 2010
- American National Standard/Hydraulic Institute (ANSI/HI) – standards for pump and pumping station design

The Public Works Design Manual specifies parameters for storm and groundwater collection, pumping and system flow characteristics, which were utilized in developing the 30% design for major components and operational demands for the pump station and outfall. Each system component outlined in this pre-qualification document will include specific conditions and operational parameters with a general description of the facilities and their function. QCS specifications will be modified and included in the final Tender documents, as applicable, to support critical equipment and operations for the project.

The structures and plant facilities proposed by the Contractor shall have a design life in accordance with industry standards but at a minimum will meet the standards provided below. On reaching the design life it is anticipated that the structures and/or plant facilities will require a major overhaul, refurbishing and/or renewal.

### Minimum Design Life

<u>Structure / Plant Item</u>	<u>Design Life</u>
Civil Structures (concrete)	50 years
Mechanical Plant	20 years
Pipelines	60 years
HV-LV Transformers	20 years
Switchgear	20 years
MCCs	20 years
PLC / SCADA / Instruments	10 years
Motors	20 years
GRP fabrications	30 years
Steel Pressure Vessels	30 years
Steel Support Frames	30 years
Tunnel	50 years

Building and equipment dimensions shown in the accompanying drawings are based on a functional concept and are intended to provide interested Contractor's a general understanding of the approach for design and installation. It's anticipated that materials, equipment, structures, means and method will be subject to revision based on the selected Contractor's tender bid and final design.

## 3. Pump Station Facilities

### 3.1 Screening Chamber

Flow from the Abu Hamour Southern Outfall tunnel will enter the pump station at the head of the bar screen chamber with a floor elevation sloping from -17.9 to -18.25. A single bar screen will be installed in each of the two individual screening channels designed to separate flow evenly. Each of the bar screens will have the ability to pass a flow of 20 m<sup>3</sup>/sec. The head loss assumed for dirty screens at 0.5 metre. Screens are sized for 50% clearance for open space. It is intended to use a relatively fine screen with 20 mm openings with 20 mm bars width, as MoE requirements are stringent on types and amount of debris that could be released into the Gulf. Upstream and downstream gates will be installed at both ends of each channel for isolation and maintenance. Hydraulic actuator units for gates will be housed separate structures located in close proximity to screening chamber, however, the Contractors design may employ alternative approaches for housing this



equipment in the operations building providing space is available and it is practical. An automated grabber rake system will operate when screens become clogged. Sensors, located on each side of the screens (upstream and downstream) will signal when a significant difference in water levels occur thus actuating cleaning rakes for debris removal. Debris will be lifted and deposited in skip buckets located at the finish floor elevation. The major equipment and components for the screening facilities include:

- 4 – 4000 mm x 4000 mm automated gates, with hydraulic control systems
- 2 – stainless steel bar screens, 20 mm bar width, 20 mm openings, minimum screen area 40 m<sup>2</sup> for each
- Automated grab rake system with overhead rail crane system
- 2 - Debris skip buckets
- Ultrasonic water level sensors and other required instrumentation
- Overhead grab rake crane apparatus to facilitate screen and equipment removal
- Stairs, hand rail systems and ladders at intermediate elevations and bridge ways / work platforms for access above the screening chamber
- Removable grills and access hatches at grade level for retrieving equipment and performing maintenance
- Air exchange and lighting systems as needed for compliance with safety and enclosed space requirements

### 3.2 Wet Well Configuration

Flow will enter the wet well through two identical openings in a barrier wall running the entire width of the wet well entrance, located between the screening and wet well chambers. Incoming flow will be controlled by individual gates placed over each opening. Past the barrier wall the wet well is separated into two identical chambers, each housing three 1500 mm suction intakes for the larger storm water pumps and a single 1200 mm intake for a smaller base flow pump. Baffle walls will be installed between intake suction lines running from the floor at -22.0 to elevation -10.0. Just prior to the suction intake bays, where flow velocity is anticipated to be at a minimum, floor depressions of 1 m deep x 3 m wide will provide sediment traps for collecting fines and heavier debris during lower flow conditions. Sumps are provided at the end of the sand traps in each wet well chamber, containing manually controlled submersible slurry pumps, for dewatering, cleaning and maintaining of the interior spaces. An overhead rail mounted bridge crane running the entire width of both wet well chambers, will be located above the finish floor elevation (+5.0), with lifting capacity adequate to lower and lift a small front end loader and fully loaded skip bucket, for sediment removal. The main hardware and components for the wet well include:

