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4 SCHEMATIC AND FUNCTIONAL DATA

4.1 General

Chapter 4 contains tables that list all of the components in each system contained in the water treatment plant and a short description of their function.

For each system in the water treatment plant, there is a table listing each component, its function and cross reference to the attached Figure. The table will list references to the manufacturer's data that is located in Chapter 9: Manufacturer Data and Service Information.

A total of five (5) systems are shown in Chapter 4: Schematics and Functional Data.

SYSTEM	TABLE	FIGURE
Process Water Flow	Table 4.1	Figure 4.1
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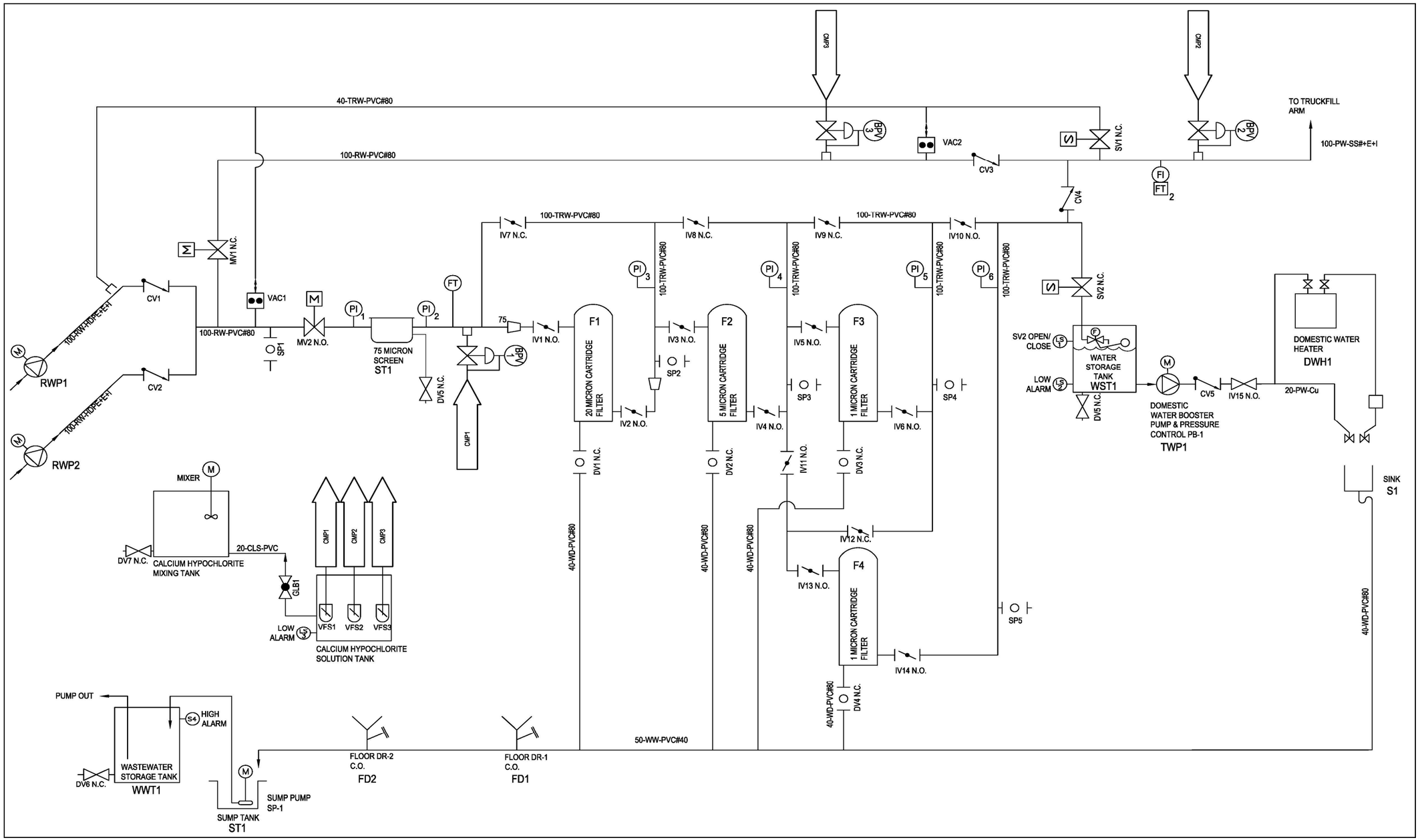


