Terms of Reference

For the Supply and Installation of a Filter Backwash Water Recirculation and Reuse System at the Water Treatment Plant of Corinth, Municipality of Corinth.

In the framework of
the "Corinth Water Replenishment" Project

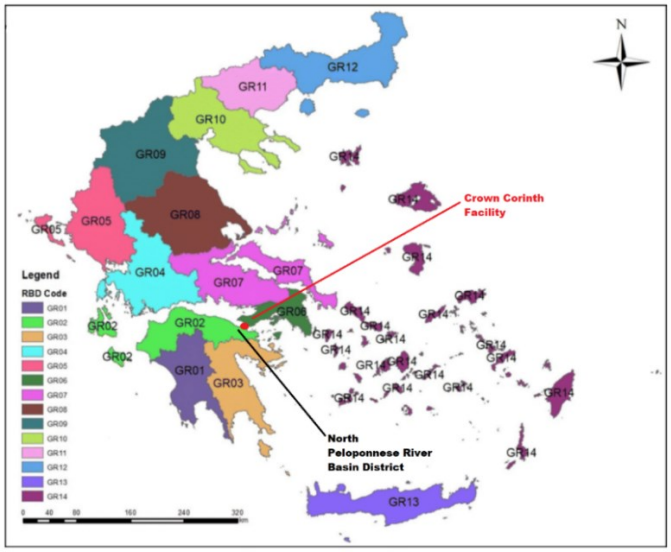
Funded by
CROWN HOLDINGS, INC

1. Background

1.1. The "Corinth Water Replenishment" Project

This project is located in Corinth, Greece, which is within the North Peloponnese River Basin District, which drains to the Ionian Sea (Figure 1). The municipality of Corinth's water supply system is currently having problems meeting demand. This problem is exacerbated in summer months and may continue to be an issue because of climate change, which causes increased temperatures (and subsequent increased evaporation) as well as more frequent and intense droughts. These issues will reduce available water to surface water bodies and reduce groundwater recharge, both of which are water sources of the municipal water system of Corinth.

This project will increase the water use efficiency of the main municipal water treatment facility (Figure 2), thereby increasing water availability and reliability in this region with water supply concerns. This will be achieved through the collection and treatment of the facility of Corinth filter backwash water and its recirculation back to the raw water tank for retreatment and use. Currently, this filter backwash water is not used within the water system. Specifically, it is rejected in the facility's drain.



River Basin Districts of Greece

Figure 1. Crown Corinth Facility Location within the North Peloponnese River Basin District

Figure 2. The Water Treatment Plant of Corinth

2. Description of the Assignment

2.1. Objective

The objective of the assignment is the "Supply and Installation of a Filter Backwash Water Recirculation and Reuse System at the Water Treatment Plant (WTP) of Corinth Municipality", based on the information presented in Annex I of the present document.

2.2. Requested Services

The tasks envisaged to be undertaken as part of this work package consist of:

a) Supply and installation of a Filter Backwash Water Recirculation and Reuse System at the WTP of Corinth Municipality". The purpose of the requested system is to treat the filter backwash water of the said WTP and return it to the raw water tank in order to be retreated by the WTP's existing equipment and become potable water.
b) Setting and starting up the requested system after its installation.
c) Provision of an "Operation and Maintenance Manual" to the respective Municipal Company for Water and Sewerage.
d) Provision of a training session for the respective employees of the Municipal Company for Water and Sewerage.

The technical specifications of the system are presented in the Technical Specifications of the present document.

2.3. Assignment Outputs

Delivery of a fully operational and on duty Filter Backwash Water Recirculation and Reuse System at the WTP of Corinth Municipality" accompanied by an "Operation and Maintenance Manual" and a training session for the respective employees of Municipal Company for Water and Sewerage.

The design capacity of the requested system is to be 26,000 m^3/year.

2.4. Deliverables

Item	Description	Unit	Quantity
A	**Filter Backwash Water Recirculation and Reuse System**		
A1	A fully operational and on duty Filter Backwash Water Recirculation and Reuse System at the Water Treatment Plant of the Municipality of Corinth, in compliance with the technical specifications presented in the present document. The works included are the following:	System	1
A1.1	Preparatory works	Lump Sum	1
A1.2	Delivery of equipment	Lump Sum	1
A1.3	Hydraulic and electrical connections	Lump Sum	1
A1.4	Testing and starting-up	Lump Sum	1
B	**Operation and Maintenance Manual**		
B1	Operation and Maintenance Manual, including troubleshooting section.	Manual	1
C	**Training**		
C1	Training session for the employees of the Technical Service of the Municipality of Tanagra.	Session	1

This tender is not divided into lots, and tenders must be for the study / report indicated.