- 2 – 4000 mm x 4000 mm automated gates, with hydraulic control systems
- 2 – Submersible slurry sump pump systems with piping
- 10 – Submersible mixed flow pumps with discharge piping rated at approximately 2.4 m<sup>3</sup>/sec each
- 2 – skip buckets
- 1 - small (bobcat type) front end loader
- 1 - 35 ton rail mounted bridge crane
- Ultrasonic water level sensors and other required instrumentation
- Stairs, hand rail systems and ladders at intermediate elevations and bridge ways / work platforms for access above the screening chamber
- Hatches at grade level to retrieve equipment and perform maintenance
- Air exchange and lighting systems as needed for compliance with safety and enclosed space requirements

### 3.3 Dry Well Configuration (Not Applicable)

The preliminary design for the dry well includes five (5) floor levels:

- Ground Floor Level – Elevation +5.0
- Floor Level 1 – Elevation 0.0
- Floor Level 2 – Elevation -5.0
- Floor Level 3 – Elevation -10.0
- Pump Floor – Elevation -22.0

Six larger storm water pumps and two smaller base flow pumps will be installed at the Pump Floor level. Hydraulically actuated valves will be installed on the suction and discharge lines for each pump. Once past the valves, discharge lines will extend upwards along the interior back wall of the facility. Discharge risers will include flow meters, installed in-line for proper operation and access for maintenance, possibly located at Level 2. Discharge lines will exit the back wall above Floor Level 1, for discharge in the Outfall Structure. The preliminary design's estimated motor capacity (for the larger pumps) indicates they are potentially too large for commercially available submersible type motors, which would be preferred by Ashghal. Per the owner's preference, under this condition, storm water pump motors were designed for installation above the pumps on Floor Level 3 in the dry well and connected with a drive shaft to avoid potential damage in the event of a most likely dry well flooding event. The smaller base flow pumps will have close-coupled submersible motors on top of the pump on the Pump Floor. The Pump Floor will include a set of a duplex sump pumps, located below the Pump Floor level in a manner that maximises removal of free water that might deposit during maintenance and/or regular operations. Pumping strategy will include the use of five large pumps (one stand by for redundancy) and VFD smaller pumps to achieve the design capacity of 19.7m<sup>3</sup>/sec. Hydraulic actuators for pump line intake and discharge valves will be placed in separate structures outside but in close proximity to the pumps station operations building or inside providing it is practical and there is adequate space.

Given site proximity to the Gulf, and water quality characteristics for incoming storm and groundwater flow, all pumping and electrical equipment, interior and exterior fixtures, controls, etc. must be fabricated, coated, lined and/or installed in a manner that, to the best extent possible, resist the corrosive marine and septic environments they will be exposed to. Piping should, at a minimum, be assumed to have epoxy coating where practical, or be manufactured / fabricated utilizing resistant type materials. Housings, cabinets and enclosures should provide adequate sealing capabilities and be rated in accordance with anticipated working environment conditions.

Each lower dry well floor will have adequately sized and strategically positioned openings to facilitate maintenance, equipment and piping removal by overhead rail mounted bridge cranes. Some openings will require grating or otherwise be provided with appropriate safety netting or hatches. Appropriate hand rail systems (removable if needed), and other safety fixtures and features, for personal access will be included at each floor level. Access to each floor, as well as the operations building internal floors and roof top, will be provided by a series of stairways. A personnel elevator will also provide access to all floors and the roof. The main equipment, hardware and components for the wet well include:

- 6 – Storm water pumps, minimum capacity 3.6 m<sup>3</sup>/sec with estimated 1600 kW motor located on level above
- 2 – Base flow VFD pumps with VFD, minimum capacity 2 m<sup>3</sup>/sec with estimated 1000 kW close-coupled motor

