EXHIBIT G3

SECTION 11226 GREEN SAND FILTRATION SYSTEM

PART 1 – GENERAL

1.01 DESCRIPTION:

A. This section of the specifications provides for an automatic pressure type filtration system complete and operable as indicated on the drawings and as specified herein.

B. The following items shall be included in this section and are to be furnished by the water treatment equipment manufacturer:

1. Filter Tanks
2. Inlet Distributor/Waste Collectors
3. Supplemental Air wash distributors
4. Gravel Retaining Screen Assemblies
5. Underdrain Distributors
6. Support Gravel
7. Filtration Media
8. Automatic and Manual valves
9. Filter System Piping / Filter Air Piping
10. System Accessories
11. Pressure Equipment
12. Flow Equipment
13. Air Blowers
14. Filter System Control Panel
15. Filtration System Skid Mounting and Shop Assembly

C. All interconnecting wiring and conduit, motor starters, and appurtenant electrical work associated with the filtration system shall be furnished and installed by the general contractor in accordance with specification section ( ), "ELECTRICAL WORK".

1.02 REQUIREMENTS:

A. The Water Treatment Facility was designed based on GreensandPlus filtration equipment as manufactured by Hungerford and Terry, Inc. The equipment provided shall be as manufactured by Hungerford and Terry, Inc., Clayton, New Jersey, (856-881-3200) or approved equal.

B. It is the intention of these specifications that the pressure filter specified in this section shall be furnished as part of a coordinated system supplied by a single manufacturer so that undivided responsibility for a complete and operable system is assured. The pressure filter manufacturer shall be the coordinating supplier of

the pressure filter system. The pressure filter system shall include the pressure filters and all other equipment and accessories specified herein.

C. Pre-Qualification Requirement

1. The following equipment manufacturer is pre-qualified to bid under this Section:

   a. Hungerford & Terry, Inc.

2. The bidder shall prepare his Bid on the basis of the materials and equipment listed herein. Any Bid using other than the specified Base Bid equipment will be considered non-responsive and the Bid will not be considered for award. Approved alternates will be considered after award of the project has been made.

3. Bidders may apply for pre-qualification of alternate equipment manufacturers by providing the following information to the Engineer fifteen (15) days prior to the opening of bids:

   a. Description of the equipment proposed.

   b. Detailed drawings, specifications, and product literature with adequate detail showing the proposed equipment layout and construction materials as required for determining that the proposed alternate equipment will meet the requirements set forth in the specifications.

   c. List of fifteen (15) operational installations in the State of Pennsylvania with contact names, addresses, and phone numbers of similar installations. "Similar Installations" are defined as municipal pressure filtration systems for drinking water applications that have a total capacity equal to or greater than that specified herein.

   d. Alternate equipment manufacturers shall provide a report of site specific pilot testing to verify the basis of design of their proposed alternate system before the bid date.

   e. Sufficient information to show compliance with these specifications.

   f. Evidence of technical capability to design and check out the complete alternate system; including modifications which will be required in structures, foundations, and existing and peripheral equipment provided by others.

g. Evidence of adequate financial resources to complete the project, assume liability for the equipment warranty, and furnish critical replacement parts over the lifetime of the alternate equipment.

h. A complete listing of changes which will be required in the contract Plans and Specifications to accommodate the alternate equipment.

i. Installation, operation and maintenance manuals specific to the proposed equipment

4. Any exceptions to these specifications shall be so noted in the pre-qualification submittal and reasons shall be given in writing for each exception.

5. Engineer shall, five (5) days prior to opening bids, issue an addenda listing Suppliers that are prequalified to provide equipment. Only bids from bidders offering the equipment from pre-qualified Suppliers shall be considered for an award of contract. Other bids shall be returned without further consideration.

6. Alternate system manufacturers shall guarantee, in writing, signed by an officer of the company that the equipment offered will provide comparable or superior features, performance, quality, and materials of construction as defined in the specifications.

7. The prior approval of equipment for Alternate Bids shall not constitute final approval of the specific equipment, but rather constitutes acceptance of the respective equipment manufacturers to provide price quotations based on equipment meeting the Specifications. Shop submittals will be required as specified herein. Approval of alternate equipment does not guarantee approval of submittals. Alternate Bids will only be considered after the award of the project.

