



TECHNICAL SCOPE OF WORKS / SERVICES

DESIGN, MANUFACTURE, SUPPLY, DELIVERY, INSTALLATION, COMMISSIONING AND
PUTTING INTO SERVICE
OF A NATURAL ZEOLITE COLUMNS AT BARRAGE WATER TREATMENT PLANT

BID NUMBER

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LIST OF ABBREVIATIONS:

Abbreviation	Definition
MLD	Million litres per day
NEMA	National Environmental Management Act
OEM	Original Equipment Manufacturer
QC	Quality Control
RW	Rand Water
SANS	South African National Standard
SCADA	Supervisory control and data acquisition
SHEQ	Safety, Health, Environment and Quality
PSF	Pressure Sand Filtration
UV	Ultraviolet
AMD	Acid Mine Drainage
GAC	Granular Activated Carbon

1. PREFACE

This document provides the technical scope of the installation of Natural Zeolite columns and auxiliary equipment to remove ammonia at the Barrage Water Treatment Plant.

2. BACKGROUND

The Barrage Water Treatment is a potable water treatment that is located at the Barrage Site (one of Rand Water's early raw water extraction points). The design capacity of the plant is 10m³/h and it abstracts raw water on the upstream side of the Vaal River Barrage for potable water production. The unit processes of this plant include coagulation/flocculation, sedimentation, pressure sand filtration (PSF) granular activated carbon (GAC), ultraviolet (UV), disinfection by sodium hypochlorite to treat the raw water to acceptable drinking water quality standard (SANS 241). The plant is operated for 7 – 8 hours during the day, feeding the main reservoir and services the Rand Water premises, the Barrage Police Station, a local school as well as a small residential area that is close to the site.

3. PROBLEM STATEMENT

In the recent past (early 2018), the ammonia concentration in the Vaal Barrage catchment has rapidly increased due to the acid mine drainage (AMD) from ceased mines in the Central and Western basins through the inflow of surface water from the Klip River and the Blesbokspruit

(via the Suikerbos River) and the inferior effluent quality discharged by wastewater treatment plants to the Rietspruit river from Sedibeng district Municipality. The currently installed water treatment processes at the Barrage water treatment plant are unable to remove ammonia from raw water as the plant was not designed to remove ammonia. Water that is untreated, or not treated to a sufficiently high standard, can expose its consumer to various health risks. At present, the site relies on water that is brought in by a truck from the Sasolburg Pumping Station.

4. PROJECT AIM

The aim of the project is to install and commission Zeolite Columns and associated equipment to remove ammonia to recommission the plant and ensure that it provides water that is compliant to SANS 241.

5. DETAILED SCOPE AND TECHNICAL SPECIFICATIONS

5.1. SCOPE OF WORK OVERVIEW

To address the ammonia challenge, the adsorption of ammonia using natural zeolite as an adsorbent as an intermediate process will be implemented in between the GAC columns and UV units. The intermediate natural zeolite process will include three natural zeolite pressure vessels and brine preparation and storage tanks, including pipes, pumps, valves and fittings as detailed in the Piping and Instrumentation Diagram 4492-024 and 4492-026.

5.2. PROCESS SPECIFICATION

5.2.1. Piping

5.2.1.1. General

- a) The Contractor shall supply new pipe supports suitable for the weight of class 12 HDPE piping.
- b) All piping which shall be neatly fastened on the pipe supports racks/supports

5.2.1.2. Zeolite Columns

HDPE manufactured in accordance with SANS 4427 shall be used for vessel inlet, outlet manifold, overflow and delivery piping as shown on the P&IDs. Plate welding shall be used for piping connections. Stub and backing rings shall be used at the head and tail ends of the piping.

5.2.1.3. Brine Solution

HDPE manufactured in accordance with SANS 4427 shall be used for vessel inlet, outlet manifold, overflow and delivery piping as shown on the P&IDs. Plate welding shall be used for piping connection. Stub and backing rings shall be used at the head and tail ends of the piping.