- 6 – Short split drive shafts
- 12 – 1500 mm dia. hydraulically operated gate valves
- 2 – 1200 mm dia. hydraulically operated gate valves
- 2 – 1000 mm dia. hydraulically operated gate valves
- 6 – Insertion magnetic flow meters for 1500 mm diameter pipe
- 2 – Insertion magnetic flow meters for 1000 mm flow diameter pipe
- Water level sensors and other required instrumentation
- 1500 mm dia. discharge piping
- 1000 mm dia. discharge piping
- Couplings, bracing & wall mounting hardware for discharge piping
- Sump pump system
- Stairs, hand rail systems and bridge ways to avoid equipment and provide safety
- Elevator assembly

### 3.4 Outfall Chamber

The Outfall Chamber will act as a containment vessel providing enough elevated head pressure to operate the system of outfall lines within specified limits for velocity (between 1 m/sec to 2.5 m/sec) and peak flow condition (20 m<sup>3</sup>/sec ). The outfall chamber will route storm water through a flow train system of channels before discharging through wall openings located at the bottom of the structure along its Gulf side wall. Flow will be regulated by hydraulically actuated gates over each outfall inlet opening, controlled by a water level sensor located along the flow path. Hydraulic actuator units for the gates will be located in separate enclosures locate near the Outfall Chamber or in the operations building should adequate space be available and it is practical. 1500 mm and 1000 mm diameter discharge lines will enter the Outfall Chamber from the top of the structure in at a level that minimises any free fall condition into the chamber, potential for splashing and possible air stripping. A divider (baffle) wall will be located at the end of the outfall chamber's flow path to create a separate flow recirculation chamber. The recirculation chamber provides the means to return flow to the wet well for exercising of the pumps and to aid in the commissioning process for the station. Flow to the recirculation chamber will be controlled by a manually (switch) operated gate located at the bottom of the separation wall, with an overflow weir at the top of the wall providing for a fail-safe condition in the event of the outfall chamber and pumping system experience a short circuit in the operational flow control.

Personnel access to the outfall chamber will be provided by a series of exterior stairs located along the side of the chamber and walk ways, platforms and bridging, running from the roof of the operations building, around the top of the outfall chamber.

A small pump system will be located in the outfall chamber, running to a lab enclosure inside the operations building, to provide means for regular sampling and testing of flows. An underwater diffusion system for adding chemical (for maintenance and possible disinfection) will be located near mid-point of the flow path in the outfall chamber. This chemical system would include piping and valves with a quick connection coupling for hook up for chemical truck deliveries. The main components and equipment for the outfall facility are:

- 4 – 2 m x 2 m hydraulically operated roller gates
- 1 – 1.4 m x 1.4 m hydraulically operated roller gate
- 1 – 1.8 m x 1.8 m hydraulically operated roller gate
- Ultrasonic water level sensor and other required instrumentation
- 1 – service pump, piping and valves for sampling and testing
- Chemical system including piping, valves and quick connection coupling

- Stair ways, bridging, work platforms and hand railing for access

### 3.5 Outfall Tunnel

Based on modelling results for the preliminary EIA, the design for the storm water discharge will provide an outfall tunnel running from the outfall chamber a distance approximately 10 km into the Gulf. The tunnel will include a concrete lined tunnel with an ID approximately 3.7 to 4.0 meters extending into the gulf for a distance of approximately 10 km. the outfall tunnel will terminate with a riser equipped with diffuser lines using “duck billed” rubber check valves in a diffuser field comprised on manifolds and approximately 90-150 individual diffusers.

Monitoring of physical (non-biological) water quality properties will be provided by a system of monitoring buoys (minimum of four) which will be tethered from the sea bed at locations generally within the field of diffuser dispersion. Buoy equipment will collect real time data such as turbidity, water pH and temperature, etc. that can be remotely gather by the station’s monitoring system. Levels for alarms will be established and included in programing for the monitoring system at the time of installation.

