



GOVERNMENT OF BERMUDA

Ministry of Public Works

Department of Works and Engineering

**BUILD OWN & OPERATE PLANT
TO PRODUCE POTABLE WATER
FOR ST GEORGES**

**VOLUME 3
SERVICE INFORMATION**

JANUARY 2017



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SECTION 1: DESCRIPTION OF SERVICE

1.1 Scope of Work

A The scope of work shall be for the Contractor to Supply/Build a Water Treatment Plant (herein after referred to as the *Contractor's Plant*) and operate it and its adjacent ancillary facilities to produce Potable Water for the Parish of St Georges on behalf of the Ministry of Public Works (herein after referred to as the *Employer*).

The *Contractor's Plant* is to be located in the St Georges Building, 15 Somner Lane, St Georges (herein after referred to as the *Contractor's Plant*). The required plant is to be installed and operational within 3 months of the award of the contract and shall be capable of producing up to 160,000 Imperial gallons per day potable water equal to the Drinking Water Standards set out in Appendix A. The *Contractor's Plant* is to be installed in parallel to the current water production to allow a smooth and uninterrupted transition from the existing service to the service provided by the *Contractor's Plant*. The *Contractor's Plant* shall have all the necessary equipment to convey its product to the designated Fort Victoria Service Reservoir. An existing system of pipework is provided by the *Employer* to convey feed water to the plant from current abstraction wells and convey product water to the Service Reservoir. The *Employer* shall provide a meter at the designated product discharge point and the *Contractor* shall provide an internet connection point for the meter to report to an internet based recording system. The *Contractor's Plant* shall include the provision of abstraction pumping to provide feed water. The *Employer* requires a guaranteed supply quantity of 65,000 Imperial Gallons per month for the duration of the contract.

B The *Contractor* shall be deemed to provide a sheltered space for the installation of the *Contractor's plant*.

C The *Contractor* shall provide all services that are required to sustain full functionality of the *Contractor's Plant* and shall include but not be limited to:

1. Operation, repair and maintenance of feed wells to the *Contractor's Plant*, including the mains between the wells and *Contractor's Plant*;
2. Operation, repair and maintenance of the equipment to provide a connection between the *Contractor's Plant* and the Fort Victoria Service Reservoir storage tank (this excludes the connecting pipework beyond the designated metering point);
3. The *Contractor* shall continuously monitor the water level in the Fort Victoria Reservoir and shall use this information to determine when the plant shall operate.
4. Operation, repair and maintenance of the *Contractor's Plant* including all



- associated equipment; both internal and external;
5. Sampling, testing and collection of data; and
 6. Prepare and submit monthly and quarterly reports as defined in the Service Information.

D Repair and maintenance of the *Contractor's Plant* shall mean fixing any sort of mechanical or electrical *Plant* should it be broken or not functioning (repair) as well as performing the routine actions which keep the *Contractor's Plant* in working order (maintenance) or prevent trouble from arising (preventive maintenance). Repair shall also include the replacement of parts when it is not possible to fix an item of *Plant*. The *Contractor* shall remove all garbage from the *Plant* and dispose of any broken or redundant equipment upon removal from the *Contractor's Plant*.

E The *Contractor's Plant* shall be operated and maintained for the Service Period which is stated in Part One of the Contract Data.

F The *Employer* will provide a meter to measure the quantity of water leaving the plant. The record of flows from the meter will provide the basis of monthly volume payments. In the event that the *Contractor* disputes the flow measurement the *Employer* will have the meter checked and calibrated by the meter manufacturer.

G The Service shall be conducted under the NEC3 Term Service Conditions of Contract (June 2005) (with amendments dated June 2006).

1.2 Security of the Site

A The *Contractor* is responsible for maintaining the security of the *Affected Property* site area.