8. Contractor shall assume overall undivided responsibility for the functioning of the Alternate Bid equipment. The cost of any changes incidental to the installation of the alternate equipment such as electrical wiring, relocation of piping, engineering design or supervision, as-built drawings etc., shall be borne by the Contractor with no additional cost to the Owner.

9. The manufacturer of the water treatment equipment whether or not named in these specifications, must comply with the experience and qualification requirements set forth herein.

1.03 SUBMITTALS:

A. The filtration equipment supplier shall submit to the Engineer four (4) complete sets of shop drawings, details, data sheets, and other descriptive drawings and material as may be required to fully describe the equipment proposed and to verify compliance with the contract documents.

B. All submittals shall be complete, neat, and orderly. The submittals shall include the following, as applicable:

1. Custom, CAD generated shop drawings pertinent to this specific application showing interconnections of the components in the system, including scaled double line piping drawings (schematics will not be acceptable), control ladder logic diagrams, electrical wiring diagrams, control panel drawings to include front panel view, internal wiring detail, and panel internal arrangements, control panel equipment charts, equipment arrangements, installation and erection details, anchor bolts, equipment pads, etc.

2. Detailed descriptions of each piece of equipment specified.

3. Description of the operation and control of the equipment along with a annotated copy of the as-built control logic program.

4. Four (4) copies of operation and maintenance requirements for the system.

1.04 PERFORMANCE AND DESIGN REQUIREMENTS:

A. The filtration system shall be specifically designed to provide filtration and treatment for iron and manganese removal from the wells. The filter media shall consist of 18 inches of Greensand Plus, 18 inches of Anthracite and 12 inches of graded gravel. A sodium hypochlorite chemical feed system shall serve to catalytically regenerate the GreensandPlus.

B. Design requirements are as follows:

1. The pressure filter equipment shall be designed based on the following requirements:

a.	System design flow rate	600 GPM
b.	Unit design flow rate	200 GPM
c.	Filter loading rate at design flow	3.9 GPM/FT2
d.	Normal maximum operating pressure	100 PSI
e.	Influent design water quality:	
	iron	.138 ppm, avg.
	manganese	1.32 ppm, avg.

2. The pressure filter backwash water source is to be filtered water back from storage.

Temperature of the backwash water will be approximately 55 degrees F.

a. Normal filter backwash rate..... 12 GPM/FT2 @ 55 deg. F.

C. Plant effluent guarantee:

The pressure filter manufacturer shall review the filter influent raw water quality and the specific requirements of these specifications, and shall guarantee in writing that the equipment supplied hereunder will consistently produce a plant effluent having iron and manganese concentrations as noted below:

Iron (Fe)	Maximum concentration 0.30 ppm
Manganese (Mn)	Maximum concentration 0.05 ppm

PART 2 - PRODUCTS

2.01 FILTER TANKS:

A. System will consist of four (4) vertical pressure filters, 96 inch O.D. by 72 inch straight shell.

B. The filter tanks shall be of welded steel construction using SA-516 Grade 70 steel, and shall be tested to withstand a hydrostatic pressure 30% in excess of the designed working pressure of 100 psi. The tanks shall be ASME code section VIII construction with stamp.

C. Tanks are to include the following features:

1. One (1) 14 inch x 18 inch elliptical manhole.
2. Flange pad or nozzle type connections as shown on the drawings.
3. Four (4) lifting lugs.
4. Four (4) structural steel I-Beam type support legs.

D. Tank exteriors are to be commercial sandblasted per SSPC-SP6, and painted with one (1) shop coat (3 - 5 mils DFT) of Tnemec Hi-Build Epoxoline II N69 primer. The tank interiors are to be cleaned removing all dirt and debris prior to shipment. The interiors are not to be sandblasted or lined.

(Finish painting of the tank exteriors is to be field applied by the Painting Subcontractor in accordance with the Field Painting section of the specifications. The exterior surfaces of all valves, meters and miscellaneous equipment will be furnished with the manufacturer's standard painting. The PVC pipe/fittings and stainless steel shall not be painted.)

2.02 INLET DISTRIBUTORS:

Each filter shall be furnished with a H-Pattern inlet distributor/waste collector with Sch 80 PVC pipe and fittings. A splash plate type distributor will not be acceptable.