2.5. Obligations

During the construction phase of the project, the following obligations are put into force:

- All necessary measures (marking, fencing, etc.) to avoid accidents, to protect residents and workers from danger that may be created during the construction of the project, to be taken.
- Storage of materials, even temporary, at the construction area should not present danger to the employees of the Municipality of Corinth.
- After the completion of the construction, if necessary, the rehabilitation of the construction area needs to be conducted.
- Pictures of the work progress should be collected and sent to GWP-Med.
- A final list of materials and equipment to be sent to GWP-Med.
- For the proper implementation of the works, the Contractor is obliged to have the construction works insured against all risks (civil liability and insurance to third parties), including cases of damage due to force majeure.

2.6. Health and Safety Precautions

Responsibility for all aspects concerning health and safety issues for the duration of this project is vested entirely in the contractor entrusted to do this job, who will exercise all control over operations, materials, employees, and all other factors respecting health and safety norms.

2.7. Reporting line

The awarded contractor will communicate directly with Dr. Nikos Skondras, Senior Program Officer at GWP-Med (Contracting Authority).

Additionally, the awarded contractor will consult with and work under the direct supervision of the technical representatives of the Municipal Company for Water and Sewerage of Corinth (Supervising Authority).

2.8. Monitoring and Progress Controls

Dr Nikos Skondras, Senior Programme Officer at GWP-Med, and Mr. Charalampos Lappas, Programme Officer at GWP-Med, will be providing oversight and guidance from the side of the Project Team. Coordination calls between the consultant and the Project Team will be held at weekly basis, to monitor the progress of the assigned services.
Services will be rendered and will be considered completed upon approval of the deliverables by the Project Coordinator, the GWP-MED Executive Secretary and the T Municipal Company for Water and Sewerage of Corinth.

2.9. Site Visit

The bidders must visit the point of the technical intervention in order to have an understanding of the actual conditions on the spot and be able to prepare their technical offer and assess the situation for the preparation of their financial offer.
The site visit has to be completed at least five (5) working days from the publication of the tender (including the date of the tender publication).

3. Duration of the Contract

Delivery of the works should be completed by 31/11/2024.
The overall duration of the contract will be maximum by 31/12/2024.

The date of the commencement of the contract execution shall be the last signing of the contract.

4. Contract Price, Schedule of Payments

The maximum fee for this assignment is **90.000,00 EUR (including VAT)**. This amount includes all other costs, income taxes and any other amount payable or cost that may be required for the completion of the service.

The schedule of payments is as follows:

- 30% payment upon completion of the preparatory works (to be verified by the Municipal Company for Water and Sewerage).
- 30% payment upon delivery of the equipment (to be verified by the T Municipal Company for Water and Sewerage).
- 40% payment upon completion of the remaining works and services (to be verified by the Municipal Company for Water and Sewerage).

Each payment will be issued upon receiving the respective deliverables and after the written approval from the Municipal Company for Water and Sewerage of Corinth.

In the event that there are delays in the execution of the contract the awarded contractor shall be liable to a deduction of €100 per day, for every day of delay, including Sundays and public holidays, up to a maximum of 10% of the contracted amount.

The successful consultant must Provide:
Certification of payment of Taxes.
Certification of payment of Social Insurance contributions before contract signing.

5. Guarantee
The awarded contractor will provide a Guarantee on all equipment for a minimum period of 12 months against faulty workmanship and materials and on the operation of the system as a whole. If during this period any parts or equipment have to be changed (due to faulty workmanship and not due to the selected operation conditions), the guarantee on that part is to be renewed for another year from date of replacement. The initial guarantee as well as the replacement guarantee include the equipment cost (transfer, labour cost, taxes, insurance etc.). The cost of the replacement of the faulty equipment or/and the necessary works is to be covered by the awarded contractor.

The awarded contractor agrees to submit to the Contracting Authority one Performance Guarantee accounting to 5% of the contract value.
The successful participant shall, within ten (10) calendar days of the receipt of the contract, sign and date the contract and return it together with a copy of the Performance Guarantee. Any Performance Guarantee issuance expenses bear's the successful participant.
The Performance Guarantee shall be released after the completion of three (3) months from the written acceptance of the works performed by the Municipality of Heraklion.
The Contracting Authority will not affect any payment to the Contractor until the Performance Guarantees have been submitted.