Figure 4-1: Process Water Flow

Table 4.1: Process Water Flow

Item No.	Item ID	Sec. 9 Tab	Location	Component Description	Make/Model	Function	Remarks/Notes
1	RWP1		Intake Casing 1	Raw water Pump	Goulds 320L20, 441 USgpm max flowrate, c/w Franklin Electric submersible motor model no. 236654, 6" motor dia., 200V, 3-phase, 60 Hz, 20 hp	Draws water from lake to WTP.	Normally open.
2	RWP2		Intake Casing 2	Raw water Pump	Same as Item No. 1	Draws water from lake to WTP.	Standby.
3	IV1		Upstream of Cartridge Filter #1	Isolation Valve	Bray 31/108, 75 mm butterfly valve	Isolates Cartridge Filter #1.	Normally open
4	IV2		Downstream of Cartridge Filter #1	Isolation Valve	Same as Item No. 3	Isolates Cartridge Filter #1.	Same as Item No. 3
5	IV3		Upstream of Cartridge Filter #2	Isolation Valve	Bray 31/108, 100 mm butterfly valve	Isolates Cartridge Filter #2.	Normally open
6	IV4		Downstream of Cartridge Filter #2	Isolation Valve	Same as Item No. 5	Isolates Cartridge Filter #2.	Same as Item No. 5
7	IV5		Upstream of Cartridge Filter #3	Isolation Valve	Same as Item No. 5	Isolates Cartridge Filter #3.	Same as Item No. 5
8	IV6		Downstream of Cartridge Filter #3	Isolation Valve	Same as Item No. 5	Isolates Cartridge Filter #3.	Same as Item No. 5
9	IV7		By-pass line for Cartridge Filter	Isolation Valve	Same as Item No. 5	Allows water to by-pass Cartridge Filter	Same as Item No. 5

			#1			#1.	
10	IV8		By-pass line for Cartridge Filter #2	Isolation Valve	Same as Item No. 5	Allows water to by-pass Cartridge Filter #2.	Same as Item No. 5
11	IV9		By-pass line for Cartridge Filter #3	Isolation Valve	Same as Item No. 5	Allows water to by-pass Cartridge Filter #3.	Same as Item No. 5
12	IV10		By-pass line for Cartridge Filter #4	Isolation Valve	Same as Item No. 5	Allows water to by-pass Cartridge Filter #4.	Same as Item No. 5
13	IV11		Downstream of By-pass line for Cartridge Filter #2	Isolation Valve	Same as Item No. 5	Allows water to by-pass Cartridge Filter #3.	Same as Item No. 5
14	IV12		Upstream of Cartridge Filter #4	Isolation Valve	Same as Item No. 5	Isolates Cartridge Filter #4.	Same as Item No. 5
15	IV13		Upstream of Cartridge Filter #4	Isolation Valve	Same as Item No. 5	Isolates Cartridge Filter #4.	Same as Item No. 5
16	IV14		Downstream of Cartridge Filter #4	Isolation Valve	Same as Item No. 5	Isolates Cartridge Filter #4.	Same as Item No. 5
17	IV15		Downstream of Treated Water Pump	Isolation Valve	Same as Item No. 5	Isolates Treated Water Pump.	Same as Item No. 5
18	DV1		Cartridge Filter #1	Drain Valve	Praher S6, 40 mm ball valve	Drains Cartridge Filter #1.	Normally closed
19	DV2		Cartridge Filter #2	Drain Valve	Same as Item No. 17	Drains Cartridge Filter #2.	Same as Item No. 17
20	DV3		Cartridge Filter #3	Drain Valve	Same as Item No. 17	Drains Cartridge Filter #3.	Same as Item No. 17
21	DV4		Cartridge Filter	Drain Valve	Same as Item No. 17	Drains Cartridge	Same as Item