The inlet distributors are to be installed at the factory by the filter manufacturer.

2.03 SUPPLEMENTAL AIR WASH DISTRIBUTORS:

Each filter shall be equipped with a dedicated header-lateral air wash distributor located near the top of the gravel support bed. The distributor shall be constructed of schedule 40 stainless steel pipe and 125# stainless steel fittings. The design of the air wash system will include a 2 inch manifold with 3/8 inch laterals on 7.5 inch maximum centers. Clips will be welded to the inside of the tank for the installation of an air wash lateral support bar system. The air discharging orifices shall be formed by first milling a longitudinal slot every 3 inches, approximately 1 inch long and 1/50th of an inch in width, two thirds (2/3) of the way through the side wall of the 3/8 inch lateral. An orifice 1/8 inch long and slightly less than 1/50th of an inch in width shall be punched through the remainder of the side wall.

The air wash distributors are to be field installed by the general contractor.

2.04 GRAVEL RETAINING SCREEN ASSEMBLIES:

Each filter shall be furnished with a gravel retaining screen assembly consisting of all necessary stainless steel angles and flats, tank clips, #304 stainless steel screen, and #316 stainless steel welding studs and fasteners. Tank clips shall be 1/4 inch thick steel plate 1.5 inches wide x 3.5 inches long. These clips will act as connecting points for the support angles and flats of various lengths. Angle clips for support of the air wash distributor shall be welded to the cross angles. The cross angles will support an 8 mesh type 304 stainless steel screen with a wire diameter of 0.028 inches with an approximate overlap of three (3) inches. The stainless steel cross flats will hold and secure the screen to the cross angle supports. The filter tank is to include a row of #316 stainless steel Nelson pointed end welding studs every 8 inches around the circumference for screen attachment, and the cross angles shall include the welding studs every 12 inches.

The gravel retaining screen assemblies are to be field installed by the general contractor.

2.05 UNDERDRAIN DISTRIBUTORS:

Each filter tank shall be equipped with a header- lateral underdrain system that is engineered to provide uniform collection of filtered water and uniform distribution of backwash water. The distributor shall consist of a schedule 80 PVC manifold and laterals. Each lateral is to include 5 inch square stainless steel, monel, and delrin sand valve assemblies as manufactured by Hungerford and Terry, Inc., Clayton, New Jersey. Sandvalves are to be installed on 15 inch maximum centers. A "gravel-less" type underdrain system will not be acceptable.

The sandvalve type underdrain will require a concrete fill of the tank bottom head plus a section of the tank straight shell up to the bottom of the sandvalves. All concrete is to be furnished and installed by the contractor.

The underdrain systems are to be installed by the filter manufacturer prior to shipment.

2.06 GRAVEL SUPPORTING BED:

A gravel support bed shall be incorporated in the bottom of each vessel, consisting of five (5) layers of graded gravel, with the largest size gravel loaded into the filter first and the succeeding smaller sizes placed on top. The gravel graduations shall be as follows:

1/8" x 1/16"	(3) inches
1/4" x 1/8"	(3) inches
1/2" x 1/4"	(1.5) inches
3/4" x 1/2"	(1.5) inches
1.5" x 3/4"	(3) inches

The gravel shall be washed, screened and shipped in clearly marked Fifty (50#) pound bags. The gravel must meet the requirements of the American Water Works Association (AWWA) Specification number B-100-89.

All gravel is to be field installed by the general contractor.

2.07 FILTRATION MEDIA:

A. Each filter is to be provided with a total of (100) cubic feet of GreensandPlus filter media to form a 24 inch bed depth. The GreensandPlus shall bear the WQA Gold Seal Certification for compliance with NSF/ANSI-61, and shall meet the following criteria:

Specific gravity:	approx. 2.4
Effective size:	0.30 – 0.35 mm
Uniformity coefficient:	less than 1.6
Screen grading:	18 x 60 mesh

B. In addition to the GreensandPlus filter media, each filter is to be provided with a total of (50) cubic feet of specially graded Anthracite to form an 12 inch bed depth. The Anthracite is to meet the following criteria:

Specific gravity:	approx. 1.6
Effective size:	0.6 - 0.8 mm
Uniformity coefficient:	less than 1.6

C. The total GreensandPlus and Anthracite bed depth shall total 36 inches.

D. All filtration media shall be shipped in bags, palletized and stretch wrapped.

E. The GreensandPlus shall be loaded into the filters and conditioned in accordance with the manufacturer’s recommendations. The GreensandPlus fines must be removed from the filter prior to loading the Ferrofilt.