6. Selection Criteria (Pass / Fail)

Successful participants must provide the following documents:

A. <u>Technical Offer:</u>
- Be enrolled in one of the official professional or trade registries at the country of registration.
- Be licensed to perform works in Greece.
- Provide Certification to carry out the requested works (ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 or equivalent on "design, supply, installation, maintenance and support of water treatment systems).
- Provide a statement of availability of resources (e.g. tools, equipment, personnel / technicians) to perform the requested tasks (either own resources or through collaboration). Minimum requirements:
  - Power cutting tools (e.g. angle wheel)
  - Drilling and screwing power tools

- Testing and measuring equipment for the electrical works (e.g. multi-meter)
- Small concrete mixer
- Small crane for moving heavy equipment.

- Provide a statement that at least one certified electrician / installer will be used to perform the electrical works.
- Provide a statement of understanding the requested objective, services, and deliverables.
- Provide a Graphic Works Schedule - Program of Works in the form of a Gantt Chart.
- Provide the datasheet of the offered electromechanical equipment (pumps / filters).
- Provide a signed statement certifying that the equipment is new and unused.
- Provide the CE or ISO certificates of the pumps, and any other electromechanical equipment which is to be offered.
- Provide a warranty for good operation for at least 1 year for the whole system which is to be installed.
- Provide proof of their average annual turnover for the last three (3) fiscal years being at least equivalent to the maximum amount of this Call.
- Provide proof (contract and Certification of Good Execution and Operation) of having executed at least one work for potable water of equal or higher value which included at least five of the six following aspects, in the last three years:
  - Booster water pumps
  - Dosing pumps for chemicals
  - Pipe flocculator
  - Filtration with Lamella
  - Filtration with pressure filter of at least two layers of filtering media
  - Control panel
- Provide proof of visiting the location of installation of the requested system in the preset time period.

B. Financial Offer (Annex 2)

7. Awarding Criterion and Evaluation Process

Award criterion is the Most Economically Advantageous offer with criterion the lowest price for the offers satisfying the selection criteria.

8. Submission of Offers

Please refer to the **Call for Offers Document** for the proper submission of the Technical and Financial Offer.

TECHNICAL SPECIFICATIONS

The following material derived from a technical study that was conducted by an awarded expert at the Water Treatment Plant of Corinth. The awarded contractor will have access to that study.

1. Water Treatment Plant of Corinth

No of filters	2
Flow per filter (m^3/h)	275.00 – 300.00
Backwash water per filter (m^3)	100.00
Total backwash water (m^3)	200.00
Average backwash times / week	2.5 (2 – 3)
Annual volume of backwash water (m^3)	26,000.00
Turbidity of backwash water (NTU)	46
Total Suspended Solids of backwash water (mg/l)	68
System design	
Reclaimed water capacity (%)	92
Maximum capacity (m^3/year)	65,700.00
Backwash water to be treated (m^3/h)	8,69

It is noted that the two filters at the Water Treatment Plant of Corinth do not perform the rinsing phase, but only the backwash phase.

2. Treatment Process of Backwash Water at the Water Treatment Plant of Corinth

Treatment Stages – also presented in Figures 3 and 4:

- Tank to balance the flow of the backwash water to be treated.
- Dosing of coagulant and flocculant
- Pressure filter feed pumping.
- Pressure filtering.
- Return to raw water tank of the WTP.

Works included:

- Installation of a control / electrical panel.
- Hydraulic and electrical connection of the equipment (including piping, fittings, cables, etc.).
- Concrete base for the equipment.
- Shed to protect the equipment.

Figure 3. An indicative allocation of the equipment in the WTP area.