1.3 Submittals

- *Contractor's Plan*
- Copies of certification and where appropriate work permits for workforce
- Insurance Certificates
- Monthly and Quarterly Reports



SECTION 2: PLANT AND MATERIALS

2.1 Plant

A The *Contractor's Plant* shall include all necessary equipment including required services to have a functioning water desalination plant that produces potable water in accordance with the water quality criteria in Appendix B attached.

B The main components of the plant include:

- Feed Water supply wells including pumps
- Desalination Equipment
- Proper chlorine dosing equipment with dosing monitoring and hi/low alarms
- Proper waste disposal facilities using an existing disposal borehole
- Product Water pumping equipment to convey the product water to the service reservoir.
- Water Level Monitoring of the Service Reservoir

C The *Contractor* is responsible for providing all tools, materials and equipment required for operation and maintenance of the *Contractor's Plant*. This includes the provision of heavy lifting equipment as necessary.

D The plant shall be maintained as per the manufacturer's recommendations for the *Contractor's Plant*.

E In accordance with the requirement for a Contractor's Plan this should include details and information about the *Contractor's Plant*. An Equipment and Operations Manual for the *Contractor's Plant* shall be provided at the site at all times.

2.2 Materials & Consumables

A The *Contractor* shall be responsible for all consumable materials required to operate and maintain the *Contractor's Plant*.

B The *Contractor* shall maintain an inventory of consumable items such as membranes, filter cartridges, dosing chemicals, cleaning chemicals and all other miscellaneous items necessary for the plant to operate continuously as required.



2.3 Spares

- A** The Contractor is responsible for maintaining the inventory of critical spares to reduce plant shutdowns to a minimum and shall at his own cost purchase replacement items when spares are used within the plant.

2.5 Chemical Dosing

- A** The *Contractor* shall provide proper dosing equipment and maintain adequate chemical supplies to ensure the product water passing through the designated water meter meets the quality criteria set out in Appendix A.
- B** Any failure of the chlorine dosing system and failure to achieve proper chlorine residuals must be immediately reported to the *Service Manager*. Such a failure will be deemed an emergency situation and an immediate rectification plan must be given by the *Contractor*.

2.6 Feed Water Wells

- A** The feed water wells shall be cleaned every six months to maintain their performance and to ensure an adequate flow of raw water. The cleaning shall include the following;
1. Remove pump from the well.
 2. Mix and pump a chlorine solution into the well.
 3. Let stand for 24 hours.
 4. Agitate the chlorine solution in the well using a drillers rig.
 5. Reinstall pumps and pump wells to divert waste until there is no chlorine residual
 6. Once the presence of chlorine is no longer detected in the raw water, the water can be redirected back to the plant.
- B** A crane and well drilling rig will be required to complete the cleaning work.



SECTION 3: PROPERTY AND FACILITIES

3.1 Contractor's Plant

- A** The *Contractor's Plant* is to be located within the *Affected Property*.
- B** The area designated for the *Contractor's Plant* is delineated on the drawings in Appendix B

3.2 Use Of *Affected Property*

- A** The *Contractor* shall have full use of the *Affected Property* to install and build his *Contractor's Plant* for the service during the Service Period of the Contract except as directed by the *Employer*.
- B** The *Contractor* shall submit requirements for the install of the *Contractor's Plant* to show the *Employer* how the plant can be accommodated in the *Affected Property* prior to commencing installation.

3.4 *Employer's Access*

- A** The *Affected Property* shall be accessible to the *Employer* or *Service Manager* at all times. The *Employer* shall have access whether by electronic or standard lock system. The *Employer* or *Service Manager* shall give notification to the *Contractor* when access is required.

3.5 Damages to *Affected Property*

- A** The *Contractor* shall make good any damages made to the *Affected Property* during the Service Period as a result of actions by the *Contractor*. The damages shall be repaired to match existing or as approved by the *Employer*.
- B** Normal maintenance and damages to the building and surrounding grounds shall be reported to the *Service Manager*.