F. All filter media is to be field installed by the general contractor.

2.08 AUTOMATIC AND MANUAL VALVES:

A. Each filter shall be furnished with an automatic and manual valve nest exterior which is to be factory assembled on the filter face consisting of the following:

1. Automatic valves:

Bray series 3W butterfly valves with wafer style cast iron bodies, nylon coated discs, EPDM seats and Bray series 70 (120VAC) electric actuators with NEMA 4X enclosures, manual handwheel override, visual open/close indication, reversible motor, auxiliary limit switches for full open and full closed status feedback to PLC and integral heater for:

a. Inlet
b. Outlet
c. Backwash Inlet / Slow refill (Modulating)
d. Backwash Outlet
e. Rinse Outlet
f. Air wash
g. Air Pressurizing
h. Draindown

2. Manual isolating valves:

Bray Series 3W butterfly valves with wafer style cast iron bodies, nylon coated discs, EPDM seats with manual operators for:

a. Inlet Isolating
b. Outlet Isolating

3. Drain, Tell-Tale and Vent Valves

Simtech PVC ball valve with manual lever operator for:

a. Tank drain (2 inch)

Flow-Tek model S80 stainless steel ball valves for

b. Backwash tell-tale (.5 inch)
c. Tank air vent (.5 inch)
d. Tank air release (1 inch)

Apco (1 inch) model 200A automatic air release valve with threaded cast iron bodies and stainless steel floats.

2.09 FILTER SYSTEM & AIR PIPING:

A. The filter system assembled piping shall be furnished with Sch. 80 PVC pipe with Sch. 80 socket weld fittings and 150 lb. socket weld flanges.

B. The air piping shall consist of Sch. 40 #304L stainless steel with 125lb. #304L stainless steel socket weld raised faced flanges and 125 lb. Sch. 40 #304L stainless steel socket weld fittings.

C. General notes:

1. All piping and supports exterior to the skid mounted assembled package are to be provided by the general contractor.

2. All system face and interconnecting piping shall be provided with the required bolts, studs, nuts, and gaskets as follows:

   a. Bolts:.....ASTM A307 grade B plated carbon steel
   b. Studs:.....ASTM A307 grade B plated carbon steel
   c. Nuts:.....ASTM A563 plated steel heavy hex
   d. Gaskets:... 1/8" thick full face EPDM or equal

3. The air piping shall be provided with the required bolts, studs, nuts and gaskets as follows:

   a. Bolts:.....ASTM F593 #316 stainless steel
   b. Studs:.....ASTM F593 #316 stainless steel
   c. Nuts:..... ASTM F593 #316 stainless steel
   d. Gaskets:... 1/8" thick full face EPDM or equal

SYSTEM ACCESSORIES:

2.10 Filter Pressure Equipment:

1. Ashcroft model D-400 snap acting differential pressure switch for the system common inlet and outlet with NEMA 4 enclosure.

2. Each filter shall be equipped with two (2) Ashcroft Model 1279SS pressure gauges with 4.5 inch diameter dials and stainless steel bourdon tubes provided to read the pressure of the inlet and outlet of each filter.

3. Each pressure gauge shall be provided with polypropylene supply tubing, fittings and manual isolating and sample valves.

2.11 Filter Flow Equipment:

1. Each Filter shall be equipped with a Rosemount model 8750 magnetic bi-directional flowtube and integral mounted transmitter with 4-20mA output.

2.12 Filter Air Blowers:

Two (2) Roots model 22 URAI air blower rated 40 cfm at 6 PSI complete with flexible connections, inlet filter/silencer, discharge filter/silencer, weight type pressure relief valve, sound attenuating enclosure, temperature gauges, V-belt drive, enclosed drive guard, motor slide base, common steel baseplate with anti-vibration support, and 460 volt, 3-phase, 60 hertz, TEFC motor.