5.2.2. Valves

5.2.2.1. General

- a) All valves, as indicated in the P&IDs shall be included in the Contractor's supply.
- b) The bore of all valves must be of the same size as that of the process media pipe.
- c) All PVC valve connections shall be double union solvent weld.

5.2.2.2. Brine Solution

- a) Full bore PVC ball valves shall be used on the zeolite system to provide full isolation.
- b) The valve material of construction including internals shall be compatible with brine (min 15% m/v).

5.2.2.3. Zeolite Columns

- a) Full bore PVC ball valves shall be used on the zeolite system to provide full isolation.
- b) The valve material of construction including internals shall be compatible with brine (min 15% m/v).

5.2.3. Tanks and Vessels

5.2.3.1. Zeolite Columns

- a) Pressure vessels shall be supplied and certified in accordance with the requirements of the Pressure Equipment Regulations of the Occupational Health and Safety Act and Regulations: Act 85 of 1993.
- b) Each vessel's total effective volume (zeolite packed volume) shall be 2.5m³.
- c) The vessel must ensure that there is adequate freeboard above zeolite packed bed to prevent sand loss during filter backwash.
- d) The vessel shall have a design pressure of 450kPa.
- e) The columns shall be epoxy lined (suitable for use on potable water supply systems and resistant to brine).
- f) Each vessel shall have the following equipment as a minimum:

- i. Pressure relief valve
 - ii. Air release valve
 - iii. Side access manhole (hinged)
 - iv. Top access manhole (hinged)
 - v. Pressure gauges on the inlet and outlet pipework of each column
 - vi. Support grating for the zeolite media
 - vii. Water underdrain piping
 - viii. Water inlet distributor for uniform water distribution.
 - ix. Piping and valve for sampling
 - x. Piping and valve for draining the column
 - xi. Strainer on the backwash outlet
- g) The contractor shall make provision for adequate relief of both “pressure and vacuum” cases

5.2.3.2. Brine Tanks

- a) The brine make-up tanks shall each be minimum 5m³ PE rotationally moulded tanks manufactured as per SANS 1731:2017.
- b) The tank will have the following
- i. Inlet and outlet nozzles
 - ii. overflow and drain nozzles
 - iii. Top vent with goose neck to maintain atmospheric pressure in the tank
 - iv. Top manhole complete with a hinged cover
 - v. Lifting lugs and holding down lugs suitable for bolting to concrete support plinth.
 - vi. Nozzle(s) for manual level indicator (Cat and Mouse).

5.2.4. Pumps

5.2.4.1. Brine Pumps

- a) The brine transfer pumps shall be sized to cater for a maximum capacity of 10m³/hr. It is the contractor’s responsibility to size the pumps accurately.
- b) The pump material of construction shall be suitable for pumping brine.
- c) The pumping system shall make adequate provision for pressure relief to protect against system overpressure.

5.2.4.2. Filter Pumps

- a) The existing installation utilises pumps to pump the clarified water through the existing sand filter and GAC columns. The installation of the Zeolite columns and

associated piping will introduce losses in the system which are likely to reduce the water flow through the plant.

- b) The contractor will shall supply and install filter pumps that are adequately sized to provide 10m³/h accounting for the additional head losses that will be as a result of the new installation.
- c) These pumps are also used for filter backwashing and as such, should not be oversized as they will lead to media loss of the filters.
- d) The selection of the pumps must take into consideration the space constraints of the current installation.
- e) The contractor must make provision for pump fittings, pipework, and ancillaries required for installation and functioning of the pumping system.