3.6 Commencement of Water Supply Operations

- A** The Commissioning of the *Contractor's Plant* shall be undertaken in an orderly manner at the commencement of the Service Period.
- B** The actual time of day for commencement of water supply through the designated meter shall be agreed prior to commencement of the Service Period.



- D** The *Service Manager* and *Contractor* shall complete an initial joint inspection of the *Contractor's Plant* prior to commencement of the Service Period and agree and certify the condition and operational competency of the *Contractor's Plant*. The following parameters shall be confirmed;

Parameter	Value
Calcite Concentration (ppm)	250 (maximum)
Conductivity (Microseimens)	700 (average)
PH	7 (minimum)
Residual Chlorine	0.6 (minimum)
Maximum Flow rate (Imperial gallons per minute)	111

The product water shall conform to the parameters outlined in Appendix A.

- E** The *Contractor's Plant* shall be shut down by the *Employer* once the condition and operational competency of the *Contractor's Plant* is confirmed. The *Contractor* shall start the *Contractor's Plant* and commence the Service Period.

- F** At the completion of the Service Period the *Contractor's Plant* shall be discontinued in the same manner as at the commencement of the Service Period to ensure a seamless transition for a continued water production.



SECTION 4: CONTRACTOR'S PLAN

4.1 Plan Details

A The *Contractor* shall prepare a plan detailing how the service shall be undertaken. This should include a management plan which entails:

1. The Management Structure;
2. Contingencies for problem solving;
3. Coverage for staff absences;
4. Financial Control;
5. Health and Safety Program (HSP);
6. Communications plan with Employer which includes contact information for key personnel;
7. Hurricane preparedness and emergency plan; and
8. Blackout operations plan (i.e. loss of electrical power).

4.2 Programme of Works

A The *Contractor* shall include a Task Order programme of the maintenance works coordinating all tasks and activities required to keep the *Contractor's Plant* functioning as required.

4.3 Warning Notices

A The *Contractor* must issue a warning notice to the Service Manager any time it is required to take corrective actions that will impact on the delivery of the service to the *Employer*.

4.4 Hurricanes and Emergency Preparations

A The Contractor shall coordinate with the Employer during tropical storms, hurricanes or other extreme weather conditions.

B In the event of a hurricane, the *Contractor* shall operate the *Contractor's Plant* as follows:

- The *Contractor's Plant* shall be operated until a Hurricane Warning is issued from the Bermuda Weather Service or at the end of the work day; whichever occurs first. The *Contractor's Plant* shall be shut down to protect it from any damage for the duration of the storm. If the Service reservoir is already full, the *Contractor* will be notified by the *Service Manager* to cease operations until after the storm. The *Contractor's Plant* shall be made secure to minimise any damage from the storm.



C

The *Contractor* shall have personnel available to attend the *Contractor's Plant* after a storm. The *Contractor* shall report to the *Contractor's Plant* as soon as is practicable, to assess any potential damage and prepare to restart the *Contractor's Plant*. No water should be sent to the Service Reservoir before notifying and coordinating operations with the *Service Manager*.



SECTION 5: SAFETY AND HEALTH

5.1 Legislation

A The *Contractor* shall comply with all current Health and Safety Legislation.

5.2 Health and Safety Program

A The *Contractor* shall prepare a Health and Safety Program as per Section 4, Clause 4.1 (A) of the Service Information.

5.2 Notification

A The *Contractor* shall, immediately on occurrence of any accident at or about the *Contractor's Plant*, or in connection with the execution of the Works, report such accident to the *Service Manager*. The *Contractor* shall also report such accident to the appropriate Authority whenever such report is required by Law.

B The *Contractor* shall post notices to inform the workers of their conditions of work in conspicuous places at the establishments and work places concerned.

5.3 Safety During Tours

A The *Employer* may occasionally conduct tours of the *Affected Property* to Government employees and members of the public. If the *Contractor's Plant* is in operation, no unescorted member of the public shall enter the main plant area.

B No member of the public shall enter the *Affected Property* without written permission of the *Employer*.