			#4			Filter #4.	No. 17
22	DV5		Water Storage Tank	Drain Valve	Praher S6, 20 mm ball valve	Drains Water Storage Tank.	Normally closed
23	DV6		Wastewater Storage Tank	Drain Valve	Praher S6, 50 mm gate valve	Drains Wastewater Storage Tank.	Normally closed
24	DV7		Chlorine Mixing Tank	Drain Valve	Same as Item No. 21	Drains the Chlorine Mixing Tank.	Same as Item No. 21
25	CV1		Water Intake Line 1	Check Valve	Valmatic 504A, 100 mm swing check valve	Prevents backflow into Water Intake Line from RWP1.	Normally closed
26	CV2		Fireflow by-pass line	Check Valve	Same as Item No. 25	Prevents backflow from Truck fill line.	Same as Item No. 25
27	CV3		Between Fireflow and Treated Water Line	Check Valve	Same as Item No. 25	Prevents backflow of Raw Water into Treated Water.	Same as Item No. 25
28	CV4		Feed line to the Water Storage Tank	Check Valve	Crane Class 125, 20 mm swing check valve	Prevents backflow into the Blower.	Normally closed
29	CV5		Downstream of Treated Water Pump	Check Valve	Same as item no. 29	Prevents backflow into the Water Storage Tank.	
30	GLB1		Downstream of the Chlorine Mixing Tank	Globe Valve	Crane Class 150, 20 mm globe valve	Isolates the Chlorine Mixing Tank.	Normally closed
31	SV1		Truck Fill Line	Solenoid Valve at the Truck Fill Line	Burkert 5281A, 40 mm solenoid valve, 0.2 – 16 bar pressure range,	Controls Drain Valve on Truck fill Arm.	Normally closed
32	SV2		Upstream of	Solenoid	Burkert 5281A, 20 mm	Controls the fill rate	Normally closed

			line to Water Storage Tank	Valve	solenoid valve, 0.2 – 16 bar pressure range	of Water Storage Tank.	
33	MV1		Intake	Motorized Valve	Bray 70-0051-113AO, 100 mm motorized valve	Three-way control valve at Intake.	Normally closed
34	MV2		Intake	Motorized Valve	Same as Item No. 33	Three-way control valve at Intake.	Normally open
35	SP1		Raw Water Line	Sampling Port	Crane 9200 Series, 20 mm ball valve	Samples raw water entering the filter screen.	Normally closed.
36	SP2		Downstream of Cartridge Filter #1	Sampling Port	Same as Item No. 35	Samples water leaving Cartridge Filter #1.	Same as Item No. 35
37	SP3		Downstream of Cartridge Filter #2	Sampling Port	Same as Item No. 35	Samples water leaving Cartridge Filter #2.	Same as Item No. 35
38	SP4		Downstream of Cartridge Filter #3	Sampling Port	Same as Item No. 35	Samples water leaving Cartridge Filter #3.	Same as Item No. 35
39	SP5		Downstream of Cartridge Filter #4	Sampling Port	Same as Item No. 35	Samples water leaving Cartridge Filter #4.	Same as Item No. 35
40	VAC1		Upstream of the pre-filter screen	Air Vacuum Valve	Valmatic 101S	Vents gases in raw water prior to water entering pre-filter screen.	
41	VAC2		Upstream of the Truck Fill Arm	Air Vacuum Valve	Valmatic 101S	Vents gases in treated water prior to water entering the Truck Fill Arm.	
42	PI1		Upstream of the pre-filter screen	Pressure Indicator	WIKA 233.34	Measures pressure in line after raw water intake pump.	

43	PI2		Downstream of the pre-filter screen	Pressure Indicator located at the outflow of the pre-filter screen	WIKA 233.34	Measures pressure in line after pre-screen filter.	
44	PI3		Downstream of Cartridge Filter #1	Pressure Indicator	WIKA 233.34	Measures pressure in line after Cartridge Filter #1.	
45	PI4		Downstream of Cartridge Filter #2	Pressure Indicator	WIKA 233.34	Measures pressure in line after Cartridge Filter #2.	
46	PI5		Downstream of Cartridge Filter #3	Pressure Indicator	WIKA 233.34	Measures pressure in line after Cartridge Filter #3.	
47	PI6		Downstream of Cartridge Filter #4	Pressure Indicator	WIKA 233.34	Measures pressure in line after Cartridge Filter #4.	
48	VFS1		Chlorine Solution Tank	Foot Valve/Strainer	Grundfos (Kit) 91835825	Directs flow of liquid chlorine into CMP1 and prevents debris entrainment.	
49	VFS2		Chlorine Solution Tank	Foot Valve/Strainer	Same as Item No. 48	Directs flow of liquid chlorine into CMP2 and prevents debris entrainment.	
50	VFS3		Chlorine Solution Tank	Foot Valve/Strainer	Same as Item No. 48	Directs flow of liquid chlorine into CMP3 and prevents debris entrainment.	
51	CMP1		Upstream of the filter train	Chlorine Metering Pump 1	Grundfos DDI209 20-3	Adds chlorine to raw water entering filter train.	