5.2.5. Corrosion Protection

5.2.5.1. General Requirements

- a) All surface mounted steel fabrications, vessels, pipe work and fittings shall be subjected to corrosion protection to inhibit corrosion on external surfaces in a chemical environment. The Contractor shall submit a corrosion protection Quality Control Plan for approval by Rand Water before the commencement of any corrosion protection activities.
- b) The following general requirements shall apply:
 - Walkways, grating, access ladders and handrails shall be hot dip galvanized to SANS 121 / ISO 1461.
 - All steel vessels shall be subject to surface preparation and painting as detailed below.

5.2.5.2. Surface Preparation

All exposed surfaces excluding copper piping and stainless steel shall be prepared to the following specifications:

- a) All oil, grease and other surface contaminants shall be removed by the application of a degreasing agent applied by brush, worked into deposits and rinsed with clean water. This should be repeated until a water break free surface is obtained. Allow to dry.
- b) Non-adherent foreign material such as mill scale, rust and weld scatter shall be removed from external surfaces by mechanical means such as abrasive

blasting (to the Swedish Standard SIS-055900-1967, Grade ASA 2 - with a blast profile of 30-50 microns), power tools and wire brushes. Foreign material is considered adherent if it cannot be lifted by a means of a dull putty knife.

- c) All machinery and metal components (other than bright finishes) shall be thoroughly cleaned down by wire brushing, dressing or sanding as necessary.
- d) Before any painting is carried out, Rand Water shall inspect all steelworks.

5.2.5.3. Painting – Vessels

External surfaces shall be painted to the following specification:

- a) Apply one or two coats (as required) of a suitable undercoat to achieve a minimum dry film thickness of 175 micron. The coating shall be applied strictly in accordance with the manufacturer's data sheet.
- b) Apply one or two coats (as required) of a suitable topcoat to achieve complete hiding of the undercoat. The dry film thickness of each coat shall not exceed 40 micron per coat. The coating shall be applied strictly in accordance with the manufacturer's data sheet.
- c) Contractor may offer an alternative coating system which shall be subject to the approval by Rand Water.
- d) The finish of all paintwork shall be of the highest quality and shall be carried out by persons who specialise in paintwork.
- e) The colours to be applied to all pipe, storage vessel and steelwork shall be in accordance with Rand Water Standards RW/00300/S/061, latest edition. Any items not covered by this standard shall be painted in colours to be decided by Rand Water.
- f) For proprietary equipment, painting shall be to Manufacturer's normal standard, provided that it is acceptable to Rand Water.
- g) Galvanised and stainless-steel surfaces shall not be painted.

5.3. ELECTRICAL SPECIFICATION

The Electrical scope of work shall comply with all applicable SANS and Rand Water Standard specifications. This shall be to design, manufacture, test, supply, deliver, offload, install, commission and putting into service the following at Barrage Water Treatment Plant as a minimum:

- a) Provide for an adequately rated feeder circuit breaker and jumper cables for the power supply to the new pump control panel. Due to space constraints, this

circuit breaker shall be installed inside the wire way cubicle of the existing 400 Volt distribution panel complete with jumper cables to the adjacent cubicle, where the power shall be tapped from. The contractor shall ensure that no live parts of the circuit breaker can be touched accidentally. Where the jumper cables transition between the two cubicles, the contractor shall ensure the cables are protected against any damage. The circuit breaker brand shall be the same as the installed units.