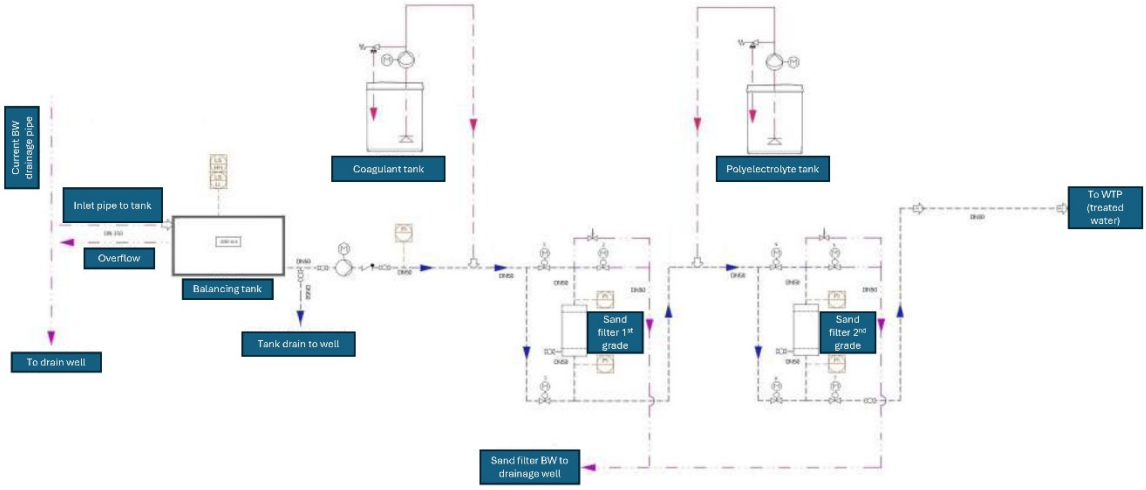


Figure 4. An indicative piping connection of the equipment.

3. Technical Specifications of Equipment

3.1. Balancing Tank

The tank for collecting the filter backwash water of the WTP will have a volume of at least 200 m^3. The tank will be placed near the existing WTP wash water drainage well.

Every time a filter backwash is performed, the backwash water will be led to the tank through a Φ350 pipe. For safety reasons, the tank will be equipped with overflow (of a similar pipe diameter), which will lead the water to the existing well. Additionally, the tank will be equipped

with a discharge valve which, again, will lead the water to the existing well. Finally, the tank will be equipped with an outlet valve, at the bottom, for connection to the treatment system.
The tank will be made of galvanized metal sheets with a thickness of 0.8 mm. Internally, it will have a special plastic membrane fabric made of special PVC 0.5 mm thick, which will be in contact with water. Before the membrane, at the sides and the bottom of the tank, a protection fabric will be installed. Finally, the upper part of the tank will be equipped with a covering fabric to prevent the formation of algae.
The tank may be above ground or partially underground, depending on the manufacturer's instructions. Depending on the diameter, height and according to the manufacturer's instructions, the base on which the tank will be placed should be built of reinforced concrete.

3.2. Dosing Pumps

3.2.1. Dosing pump for coagulant
A flow of 0.73 l/h is required. The offered dosing pump must be of 0 – 2 l/h at 7 bar

3.2.2. Dosing pump for polymer
A flow of 1.74 l/h is required. The offered dosing pump must be of 0 – 2 l/h at 7 bar

The dosing systems will be accompanied by a tank of minimum volume 100 l for the chemicals.

For the startup of the system, the contractor will offer the necessary quantity of coagulant and polymer (see Annex II).

3.3. Automatic Pressure Filter System

1st Grade of Filtering

Technical Specifications	
Flow (m^3/h)	8,69
Velocity (m/h)	13,24
Filter diameter (inches)	36
Material of filter	Glass Reinforced Plastic
Shape	Vertical, cylindrical, with hemispherical edges
Cylindrical height (mm)	1.170
Maximum pressure of operation (bar)	5
Test pressure	60% more than the maximum operation pressure
Pressure drop	Less than 1 bar
Backwash flow (m^3/h)	18 (for 12 minutes)
Diaphragm valves	3
Filtering media	

Substrate	
Layer 1	Silica Gravel 10 – 15 mm
Layer 2	Silica Gravel 6 – 10 mm
Layer 3	Silica Gravel 2 – 5 mm
Total height of substrate	420 mm
Filtering Layer 1	Silica Sand 0,5 – 1 mm 380 mm height
Filtering Layer 2	Anthracite 0,8 – 1,6 mm 450 mm height

2nd Grade of Filtering

Technical Specifications	
Flow (m^3/h)	8,69
Velocity (m/h)	13,24
Filter diameter (inches)	36
Material of filter	Glass Reinforced Plastic
Shape	Vertical, cylindrical, with hemispherical edges
Cylindrical height (mm)	1.170
Maximum pressure of operation (bar)	5
Test pressure	60% more than the maximum operation pressure
Pressure drop	Less than 1 bar
Backwash flow (m^3/h)	18 (for 12 minutes)
Diaphragm valves	4
Filtering media	
Substrate	
Layer 1	Silica Gravel 10 – 15 mm
Layer 2	Silica Gravel 6 – 10 mm
Layer 3	Silica Gravel 2 – 5 mm
Total height of substrate	420 mm