52	CMP2		Upstream of the Truck Fill Arm	Chlorine Metering Pump 2	Grundfos DDI209 20-3	Adds chlorine to treated water entering Truck Fill Arm.	
53	CMP3		Upstream of the by-pass line	Chlorine Metering Pump 3	Grundfos DDI209 20-3	Adds chlorine to raw water entering pre-filter screen and the Water Storage Tank.	
54	BPV1		Chemical Metering Pump #1	Back Pressure Valve	Meridian Ball Valve, 3-Way L Port, Model # M21SRL	Prevents backflow of calcium hypochlorite solution.	
55	BPV2		Chemical Metering Pump #2	Back Pressure Valve	Same as Item no. 55	Same as Item no. 55.	
56	BPV3		Chemical Metering Pump #3	Back Pressure Valve	Same as Item no. 55	Same as Item no. 55.	
57	FT1		Upstream of filter train	Flow Transmitter	Endress & Hauser Proline ProMag 50W, max. pressure 40 bar, max. flow measurement 110000 m^3/h	Measures flow of raw water entering filter train.	
58	FT2		Upstream of Truck Fill Arm	Flow Transmitter	Same as Item No. 54	Measures flow of treated water entering truck fill arm.	
59	F1		Treatment Room	Cartridge Filter #1	Harmsco Hurricane filters HUR 3X170 HP, 20 micron	Removes sand, silt, rust and loose scale.	
60	F2		Treatment Room	Cartridge Filter #2	Harmsco Hurricane filters HUR 5X170 HP,	Removes extra fine dirt, dust and	

					5 micron	particulates.	
61	F3		Treatment Room	Cartridge Filter #3	Harmsco Hurricane filters HUR 5X170 HP, 1 micron absolute	Provide 3-log removal of Cryptosporidium, Giardia cysts and other cyst-sized particles from raw water.	
62	F4		Treatment Room	Cartridge Filter #4	Same as Item no. 61	Same as Item no.58.	
63			Chlorine Room	Calcium Hypochlorite Mixing Tank	Mixer: Dynamix MMX-2103D-9C7C, Tank: Zeebest Plastics OTCO 12, 45 Litres (12 US gallons), 12” (0.3m) dia. X 26” (0.66m) H, polyethylene w/ UV inhibitor	Mixes calcium hypochlorite solution.	
64			Chlorine Room	Calcium Hypochlorite Solution Tank	Zeebest Plastics OTCO 12, 45 L (12 US gallons), 12” (0.3m) dia. X 26” (0.66m) H, polyethylene w/ UV inhibitor	Stores liquid calcium hypochlorite.	
65	WST1		End of Filtration Train	Water Storage Tank	Norwesco 41862, 28” D X 81” H, 379 Litres (100 US Gallons)	Stores treated water.	
66	WWT1		Treatment Room	Wastewater Storage Tank	Norwesco 40215, 35” D X 81” H, 1136 Litres (300 US Gallons)	Stores wastewater from Sump Tank	Mounted on sleeper 50 mm above facility floor
67	DWH1		Treatment	Domestic	Rheem RE6, 6 Gallons	Heats and stores	Mounted under

			Room	Water Heater		treated water prior to supply for domestic use.	counter
68	LS1		Water Storage Tank	Level Switch		Opens and closes SV2 to initiate/end filling of water storage tank.	
69	LS2		Water Storage Tank	Level Switch		Initiates low level alarm when water level is water storage tank is below the setpoint.	
70	LS3		Calcium Hypochlorite Solution Tank	Level Switch		Initiates low level alarm when the level of calcium hypochlorite solution is below the setpoint.	
71	LS4		Wastewater Storage Tank	Level Switch		Initiates high level alarm when the level of wastewater in the tank is above the setpoint.	
72	FV		Water Storage Tank	Float Valve		Opens and closes depending on the actual treated water level in the tank.	
73	TWP1		Treatment Room	Treated Water Pump	Shurflo Park Model 2088-492-444, 0.5 hp	Boosts pressure in water supply lines to distribute domestic water throughout the WTP.	Consists of a booster pump with integrated pressure control
74	S1		Treatment Room	Sink	Kindred QSL 2020/8	Used for washing	