- b) Provide a 4x core copper armored cable from the feeder breaker to the new pump control panel. This shall include for a separate black insulated earth conductor with green/yellow shrink sleeve at the termination points.
- c) Provide for a new surfaces mounted IP 56 3CR12 orange powder coated pump control panel complete with Voltmeter, Amp meter, manual stop-start, run indication, stop indication and trip indication. The panel shall incorporate protection for the pump to protect against overload, phase failure and protect pump against dry running as a minimum. The panel should be designed and manufactured in accordance with the Rand Water internal standard SAM EAM 00001.
- d) Provide for a transformer based 5kVA true online, pure sinewave, double conversion UPS unit complete with static bypass and internal batteries with a minimum of 7 years life expectancy. The unit shall be capable of backing up the automation load for at least 20 minutes.
- e) The contractor shall provide for a feeder and distribution breaker. Due to space constraints, these circuit breakers shall be installed inside the wire way cubicle of the existing 400 Volt distribution panel complete with jumper cables to the adjacent cubicle, where the power shall be tapped from. The contractor shall ensure that no live parts of the circuit breakers can be touched accidentally. Where the jumper cables transition between the two cubicles, the contractor shall ensure the cables are protected against any damage. The circuit breaker brand shall be the same as the installed units.
- f) Provide for two new 1200mm IP 65 rated vapor proof LED type light fittings at the new structure to be installed, complete with yellow lamps to mitigate against excessive insects at night. The contractor shall also replace the two existing vapor proof light fittings at the existing plant structure where the three existing vessels are placed. The contractor shall allow for the extension of the lighting circuit to accommodate the two new light fittings. This shall include armored cables, CCG termination boxes and hot dipped galvanized cable support for the cables.

- g) Provide for all power, control and earth cabling for newly installed equipment. This shall include the cable to the Automation panel installed at the plant.
- h) Provide for hot dipped galvanized cable supports.
- i) Provide for the lightning protection system for the new structure, by an ELPA (earthing and Lightning Protection Association) registered service provider complete with test reports as per SANS requirements.
- j) Complete earthing and equipotential bonding of all equipment, structures and installations.
- k) Provide for all UV resistant engraved WKS labels for panels and WKS cable numbers for all cables.
- l) Provide for interface with other disciplines to provide a complete and working installation.
- m) Provide for electrical supervision on all items and works forming part of this project.
- n) Complete decommissioning, removal and disposal of any redundant electrical equipment and installations.
- o) Provide detailed Auto CAD design drawings on the Rand Water templates, method statements, GAs, single lines, etc. prior to construction for approval and updated As Built drawings, comprehensive Asset Register, GAs, single lines, cable routes, cable rack layouts, etc. for installation and equipment on completion of the project.
- p) Provide for all test reports including electrical COC, protection grading, cable testing, Panel FAT, UPS FAT, SAT, etc. Provide for electrical certificates of compliance for the electrical installations. Test certificates for all earthing and lightning protection installations.
- q) Provide all documentation such as manuals, warranties, guarantees, O&M manuals, etc. for all equipment installed.

5.4. AUTOMATION SPECIFICATION

The Automation scope shall involve the contractor supplying and installing the Ammonia analyzer including all cabling for signalling and power supply. The Contractor shall also supply and install a local data logger for logging the ammonia reading locally at the plant. The Contractor shall link the ammonia analyser to a local data logger. The datalogger shall be linked to the SCADA located in the main operator control room. The Contractor shall utilize the existing radio network to link the analyzer to the main control room SCADA.

Rand Water shall modify the existing plant PLC program to read the analyzer. Rand Water shall also modify the plant HMI application to display the reading from the ammonia analyzer and also set alarms in case of hi or hi-hi ammonia residual in the plant. Rand Water shall also make modification in the SCADA application located at the operator Control Room.

5.4.1. The Contractor shall supply, install and commission one (1) online Ammonia analyzer.

- a) The ammonia analyzer shall have a range 0 – 5mg/l.
- b) The ammonia analyzer shall have local LCD display.
- c) The ammonia analyzer shall have 4-20mA output to PLC.
- d) The ammonia analyzer shall be complete with all necessary pumps and flow cell.
- e) The ammonia analyzer shall be installed as shown in drawing RA 72224.