### 3.6 Recirculation System

An 1800 mm diameter GRP line will be installed from the recirculation chamber to a discharge point located at the head of the screening facilities inside the wet well, just before the first upstream roller gate. The recirculation system provides a means for recycling flow from the outfall chamber to the front end of the pumping station so that pumping equipment can be exercised regularly, effect regular station testing and to assist in commissioning pumping operations for the facility. Return flow through the system will be controlled by a manually (switch) operated gate installed along the separation wall between the recirculation and outfall chambers. In the event of system failure or extremely high flow conditions in the outfall chamber, an overflow weir located at the top of the separation wall will provide additional relief as needed. The recirculation line will have an insertion magnetic flow meter installed to record return flow data. Potential splashing and turbulence, which might otherwise be caused by dropping recirculated flow directly at the head of the screening system, will be controlled by installation of a Helico Drop Shaft system (or similar type). Recirculation line velocity should not exceed 2.5 m/sec. The main components for the recirculation system are:

- 1800 mm dia. GRP (or acceptable alternative material) w/flexible couplings
- 2200 mm dia. GRP Helico Drop Shaft system including internal culvert
- 1 – 1800 mm dia. Insertion Magnetic Flow Metre w/buried vault and cover

### 3.7 Overflow Spillway

In the event of a complete system short circuit/failure or storm conditions causing extreme high water elevations in the wet well, it may be possible that permissible head allowances for operating pumps and amount flow into the outfall chamber would be exceeded. An overflow opening at the top of the wet well will be provided for a passive diversion to an exterior spillway which will discharge flow at the shoreline. As water surface elevations reach the top of the wet well, the system will be programed for all pump shut down to avoid equipment damage and possible overflow of the outfall chamber. Once water surface begins to recede, pumps can be reactivated to pump down high water and resume normal operations under the required programed model. The concrete spillway should be designed to handle, at a minimum, flow in excess of the 19.7 m<sup>3</sup>/sec peak condition.

### 3.8 Operations Building

The preliminary design locates the Operations Building directly above the dry well, with the general dimensions of 22 m x 44 m. The building will contain three working levels with internal partitions to separate interior working space for the pump and motor access room from operations areas that will be sensitive to moisture, heat and marine environment, requiring climate control. The general height configuration for building to the top of floors and roof are:

- Ground Floor (Bottom Floor)  
Pump access room – Enclosed, elevation +5.0 to +16.0  
Partitioned Electrical Room, elevation +5.0 to +10.5
- First Floor  
Operations and Accommodations – Partitioned, elevation +10.5 to +16.0
- Roof  
Access to catwalk for outfall structure – Outside, elevation +16.0

Pump and motor access room will be located in the open area of the ground floor level. Two roll up doors with drive ramps will provide access to the room for delivery and removal of equipment. A minimum 50-ton overhead rail mounted crane system will be installed for the entire length and width of the room area to ensure equipment can be easily lifted from lower levels in the dry well and placed on vehicles for transfer and repair. Floor openings, of adequate size, will be strategically located for access and maintenance. All openings will include safety hatches, netting and/or hand railing as needed. Adequate space will also be provided for installation of a sampling / testing lab enclosure for installation of a sink, counter space, testing equipment, shelving and refrigerator, which will be used to retrieve sample flow from the pump in the Outfall Chamber for discharge water quality monitoring. Stairs will be located in the building for access to all floor levels in the dry well, all internal building floors and the roof. The main equipment located in the ground floor will be:

- Hydraulic actuator units
- Water Quality Monitoring Room and online water quality instrumentations (w/HVAC)
- 50 ton rail mounted overhead crane
- Various other crane or lifting equipment for removal/replacement and maintenance
- Appropriate safety hatching and hand rail systems
- Stairways, bridging / platforms and hand railing for access

Space in the ground floor may also be provided for hydraulic actuators for gates in the screening facilities and outfall chamber and, for pump intake / discharge valves located in the dry well should it be adequate and practical. A separate area will be partitioned off, in the ground floor level, for the electrical room. The electrical room will have HVAC suitable for housing MCC's and electrical controls for the pumping equipment. Appropriate access will be provided for maintenance, removal and installation of equipment.