SECTION 6: TESTS AND INSPECTIONS

6.1 Water Quality Standards

- A** The quality of the water produced by the *Contractor's Plant* shall conform to the Drinking Water Standards contained in Appendix A. This standard is the minimum requirements as established by the Department of Health.

6.2 Measurement Requirements

- A** In addition to activities that the *Contractor* must perform to satisfy obligations under other sections of this Contract, the *Contractor* is required to provide the sampling and analytical services. All analysis is to be performed in accordance with the protocols and procedures specified in the product water criteria.

6.3 Measurement of Volumes

- A** The measurement of the volumes of treated water, and basis for payment will pass through a designated metering point where the treated water exits the *Contractor's Plant* after the pumping unit. The volume of raw water entering the *Contractor's Plant* shall be measured and included with the monthly reports.

All measurements are to be continuous and recorded electronically using SCADA system.

6.4 Measurement of Physical and Chemical Parameters

- A** Weekly bacteriological testing samples can be delivered to the Central Government Laboratory located at Building 332, 11 Waller's Point Road, St George's Parish. Arrangements will need to be made with the laboratory for an appropriate delivery time. There is a charge per sample (as per current Government Tariff Schedule) all costs to be included by the *Contractor*. The requirements below are the minimum required by the *Employer*. The *Contractor* may require more frequent sampling and analysis for process control.

Raw sea water

- ***Continuous*** - pressure, flowrate
- ***Quarterly*** - TDS, SDI, Iron, H₂S

Product water

- ***Continuous*** – TDS, residual chlorine, flowrate, conductivity, reservoir level at Fort Victoria Service Reservoir



- **Weekly** - Total Coliform, fecal coliform, E. Coli
- **Quarterly** – All parameters in the EPA National Primary Drinking Water Standards.
- **Annual** – All parameters in the EPA National Primary and Secondary Drinking Water Standards



SECTION 7: RECORD KEEPING

7.1 Reporting

- A** The *Contractor* shall develop and maintain a system for documenting the operation of the *Contractor's Plant* and other components of the *Contractor's Plant*, and preparing monthly reports to the *Employer*. The information includes, but is not limited to that required for calculation of payments due. The *Employer* may require additional information that the *Contractor* would normally be expected to compile as complete documentation of the service.
- B** The report shall be submitted to the *Service Manager* each month and shall be used as a basis for payment when invoice is received. The *Contractor* shall meet with the *Service Manager* to review the report. No payment shall be made until the report is received.

7.2 Monthly Performance Report

- A** The following details shall be contained in the monthly performance report.
- Summary of daily operations.
 - Report of all days when water was not treated and/or the *Contractor's Plant* was not available for treating such water.
 - Identify length of time the *Contractor's Plant* was not in operation at a materially low level. Report reason for such failures.
 - Summary of all maintenance performed at the *Contractor's Plant*.

Detailed daily and continuous measurements to be retained by the *Contractor* and summarized for the *Employer* in the Monthly Report. This shall include but not be limited to the following:

- A record of water abstracted from the feed wells
 - Plant potable water production meter readings from the designated supply meter
 - Average flow rate from *Contractor's Plant*
 - Average conductivity of product water
 - Number of production days
 - Number of unscheduled downtime days or any part thereof
 - Daily production rate
 - Total volume of water produced in a month at *Contractor's Plant*
 - Daily water levels at the Fort Victoria Service Reservoir
 - Chemical usage per month
 - Results of bacteriological and chemical tests
- B** A log shall be kept of all maintenance performed on site.



7.3 Quarterly Performance Report

A The Quarterly Report shall contain a summary of overall operations. Results of water quality analysis of the quarterly parameters measured shall be presented.

7.4 Statutory Reporting

A The *Contractor* shall maintain all records and reports as required by law.