						and cleaning in the Water Treatment Plant.	
75	FD1		Floor of the water treatment plant	Floor Drain	Watts FD-200	Collects runoff water and waste from the floor of the plant.	Floor of the water treatment plant
76	FD2		Floor of the water treatment plant	Floor Drain	Watts FD-200	Collects runoff water and waste from the floor of the plant.	Floor of the water treatment plant
77	ST1		Treatment Room	Sump Tank	Hydromatic Series 218 Basin, 23" X 31", 50 mm PVC piping between sump pit and wastewater tank	Collects wastewater from floor drains.	Polyethylene sump tank recessed into floor, c/w pump
78	SP		Between Sump Tank and Wastewater Storage Tank	Sump Pump	Hydromatic SKV40AW110	Pumps water from Sump Tank into the Wastewater Storage Tank.	

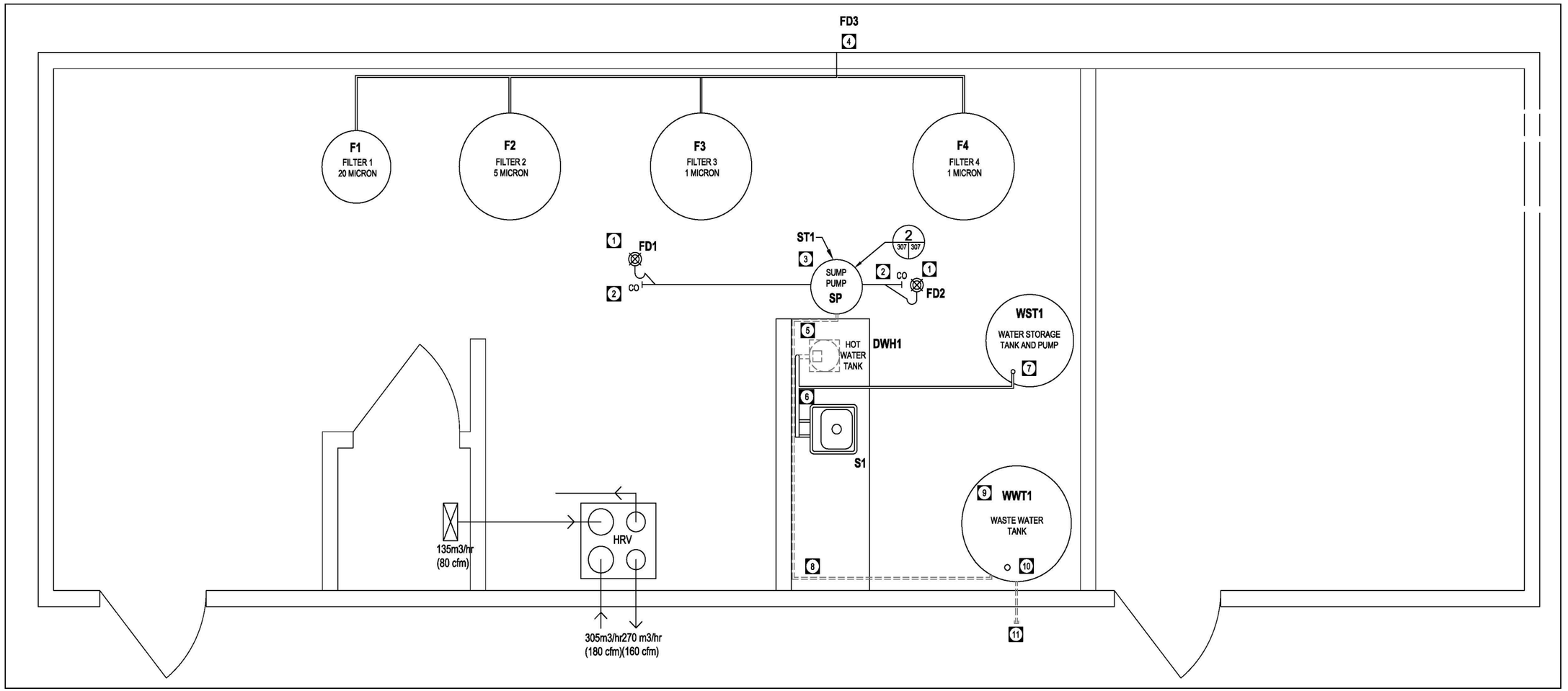
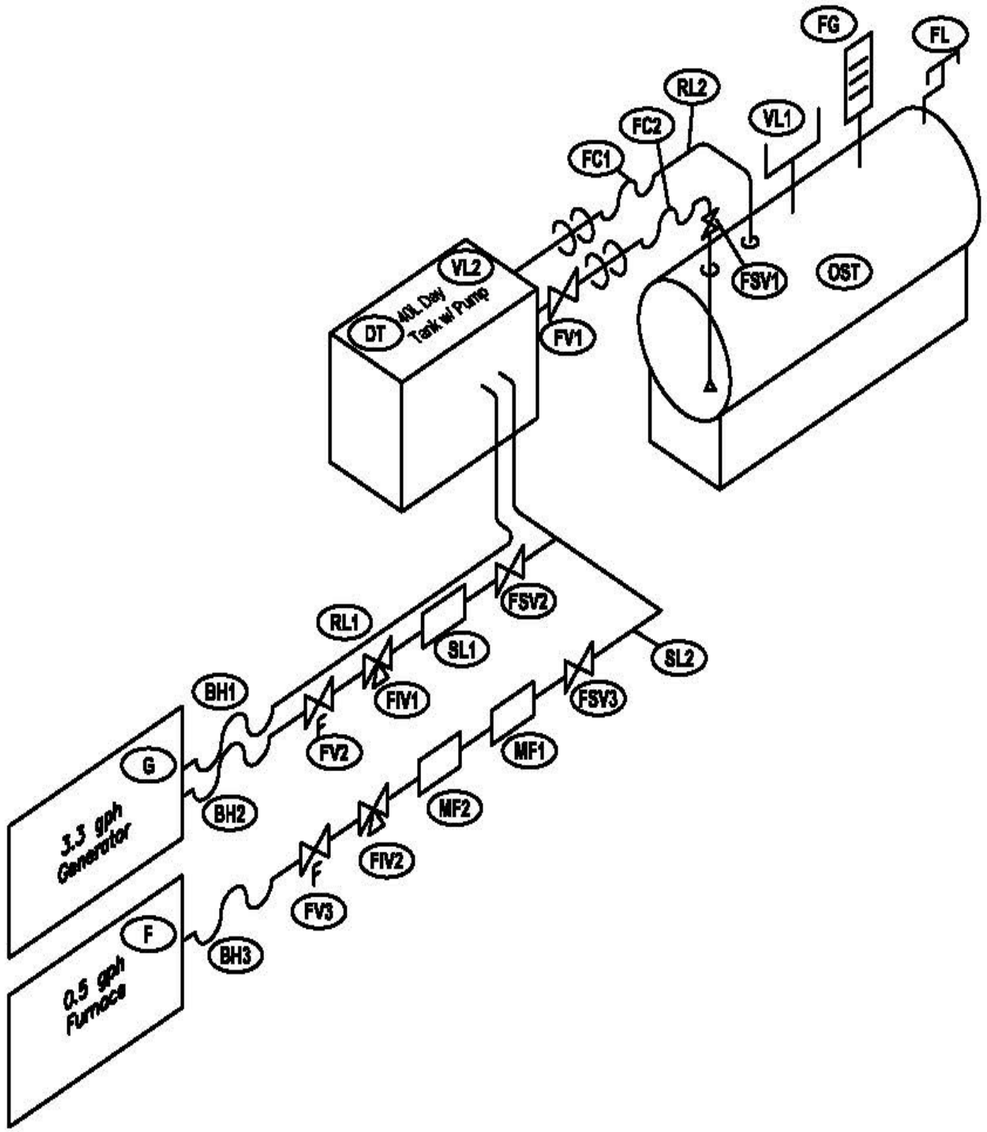