5.4.2. The Contractor shall supply, install and commission one (1) panel to house the analyzer

- a) The panels shall be wall mountable.
- b) The panel shall be manufactures of 3CR12 stainless steel.
- c) The panel shall be IP54 rated.
- d) The panel shall be powder-coated cornflour blue.
- e) The panel shall be lockable with square panel key.
- f) The panel door shall have a see-through window.
- g) The panel shall have a canopy to protect it against direct sunlight.
- h) The panel shall be complete with all cable trunking, mountings and fitting accessories.
- i) The panel shall be installed as shown in drawing RA 72224.
- j) The panel shall have heat extraction fan.
- k) The panel shall have light with door limit switch.
- l) The panel shall have all suitable miniature circuit breakers and surge arrestors.

5.4.3. The Contractor shall supply, install and commission one (1) Remote IO PLC system.

- a) The remote IO PLC system shall be used to monitor the ammonia analyzer and din rail UPS as shown in drawing RA 72224.
- b) The remote IO PLC system shall support Modbus TCP/IP.

- c) The remote IO PLC system shall be complete with IO modules.
- 5.4.4. The Contractor shall supply, install and commission one (1) set of din rail mount UPS system with batteries.
- a) The din rail UPS shall support Modbus TCP/IP for monitoring purposes
 - b) The din rail UPS shall provide power to the loads for a period of minimum 5 hours.
 - c) The batteries shall be Lithium-Ion type.
- 5.4.5. The Contractor shall supply, install and commission two (2) Managed Industrial Ethernet switch.
- a) The Ethernet switch shall comply with RW AAM 07000 standard.
 - b) The Ethernet switch shall be installed as shown in RA 72224 with Fiber Optic ports.
 - c) The Ethernet switch shall support minimum 16 x100/1000Mbps port speed.
 - d) The Ethernet switch shall be managed.
 - e) The Ethernet switch shall be din rail mount.
 - f) The Ethernet switch shall support IEC62443.
- 5.4.6. The Contractor shall supply, install and commission one (1) data logger.
- a) The datalogger shall support telemetry DNP3 protocol.
 - b) The datalogger shall have expandable memory.
 - c) The datalogger shall support Ethernet ports.
 - d) The datalogger shall be web configurable.
- 5.4.7. The Contractor shall supply, install and commission one (1) panel to house the Remote IO, Din Rail UPS and Industrial Ethernet switch.
- a) The panels shall be wall mountable.
 - b) The panel shall be manufactures of 3CR12 stainless steel.
 - c) The panel shall be powder-coated cornflour blue.
 - d) The panel shall be lockable with square panel key.
 - e) The panel shall have a canopy to protect it against direct sunlight.
 - f) The panel shall be complete with all cable trunking, terminals, labelling, mountings and fitting accessories.
 - g) The panel shall be IP54 rated.

- h) The panel shall be installed as shown in drawing RA 72224.
- i) The panel shall have heat extraction fan.
- j) The panel shall have light with door limit switch.
- k) The panel shall have all suitable miniature circuit breakers and surge arrestors.

5.4.8. The Contractor shall supply, install and commission complete cabling and wiring.

- a) The cabling and wiring shall be for power, serial Modbus RTU and Cat6 Ethernet.
- b) The cabling shall be implemented as shown in RA 72224.

5.4.9. The Contractor shall supply, install and commission full length ruggedized Fiber Optic patch lead.

- a) The ruggedized Fiber optic patch lead shall be as shown in RA 72224.
- b) The ruggedized Fiber optic patch lead shall be complete with terminating connectors suitable for connecting to the industrial Ethernet switches.

5.5. CIVIL SPECIFICATION

The civil scope comprises of the following items:

- a) Fencing off around designated site areas
- b) Surveying and setting out of works
- c) Accommodation of traffic along existing road maintaining entry for staff to access the plant
- d) Exposure of services by hand (Site to indicate location of existing services)
- e) Relocation and/or protection of existing services and structures
- f) Excavation and Earthworks
- g) Laying of services (electrical, telecommunication)
- h) Temporary works design and erection, as part of formwork
- i) Construction of structures/buildings:
- j) Reinforced concrete platforms and plinths,
- k) Canopy Structure (including sheeting).
- l) Landscaping in line with existing run-off requirements (including the addition of a half-round drain on the north side of the structure – per construction drawings).
- m) Generation of as-built drawings

- n) Reinstatement of structures damaged or relocated during construction to their preconstruction condition / location.
- o) Paint structural steel to match existing structures.