SECTION 8: CLEARANCE OF REDUNDANT EQUIPMENT

8.1 Objectives

The *Contractor* shall remove all redundant equipment and pipework not currently in use for the treatment/production and distribution of water.

objectives:

- Clear the necessary space for a new treatment facility to be installed concurrently with present operating treatment system
- Remove all equipment and disconnect all redundant electrical works and dispose of items in accordance with Government waste disposal regulations.

8.2 Provision of Work Plan

Prior to initiating the work the *Contractor* shall provide to the Service Manager a detailed work plan for the removal of equipment and piping to make space for the install of a replacement plant and provide a schedule for the completion of this. All integration of the new plants production water into the existing feed lines is to be undertaken with minimal disruption to the current desalination plant operation.

8.3 Payment

Upon the successful clearance of redundant equipment to the satisfaction of the Service Manager the Contractor shall submit an invoice for the balance of monies as given in the Contract Data Price Schedule and shall include all fees and services associated with the clearance works.

As part of the Contractors' bid a fee for the clearance and removal/disposal of redundant equipment under this Section shall be included in the Annex A: Price Schedule submitted with the Contractors bid.



APPENDIX A



DRINKING WATER STANDARDS

Chemical

Maximum Acceptable Limit

Arsenic	.....	0.05 mg/l
Cadmium	.....	0.005 mg/l
Chromium	.....	0.05 mg/l
Cyanide (CN)	.....	0.05 mg/l
Flouride	.....	1.5 mg/l
Lead	.....	0.015 mg/l
Mercury	.....	0.001 mg/l
Nitrate (as N)	.....	10.00 mg/l
Nitrite (as N)	.....	1.00 mg/l
Selenium	.....	0.01 mg/l
Silver	.....	0.05 mg/l
Pesticides (total)	.....	0.005 mg/l
Phenols	.....	0.002 mg/l
Trihalomethanes	.....	0.10 mg/l
Asbestos fibres	.....	7 x 10 ⁶ fibres/l

Aesthetic Quality

Aluminium	.....	0.2 mg/l
Chloride	.....	300.0 mg/l
Colour	.....	15 (TCU)
Copper	.....	1.0 mg/l
Anionic synthetic detergents	.....	0.2 mg/l (no foaming, taste, no odour problem)
Hardness	.....	300.0 mg/l
Total Dissolved Solids	.....	800.0 mg/l
Iron	.....	0.3 mg/l
Manganese	.....	0.1 mg/l
pH	.....	6.5 – 8.5
Sodium	.....	200 mg/l
Sulfate	.....	250.0 mg/l
Turbidity	.....	1-5 (JTU)
Zinc	.....	5.0 mg/l

Bacteriological

Treated Water Entering

Distribution System

Faecal coliforms	.....	0/100 ml
Coliform organisms	.....	0/100 ml



Unpiped Water Supplies

Faecal coliforms	.....	0/100 ml
Coliform organisms	.....	5/100 ml (should not occur repeatedly)
Chlorine residual	.....	0.5 ppm

Note: These standards are the requirements set forth by the Bermuda Government, Department of Health.