Figure 4-2: Plumbing System

Table 4.2: Plumbing System

Item No.	Item ID	Sec. 9 Tab	Location	Component Description	Make/Model	Function	Remarks/Notes
1	WST1		End of Filtration Train	Water Storage Tank	Norwesco 41862, 28" D X 81" H, 379 Litres (100 US Gallons)	Stores treated water.	
2	WWT1		Treatment Room	Wastewater Storage Tank	Norwesco 40215, 35" D X 81" H, 1136 Litres (300 US Gallons)	Stores wastewater from Sump Tank.	Mounted on sleeper 50 mm above facility floor
3	DWH1		Treatment Room	Domestic Water Heater/Tank	Rheem RE6, 6 Gallons	Heats and stores treated water prior to supply for domestic use.	Mounted under counter
4	TWP1		Treatment Room	Treated Water Pump	Shurflo Park Model 2088-492-444	Boosts pressure in water supply lines to distribute domestic water throughout the WTP.	
5	S1		Treatment Room	Sink	Kindred QSL 2020/8	Used for washing and cleaning in the Water Treatment Plant.	
6	FD1		Floor of the water treatment plant	Floor Drain	Watts FD-200	Collects runoff water and waste from the floor of the plant.	
7	FD2		Floor of the water	Floor Drain	Watts FD-200	Collects runoff water and waste	