Please refer to Annexure A for the Civil Specifications for detailed project specifications pertaining to the concrete, structural steel and earthworks.

6. LABELING

- Safety signs in compliance to SANS 1186 (Part 1-4) "Symbolic safety signs"
- Service Provider to adhere to the Rand Water WKS numbering convention of equipment, piping, and instrumentation.

7. DESIGN, ASSEMBLY, INSTALLATION, TESTING AND COMMISSIONING

The Successful bidder(s) shall design, supply and deliver all solution designs according to reputable local (eg. SANS) or international (eg. ISO, EN, ASME, etc.) standards.

- b) All drawings shall be done on Rand Water drawing templates and populated with drawing numbers (to be provided by Rand Water).
- c) The Successful bidder(s) shall, when pricing for the work, provide a detailed breakdown of part numbers, suppliers and local technical agents.
- d) All designs submitted for acceptance shall be signed off by the appropriate, discipline specific (automation, electrical, mechanical, civil, etc.) ECSA approved professionally registered engineer or technologist.
- e) All design and quality documents shall be required to provide a fully functional plant as intended for in this proof of concept.
- f) A copy of all installation guidelines shall form part of the O&M manual.
- g) The Successful bidder(s) shall supply data sheets indicating the part numbers, supplier, necessary installation dimensions, weights, materials and performance information as a minimum.
- h) The Successful bidder(s) shall supply the following plans:

Quality Control Plan (QCP):

- Within 15 (fifteen) days after the date of the signing of the Contract, the Successful bidder(s) shall submit a comprehensive proposal for a quality assurance plan. The program shall have a facility for Rand Water to indicate hold and witness points as required. Rand Water shall then issue its requirements for quality assurance which shall be based on the Successful bidder(s) proposals provided these are adequate and shall be finally subject to the approval of Rand Water. A QCP check shall be

submitted to Rand Water for approval prior to any commencement of the works.

Installation Plan:

- An installation plan shall be submitted to Rand Water for approval prior to any commencement of the installation works
- The installation plan shall consist of the following as a minimum:
 - Completed signed off design for the affected plant area
 - Installation procedure
 - Installation schedule (broken down per days' activity)
 - Installation personal
 - Standby personal
 - Equipment required
 - Specialist equipment required
 - Risks
 - Risk mitigation plan
 - Daily activity log

Cold Commissioning Plan:

- A cold commissioning plan shall be submitted to Rand Water for approval prior to any cold commissioning work being undertaken.

Hot Commissioning Plan

- A hot commissioning plan shall be submitted to Rand Water for approval prior to any hot commissioning work being undertaken

Testing Plan

- A testing procedure shall be submitted to Rand Water for approval prior to any testing work being undertaken.

7.1.1. The Successful bidder(s) shall submit a completed asset register for all equipment used in the plant.

7.1.2. The asset register shall include the following as a basic minimum:

- Equipment serial number
- Equipment part number
- Equipment rating
- Equipment size
- Equipment setting

7.1.3. All communications, pamphlets and technical literature shall be in English.

7.1.4. Draft copies of the Operating & Maintenance Manuals and the Data Books shall be submitted to Rand Water for acceptance prior to before the solution being put into

service. Two (2) hard copies and soft copies of the approved manuals shall be supplied to Rand Water post the draft copy being approved.