The building's first floor level will be located directly above the electrical room, enclosed with adequate climate control. It will provide enough space to accommodate the needs of required staff for operating and maintaining the station 24/7. It's worth noting that while the preliminary design is under review by Ashghal PWA there may be revisions to general configuration of all staff accommodations including entry ways, lobby area and office space. At this time it remains possible that a separate building will be provided on-site to house additional administrative; offices; conference room and; lobby area. To date this portion of the building will provide separate rooms for the following areas:

- 3 - Accommodation rooms
- Control room w/PLC equipment, ether net and appropriate level of communications
- Office
- Kitchen with eating area
- Bathrooms and showering facilities

### **3.9 Generator and Fuel Storage Facilities**

Enough backup power must be provided on-site to operate all equipment and regular daily functions in the event of electrical outage. The preliminary design load is estimated for Peak conditions and facility operations at 11MVA. This includes running all internal and external lighting, HVAC and air exchange systems, communications, monitoring/controls and pumping equipment. The preliminary design calls for four diesel type generators of equal size to handle the station's full power requirement. Generators will be housed in a separate building with spatial considerations for maintenance and removal as needed. Each unit will be housed, insulated and/or muffled with noise dampening systems to comply with industrial standards for levels not exceeding 75 decibels. Units will be properly vented for heat and air exchange. The conceptual design integrates additional rooms, adjacent to the generator compartments, for electrical switch gear, maintenance workshop, lockable storage room for tools and additional equipment and, a separate room for fuel pumps for the generators. At a minimum the switch gear area and workshop will be equipped with HVAC.

A diesel fuel storage facility will be located directly adjacent to the generator building. Fuel lines between the two facilities will be buried. A quick connection piping arrangement at the storage site will be provided for easy delivery and filling of the fuel tank. The tank will have adequate capacity to operate all generators for outage duration of at least 48-hours. The tank will be placed in a containment structure large enough to hold its entire capacity in the event of catastrophic rupture, with an appropriately rated sump system installed in the containment area to remove any spillage. The entire facility will be covered and partially enclosed to comply with the required architectural site aesthetics. The facility will have adequate means for ventilation for health and safety. Aside from the building the main components for the generator and storage facilities will be:

- 4 – 2750 kVA diesel generators, w/hardware, ventilation, nose dampening system, etc.
- 55,000 litre cylindrical bulk fuel tank w/ filling connection
- Fuel pump and containment sump systems
- Interconnecting piping with hardware

### **3.10 Substation Area**

Discussions are proceeding with KAHRAMAA for electrical service requirements that include equipment size, configuration and spatial considerations for the required substation. At present it's likely that KAHRAMAA will need to install substation transformers sized for 11MVA that step down power from transmission lines 33kV or higher. Circuit breakers, power buses with large required working clearances may create a need for additional property to support placing and housing these improvements. At this time the contract for this project is required to install backup power generation to run the entire station's facilities during peak operation with switch gear, station interface for primary power, including the compatible switch gear for station operation and adequate site to install and secure KAHRAMAA facilities. The preliminary design provides an area of 22 m x 40 m for the HV Building and substation components which may be subject to change based on KAHRAMAA requirements.

### 3.11 Power Supply and Power Distribution System

Power supplies for the Pump Station will include a KAHRAMAA utility power supply for normal daily operational power and on-site diesel engine driven generators for emergency backup power supply. The KAHRAMAA utility supply shall be sized to provide power for all peak demand pumping requirements. The Contractors tender package will include all coordination and installation requirements associated with securing the normal power supply source from KAHRAMAA. The Contractors tender package will also include furnishing and installing the diesel engine driven generators with associated accessories and appurtenances. The power supply for the Pump Station will be based on 11kV incomers from KAHRAMAA and 11kV back-up power supply from the diesel engine driven generators. Cables and conductors from the KAHRAMAA substation switchboards to the electrical equipment rooms located in the Pump Station Structure will be carried throughout in cable trays or by other appropriate means. This applies to conductor and cable from the emergency generators as well.