			treatment plant			from the floor of the plant.	
8	ST1		Treatment Room	SumpTank	Hydromatic Series 218 Basin, 23" X 31", 50 mm PVC piping between sump pit and wastewater tank	Collects wastewater from floor drains.	Polyethylene sump tank recessed into floor, c/w pump
9	SP		Between Sump Tank and Wastewater Storage Tank	Sump Pump	Hydromatic SKV40AW110, 1/3 hp	Pumps water from Sump Tank into the Wastewater Storage Tank.	
10				Pumped Sanitary Discharge Line	75 mm dia.	Pumps wastewater out of WTP.	
11	CO			Cleanout		Allows access to drains for waste material cleanout purposes.	
12	CO			Cleanout		Allows access to drains for waste material cleanout purposes.	
13			Wastewater Storage Tank	Plumbing Vent		Vents gases from Wastewater Storage Tank.	Installed at high level and penetrate roof.
14			Downstream of filter train	Filter Drain	50 mm dia.	Drains water from filtration train to the outside of WTP.	



OST 4328L OIL STORAGE TANK TO BE INSTALLED ON NON COMBUSTIBLE STRUCTURE TO BUILDING FLOOR ELEVATION

FL 50mm (2") FILL W/ SECURED CAP.

FG FLOAT GAUGE

VL 31mm (1 1/4") VENT LINE W/ CAP

FC 500MM - 50MM DIA. FLEXIBLE COUPLING JUST PRIOR TO BUILDING PENATRATION

FV FUSIBLE VALVES FOR FIRE PROTECTION

DT INTEGRAL 40L DAY TANK & PUMP. TANK TO BE MOUNTED AT ELEVATION, SO THAT PUMP FEED IS ABOVE TOP OF TANK, TO AVOID SIPHONING.

SL SUPPLY LINE FROM DAY TANK TO GENERATOR AND FURNACE. 12mm Ø HEAVY WALLED COPPER TUBING FROM FUEL DAY TANK (TYPE K GREEN) REDUCED TO 9mm Ø AT FILTERS.

MF1 40 to 50 MICRON FILTER

MF2 ADDITIONAL 7 TO 10 MICRON FILTER

FIV 3-WAY BLEED & ISOLATION VALVES

BH 300mm FLEXIBLE COUPLING (ULC LISTED BRADED STAINLESS STEEL)

RL 25mm RETURN LINE

FSV FUEL SOLENOID VALVES TO CONTROL FUEL FLOW RATE.