- 7.1.5. For ease of reference and handling, the documents shall be divided into separate volumes each relating to specific sections of the work.
- 7.1.6. After testing of the equipment, full test results with curves as applicable shall be provided for inclusion in the manual. This requirement covers works and/or site tests.
- 7.1.7. All data included in the manual shall be produced on standard A4 size sheet. An exception shall be made for drawings that require larger sized sheets. However, the sheets must be folded to A4 size.
- 7.1.8. Each document shall bear the title specified.
- 7.1.9. In addition to the hard-copies, all manual contents shall be provided as soft-copies.
- 7.1.10. The Successful bidder(s) shall provide a fully indexed, illustrated Data Book for all equipment. The Data Book shall contain all information pertaining to quality assurance, testing and certification of the plant, including the following:
 - Quality assurance documentation, including signed off Quality Control Plans (QCP's)
 - Instrument calibration certificates
 - Online Water Quality measuring equipment calibration certificates, where applicable
 - Flow and pressure measuring equipment calibration certificates, where applicable
 - Commissioning test results

The installation shall undergo performance tests to ensure that they comply with the specifications. Performance testing shall be based on performance test criteria/procedures which shall be developed during detailed design and submitted to Rand Water for approval.

8. DELIVERABLES

The Successful bidder(s) shall provide and meet all requirements listed in the specifications. The below presents a high-level outline of the deliverables:

- Occupational Health and Safety requirements
- Activity Schedule/Programme
- Complete Detailed and Technical Design of the solution including relevant drawings (e.g. General Arrangements drawings, P&IDs, etc.)
- Operation and Maintenance manuals.

- A comprehensive method statement for the works shall be provided covering design, assembly, implementation, commissioning, and testing.
- Project progress reports
- Project and payment schedule
- The Successful bidder(s) shall design, assemble (where necessary), deliver, install, commission, and test all equipment
- The Successful bidder(s) shall provide any necessary training to relevant Rand Water staff to facilitate the understanding and assessment of the offered solution (including configuration, maintenance and operation of the plant)

9. RECEIVABLES

Rand Water will supply the following items:

- Site layout (indicative of the proposed plant location)
- Tie-in location only – actual tie-ins to be done by service provider
- Operating conditions (pressures) of required pipelines
- Necessary Rand Water standards and templates to adhere to
- Relevant drawings as per drawing list
- Bill of Quantities

10. DRAWINGS

Applicable and relevant drawings such as P&IDS, existing drawings, typical drawings, etc. are supplied with the pack.

Table 1: Drawing list

Drawing No.	Description
DRG No. 4492-024	Barrage Water Treatment Plant - GAC Plant - Piping and Instrumentation Diagram
DRG No. 4492-026	Barrage Water Treatment Plant - Natural Zeolite Plant - Piping and Instrumentation Diagram
RA 72224	Barrage Water Treatment Plant – Zeolite Water Treatment Plant – Automation Network Layout
RA 72229-001 TO 004	Barrage Water Treatment Plant – Zeolite Water Treatment Plant – Steel and Concrete Details Sheets 1 to 3 and Schedules

11. INTERFACES

11.1.1. Brine Water Supply

- Brine preparation water supply tie-in point shall be as per the P&ID. Actual tie-in shall be determined by the contractor on site during construction/installation.

11.1.2. Zeolite Columns (Backwash)

- Zeolite columns (backwash) water supply tie-in point shall be as per the P&ID. Actual tie-in shall be determined by the contractor on site during construction/installation.

11.1.3. Automation

- As per section 5.4 of this document

11.1.4. Power Supply

- As per section 5.3 of this document

12. SITE INFORMATION AND REQUIREMENTS

12.1.1. Site Boundaries

- The Service Provider shall confine his activities to the area in the vicinity of designated sites, which is fenced, and the actual boundaries of the site will be pointed out by Rand Water.
- The Service Provider shall not extend his activities outside the boundaries unless Rand Water has specifically authorised the extension in writing.

12.1.2. Site Access

- A Site Access Certificate will be required before the Service Provider is granted access to site.