The Contractors tender package will include furnishing and installing all electrical power distribution equipment including the main 11kV (HV) switchgear equipment, step-down transformers, (HV) motor control centres, HV and LV Variable Frequency Drives (VFDs) and low voltage (LV) switchboards and motor control centres. The electrical equipment will be housed in rooms located in the Pump Station Structure. The electrical equipment rooms will be climate controlled to limit temperature and humidity conditions. Major components of the electrical distribution system include:

- 11kV Vacuum Bottle HV Switchgear w/Generator transfer scheme control system
- 11kV Vacuum Bottle Motor Control Centre
- 11kV – 415V Cast Resin dry type transformers
- HV and LV Variable Frequency Drives
- 415/400/230 Volt Motor Control Centre
- Generator Paralleling Control and Transfer Systems
- HV and LV cable installation

### 3.12 Instrumentation and Controls

The Contractors tender package will include a complete control system to monitor and control the operation of the pump station and pumping system equipment. The integrated control system shall be based on PLC architecture. Manual control of all system shall also be made available in the event of a PLC failure.

All instrumentation and equipment required for onsite monitoring and control of pumping station facilities will be housed in the Operations Building first floor level control room. Some areas of the onsite facilities will be fitted with CCTV surveillance and readily accessible communication devices will be provided at critical locations throughout the station. It should also be anticipated that capabilities for a seamless monitoring interface for all station operations will be provided for future connection with a Surface and Groundwater SCADA network for Doha City. At a minimum the instrumentation and control systems will include the following:

- PLC operations of Pumps - starting and stopping of pumps based on wet well water levels and programmed start/stop sequence of pumps during wet well water level rise and fall,
- PLC operation of Outfall Chamber – opening and closing of gates based on outfall chamber water level

- Logging and totalizing of data from flow meters
- PLC operation of the screens cleaning based on differential water level
- Monitoring and alarming based on programmed set points
- Manual override of individual equipment for temporary independent operation and maintains
- Rotation of duty equipment for exercising of all units of the same type
- Programmed periodic maintenance cycles for exercising pumps and outfall flushing
- CCTV monitor of key processes include screening chambers, wet well, outfall chamber; also as required for general site security
- Site fire and safety alarms as required by code and Civil Defence
- Onsite voice communication system

### **3.13 Additional Facilities and Structures**

The entire site will be surrounded by a minimum 2350 mm high boundary wall, with pillars, for screening and security, with a minimum 2500 mm double swing gate for vehicular traffic and major equipment ingress/egress. Additional pedestrian access will be provided through personnel gates located near the facility's entrance and possibly into the substation area (per KAHRAMAA). An air conditioned guard house will be located near the front gate, containing a work area, bathroom and kitchen facility.

A concrete laydown/storage area will be located onsite for the dumping, dewatering and eventual removal for spoils, sediment and debris taken from the wet well and outfall chambers. This laydown area will have adequate containment to dewater debris prior to removal and proper disposal. A larger portion of the site will be paved and have covered and open parking space located near the front and rear of the site. Curbing and sidewalk will be designed to separate driving areas from walkways and buildings. The entire site will have a gentle grade slope for positive drainage. Exterior lighting, for safety and security, will be located along and inside the boundary walls, in and around work and laydown areas and above parking and outside of buildings, particularly over doorways and entryway stoops.

The contract will include provision of all construction administrative and field offices including space and equipment to support the Owner's onsite engineers and inspectors. The Contractor will be responsible for acquiring adequate areas for secure construction yards, material laydown sites, storage areas for equipment and temporary deposition of project spoils. This would include spoils area for excavations from the onsite facilities, laydown and assembly areas for outfall pipe lines, as well as any dredging spoils from trenching operations from outfall installation in the Gulf. The Contractor will also be responsible for acquiring approvals as necessary to establish and maintain access roads to and from all working sites, including required traffic control, over the course of the entire project. The contract will include construction of a permanent all weather access road to the pump station site once the facilities are in place.

### **3.14 Operation and Maintenance Period**

The Contractor will operate and maintain the pump station and outfall for a period of up to 3 years from the date of construction substantial completion. This includes the all water quality monitoring and reporting required by the final MoE approved EIA and by the Ashghal PWA O&M Department.