Filtering Layer 1	Silica Sand 0,5 – 1 mm 380 mm height
Filtering Layer 2	Anthracite 0,8 – 1,6 mm 450 mm height

3.3.1. Additional features:

- The filters must rest on a base to prevent damage from moisture and also to allow easy access to the bottom of the filter.
- The filters must be accompanied by a piping system made of NORYL PVC polymer material, of high quality with particular resistance to corrosion, diameter Φ50.
- In the upper part of the filters there must be a cylindrical system of uniform distribution, while in the lower part of the filter there is a system of uniform distribution of the water perforated distributors placed radially.
- The filters will be accompanied by an air compressor which will include an electric motor and an air tank of 50lt, and the following technical specifications:
  - Flow: 175 l/min
  - Pressure: up to 8 bar
  - Power: 2.5 hp

3.3.2. Operation and washing control unit of double in-line filtration system.

The washing of the filters will be conducted automatically with water. The water will be supplied to the filters via a pump (see below 3.4). The pump will be the same booster pump which will forward the water to the filters during their normal operation.

The filter valves will be of diaphragm type and will be controlled by pneumatic motors / actuators. Totally, the filtering system will be equipped with seven (7) diaphragm valves.

The valve operation commands will be provided by an electric board of 24V. The whole filtering system will be controlled by an electric board.

The control will ensure:

- The automatic operation in all the phases of filtering and backwashing
- The minimization of hydraulic hammering
- The chronometric setting of the backwashing of each filter.
- The independent setting of the duration of each stage of backwashing
- The option of manual operation with the simple pressing of a button

3.3.3. Operation of Filters

The two in-line filters will be controlled by seven (7) diaphragm type valves which will open and close to direct the water for the various phases of operation (normal operation, backwash, etc.). The electric board of each filter will control the operation of the respective electrovalves which, in turn, will control the operation of the diaphragm valves. The air for the operation of the diaphragm valves will be provided by an air compressor (air in/valve closes – no air/valve

opens). The opening and the closing of the valves will be made slowly to avoid hydraulic hammering.
During the normal operation, the raw water (WTP filter backwash) is inserted from the top of the first filter vessel and the total suspended solids are removed as it moves downwards through the filtering materials. Finaly, the water exits the vessel from the bottom and, similarly, inserts the second filter. The second filter removes any residual suspended solids that bleed the first filter.

A puddle-wheel type flow meter, with flow indication on the spot, will be installed after the second filter for the replenishment volume to be identified.

3.3.4. Backwash

During the backwash operation of the first filter, the water is inserted from the bottom of the vessel and removes the suspended solids from the filtering media as it moves upwards. From there, it is forwarded to the drain. The backwash of the first filter is performed with raw water (WTP filter backwash). Then, the first filter returns to normal filtering operation. The backwash operation of the second filter is conducted in a similar way but with filtered water from the first filter vessel.
The above-described procedure is performed completely automatically.

3.4. Booster and Backwash Pump

Filter Pump (including backwash)	
Flow of operation	8,69 m^3/h
Manometric pressure of operation	2,7 bar
Flow of backwash	18 m^3/h
Manometric pressure for backwash	2,2 bar

BILL OF QUANTITIES

ITEM / EQUIPMENT	**QUANTITY**
Backwash water collection tank of 200 m^3.	1 pcs
Concrete slab for the equipment and the water tank	Approx.12 m3
Housing for the equipment / shed	1 pcs
Dosing pump for polymer (including tank for chemicals)	1 set
Dosing pump for coagulant (including tank for chemicals)	1 set
Double pressure filter of 36”	1 set
Filter feed pump	1 pcs
Flow meter, puddle-wheel type, with flow indication on the spot (screen)	1 pcs
Control panel / electric board	1 pcs
Electrical connections	1 (lump sum)
Hydraulic connections (including Φ350)	1 (lump sum)
Coagulant for the start-up	1000 lt

Polymer for the start-up	100 lt

It is noted that the contractor should ensure that the sensitive electromechanical equipment will be protected from the weather conditions.

DRAWINGS

P&ID and LAYOUT drawings are provided as separate files in .pdf format.

WORK PHASES

Phase I	Preparatory works (e.g. cleaning of the area of installation, ground leveling, concrete slab, etc.)
Phase II	Supply and delivery of equipment to the location of installation
Phase III	Hydraulic and electrical connection of equipment and control / electric board
Phase IV	Testing and start-up of the system
Phase V	Operation and Maintenance Manual, including troubleshooting section
Phase VI	Training session for the employees of the Technical Service of the Municipality of Tanagra