12.1.3. Existing Services Detection

- The Successful bidder(s) shall be responsible for determining of known and unknown surface and sub-surface services through communication with the Rand Water as well as the use of detection equipment for the location of underground services should there be a need to break ground.
- The Successful bidder(s) shall provide a report of services identified prior to the constructions/installation as well as method statements detailing the appropriate treatment of existing services should they provide construction constraints.

12.1.4. Accommodation On Site

- The Service Provider shall erect, maintain and remove on completion of the work, ample temporary offices and sheds to Rand Water's approval, for proper storage of perishable and other materials and for the use of the workmen.

12.1.5. Latrines, ablution, and change rooms:

- The service provider shall provide for any temporary/mobile/portable ablution (toilets), change room facilities for the required number of personnel needed during construction, until site de-establishment.
- All latrine accommodation provided by the Service Provider shall be efficient, sanitary and non-offensive.
- Any septic waste generated shall be periodically and safely removed by the Contractor.
- All sanitary fees payable to any party shall be paid by the Service Provider

12.1.6. Access Roads

The Service Provider shall be liable for all unnecessary and unreasonable damage caused by his equipment and/or transport to the access roads and fences. The cost of repair and reinstatement of unnecessary and unreasonable damage to these roads and fences will be deducted from monies due to the Service Provider.

12.1.7. Services On Site

- The Service Provider shall be entitled to use, for the purpose of carrying out the installation, electricity and water.
- A sufficient supply of water is available at a convenient point at the site from which the Service Provider shall be responsible for the distribution of water.
- The power supply connection point for welding machines and similar equipment shall be supplied by Rand Water to the Service Provider.

12.1.8. Site Security

Although security is available at some of these sites, Rand Water takes no responsibility for the safe-guarding of equipment and personal. The service provider shall provide the necessary security to equipment and personnel

12.1.9. Cleaning Up of Works and Site

The Service Provider shall maintain the whole of the site in a clean and orderly condition, to the satisfaction of Rand Water. On completion of the work the Service Provider shall tidy up the site to the satisfaction of Rand Water; all temporary buildings shall be dismantled and removed; all surplus material, debris etc. shall be carted away and the whole site shall be left in a neat and orderly condition.

12.1.10. Induction

- The Service Provider shall be responsible for acquainting him or herself with and attending any safety induction courses presented at the applicable sites.

12.1.11. Decommissioning and site rehabilitation

- The Contractor is required to restore the site to its "as before" status prior to the project
- The initial "as found" condition of the laydown site should be well documented and provided to Rand Water for records purposes.

13. WASTE MANAGEMENT

13.1.1. Any waste streams (sample water contaminated with any environmentally hazardous reagents, spent chemicals, contaminants, etc.) generated at the plant shall be safely temporarily stored in holding vessels and periodically removed by the contractor.

13.1.2. All waste generated and disposed-off shall be fully, and accurately, documented to meet the objectives of this project.

14. LEGISLATIVE REQUIREMENTS

All facilities and installations shall be fully compliant to the Municipal by-laws and the Occupational Health and Safety Act 85 of 1993 as well as its regulations in general, and specifically:

- The site shall adhere to the General Safety Regulations.
- The site shall adhere to environmental legislation.
- As environmental best practice and in satisfying the National Environmental Management Act, duty to care principle, the contractor shall effectively

implement the conditions of the Rand water generic Environmental Management Plan.

- The construction (and decommissioning) works shall adhere to the Construction Regulations.
- All hazardous chemicals shall be safely stored and adhere to requirements within the Hazardous Chemical Substances Regulations.
- Pressure equipment shall adhere to the Pressure Equipment Regulations requirements.

15. SAFETY, HEALTH AND ENVIRONMENTAL REQUIREMENTS

15.1.1. The Successful bidder(s) shall supply, install and maintain any safety equipment needed or dictated by legislation.

16. PROPOSED PROJECT TIMELINE

- Dates for delivery and completion are to be included in the Contractors proposal

ANNEXURES:

ANNEXURE A: CIVIL SPECIFICATION