The pump station will be fully staffed by the Contractor with qualified and experience operators and support staff for the duration of the O&M Period necessary to operate and maintain the pumping station, outfall, and all support facilities on and around the site. This



includes the onsite water quality laboratory and offshore water quality monitoring equipment. An equitable arrangement for the payment of utility costs will be defined in the project construction tender documents.

#### **4. Site Restrictions and General Development Information**

The Civil Aviation Authority has imposed a height restriction that no structure/building shall be taller than 30 m AGL (above ground level). This includes the use of equipment and, all means and method employed during installation of the facilities. Further restrictions will be placed on access and height for construction operations in and around the flight paths for the new airport. Requests regarding means and method to install the outfall lines must be made directly to the NDIA and Civil Aviation Authority to establish specified limitations. To date preliminary height restriction issued by CAA on the outfall alignment within the airport approach is 19 m MSL (mean sea level).

Qatar Rail is planning to install underground rail line through tunnels located just off shore and adjacent to the Musaimeer facilities (approximately 80 metres east of the major proposed underground improvements for the pump station). Preliminary Qatar Rail information indicates that the tunnel will have a cover of 30 metres, below sea bed. The Contractor's final design must show definitively that no adverse structural influence will be exerted to the installation and operation of the Qatar Rail system. The contractor must make special application for and gain approval from Qatar Rail before any construction operations will be allowed to commence. The project has a conditional NOC from Qatar Rail on the project concept described herein.

The preliminary design for installation for the outfall system of lines utilises a trench and bury scenario. Although the Contractor has latitude to suggest alternative means and methods special attention must be paid to monitoring and controlling sediment transport and any other adverse environmental effects that might occur during installation operations. In particular, means and method must eliminate any environmental and physical impacts to the Ras Abu Fontas Power and Desalination Plant, NDIA and the Banana Island Resort. Additionally, outfall installation will likely impact several areas of sensitive marine environment along its alignment, such as sea grass beds. Where encountered, the contract requires that mitigation be implemented to re-establish, replace or by other means provide recovery for impacted eco-systems in accordance with MoE directives.

Architectural treatments to the interior and exterior of the boundary wall, pedestrian and entrance gates and, all exteriors of the buildings and structures, will be subject to review and approval by the NDIA and Ashghal PWA. The main goal is for all site improvements to match, to the greatest extent possible, colour, architectural features and design of surrounding development, including the New Airport. At a minimum the Contractors must prepare and submit all plans including elevation renderings to the NDIA for review, comment and approval for final installation. Ashghal PWA will have additional input in the review process but dimensions and placement of any emblems and/or logos shall ultimately remain under their authority.

#### **5. Programme Overview**

The Authority's high level target procurement programme is as follows:

Advertise Pre-qualification questionnaire	8 May 2014
Return of completed Pre-qualification questionnaires	30 June 2014
Invitation to tender sent out to short listed companies	17 August 2014
Tender return and commencement of evaluation	15 December 2014
Tender evaluation and agreement of successful contractors	15 February 2015
Contractors appointed	15 March 2015
Contract commencement date	1 April 2015

However, it is stressed that this target procurement programme is subject to change, including change to the dates and the stages involved in the process.

## **APPENDIX B: CONDITIONS OF CONTRACT**

### **1. Type of Contract**

1.1 The type of contract used will be as follows:

General Conditions of Contract for Design-Build contracts in Qatar modified for Operation and Maintenance as Published by Infrastructure Affairs Public Works Authority, P O Box 22188, Doha, State of Qatar.

## APPENDIX C: DRAWINGS

For clear identification of scope of works, followings drawings are attached under this section;

- Overall Site Plan – Pumping Station - CP671-P00-CDM-GE-0004
- Site Plan – General Arrangement - CP671-P00-CDM-GR-2001
- Pump Station Profile - CP671-P00-CDM-ST-1001
- Pump Station General Arrangement - CP671-P00-CDM-ST-1002
- Pump Station Plan View Roof - CP671-P00-CDM-ST-1008
- Pump Station Architectural Elevations Operations Building - CP671-P00-CDM-ST-1040
- Pump Station Architectural Elevations Operations Building - CP671-P00-CDM-ST-1041
- Outfall pipeline overall plan-profile - CP671/2-CDM-EN-1103