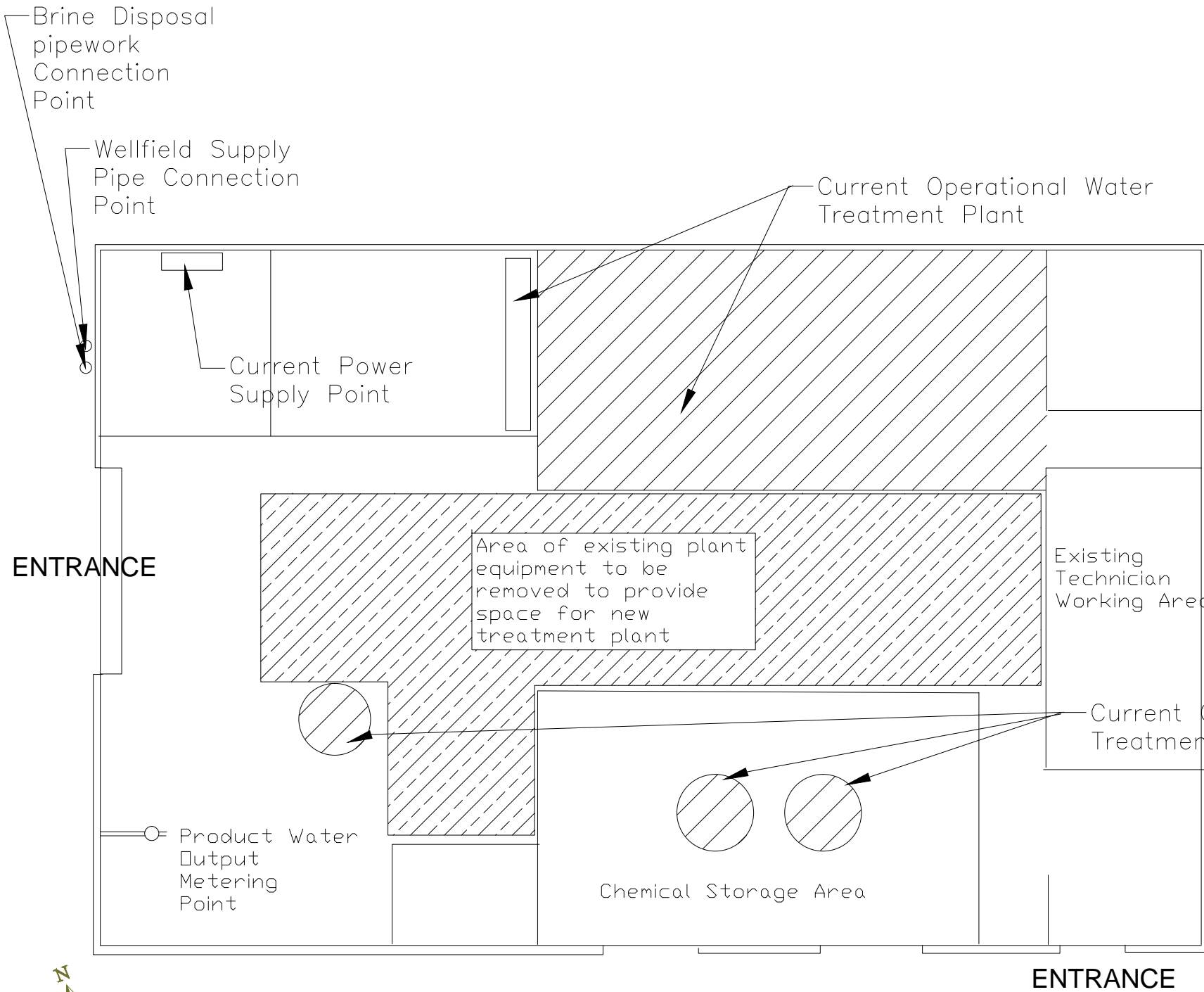


APPENDIX B

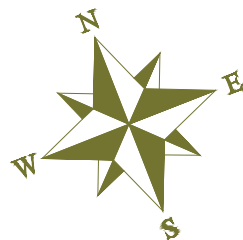
DRAWINGS



LOCATION PLAN (NTS)



EXISTING BUILDING LAYOUT (NTS)



ISSUED FOR: RFP

AMENDMENTS:

NO	REVISION	BY	APP	DATE

SCALE: NTS

SURVEY PREPARED BY: DATE:

DESIGN PREPARED BY: DATE:

CHECKED BY: DATE:

DRAWING PREPARED BY: DATE:
KC

CHECKED BY: DATE:

APPROVED BY: DATE:

PROJECT NUMBER:
50/203/50

PROJECT NAME:
St. George's Water Treatment Plant

15 Somner Lane
St. George

SHEET TITLE:
Building Available Space

SHEET NUMBER:
St Geo 01

REVISION

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