Two (2) Allen Bradley 512 series combination motor starters with NEMA 4 steel enclosure, fusible disconnect, 480/120V control power transformer, H-O-A switch electronic overload, etc.

Check rite or equal check valve of steel construction for the common blower discharge

(.5 inch) solenoid valve for air inlet header drain.

2.09 FILTER SYSTEM CONTROL PANEL:

The filter system manufacturer shall provide one (1) NEMA 4 electrical control panel of painted (ANSI 61 light gray) steel construction complete with an Allen Bradley CompactLogix L33ER Ethernet programmable controller, Two (2) Automation Direct #EA9-T10CL 10" diag. color touch screen Operator Interface Terminals and all required nameplates, Phoenix Contact #UT-6 terminal blocks, internal type "THHN" wire, Phoenix Contact AC surge suppressor, 24VDC power supply, C3 Controls door mounted disconnect switch, Allen Bradley #700-HK series interposing relays, Panduit Type "G" gray wire duct, Phoenix Contact heat-shrink white wire sleeves, Red Lion/Ntron #105TX unmanaged switch, GFCI duplex, UL-508 label, and etc.

1. The control panel shall be completely shop wired and tested prior to shipment.

2. All interconnecting wiring, conduit and wire terminations between the Filter System Control Panel and remote located electrical equipment shall be furnished and installed by the contractor. A 120VAC-1PH-60Hz, 30A power feed is required for control panel.

3. Included shall be one (1) spare Ethernet port for communication to (future) SCADA System (by others) via Ethernet/IP protocol. Required interconnecting Ethernet cable and connections shall be by others.

4. Programming shall be integral to the operation of the equipment supplied by Filter Manufacturer.

5. Control Panel shall only provide controls for the filter valves, D/P switch & filter inlet flow meters. Panel will not control existing wells, distribution and/or chemical feed pumps & equipment.

2.10 FILTRATION SYSTEM SKID MOUNTING AND SHOP ASSEMBLY:

A. Filtration System Skids shall be constructed of structural steel I-beam and channel and shall be power wire brushed and painted with one (1) coat of red oxide primer, prior to shipment.

1. Each Filtration System Skid shall include one (1) filter tank complete with internal distributors, exterior face and interconnecting piping, automatic and manual valves and the NEMA 4 junction box which is to be wired using Rigid Galvanized steel/LFMC conduit to each electrical item.

2. Each skid-mounted unit shall be assembled and shipped to the maximum extent allowable for safe shipment.

3. Any equipment not suitable for mounting due to safety limitations shall be shipped for jobsite installation by the contractor.

4. Piping assemblies may require re-tightening once the skid mounted equipment arrives on the site. The contractor shall be required to check and tighten all nuts and bolts upon arrival.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. All water filtration equipment shall be installed as shown on the Drawings and in accordance with manufacturer's instructions and recommendations and the approved Shop Drawings.

3.02 TESTING:

A. Upon completion of the installation, the GreensandPlus filters shall be regenerated prior to acceptance.

B. Prior to placing into service, each GreensandPlus filter shall be disinfected. All conditioning and disinfecting chemicals shall be furnished by the contractor.

3.03 MANUFACTURER'S SERVICES

A. The supervisory service of a factory trained technician, who is specially trained in the type of equipment herein specified, shall be provided for a period of one (1) 8 hour day during construction. The technician shall assist the Contractor or Subcontractor with technical advice on the installation of the major components of the equipment.

B. The supervisory service of a factory trained technician shall be provided for a period of two (2) 8 hour days during media loading. The technician shall supervise the Contractor with technical advice on the installation of the filter media to include:

1. Proper placement of the gravel support material
2. Supervision of GreensandPlus media loading
3. Backwashing and undercutting of the GreensandPlus
4. Supervision of anthracite media loading

C. The supervisory service of a factory trained technician shall be provided for a period one (1) 8 hour day for conditioning of the filter media.

D. The supervisory service of a factory trained technician shall be provided for a period of three (3) 8 hour days to commission the filtration system, check the completed installation, make any required adjustments, and place the system in satisfactory operation.

E. A factory trained technician for a period of for one (1) 8 hour day for instructing the end users operating personnel.