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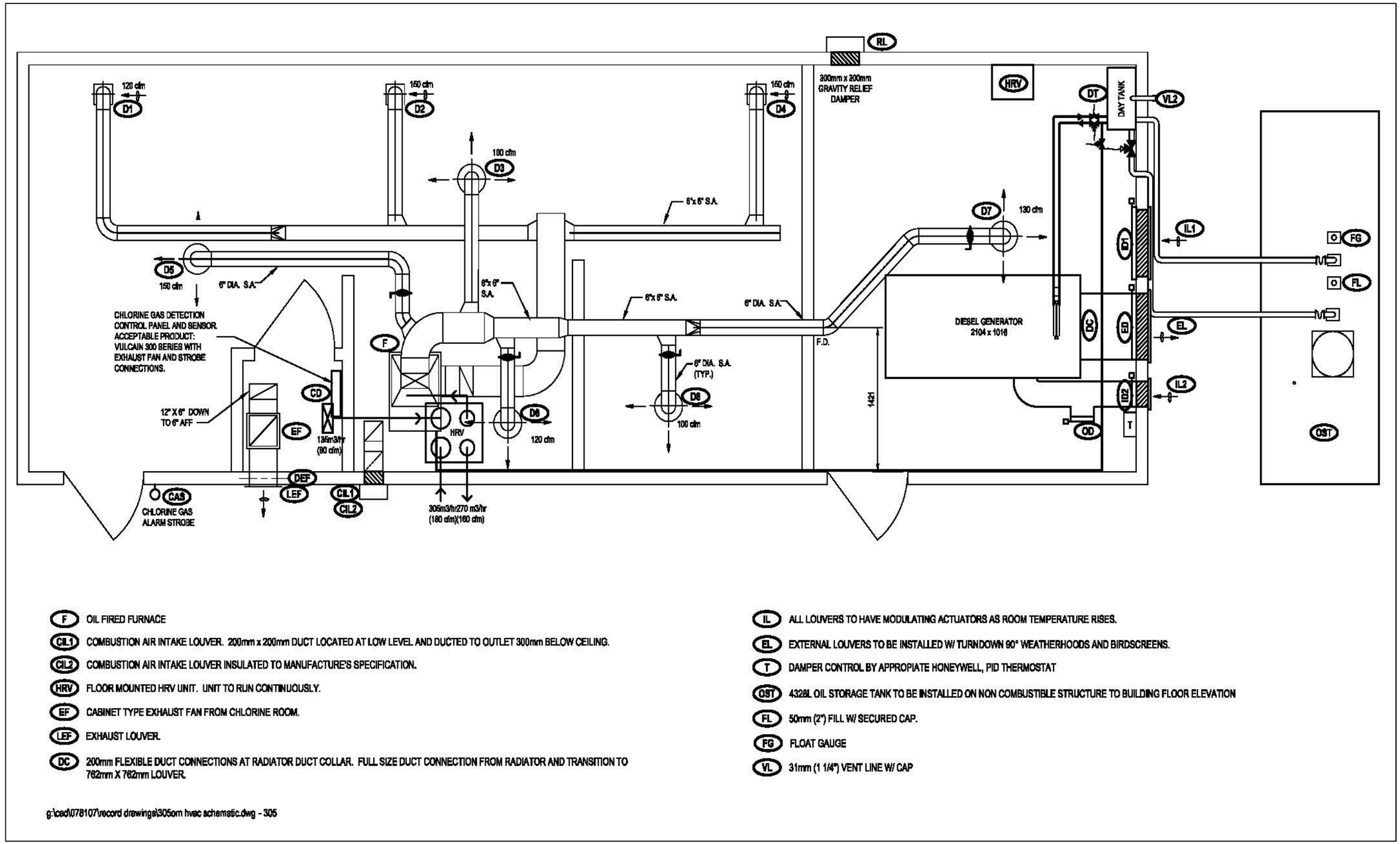
Figure 4-3: Fuel Oil System

Table 4.3 : Fuel Oil System

Item No.	Item ID	Sec. 9 Tab	Location	Component Description	Make/Model	Function	Remarks/Notes
1	G		Power Room	Generator	Stamford UC1224F, 3.3 gph, 40kW, 120/240V, 1-phase, 60 Hz, 50 kVA standby	Provides secondary power in case of primary power loss.	
2	OST		Outside of Water Treatment Plant	Oil Storage Tank	Westeel Fuel Vault, 4540 L	Stores fuel oil to supply generator and furnace.	To be installed on non-combustible structure
3	DT		Power Room	Day Tank	Tramont TRS Series, 40 Liters c/w 2 gpm pump	Provides fuel to generator and furnace.	Indoor fuel oil tank
4	F		Furnace Room	Furnace	Carrier 58CMA, oil-fired, 3450 rpm, 57 kBTUH heating capacity, 0.5 USgph firing rate	Provides heating for the WTP.	
5	FIV1		Upstream of the Generator	Fuel Isolation Valve		Isolates fuel going into the Generator.	
6	FIV2		Upstream of the Furnace	Fuel Isolation Valve		Isolates fuel going into the Furnace.	
7	BH1 & BH2		Generator	Braided Hose Connections	Silex, 300 mm dia.	Connection transfers pipe into braided hose to connect to component.	
8	BH3		Furnace	Braided Hose Connection	Same as Item No. 9	Connection transfers pipe into braided hose to connect to component.	
9	FC1		Prior to	Flexible	500 mm dia.	Connects Oil Storage	

	& FC2		building penetration	Coupling		Tank to Day Tank	
10	FSV1		Upstream of the Day Tank	Fuel Solenoid Valve		Control flow of fuel into the Day Tank.	
11	FSV2		Upstream of the Generator	Fuel Solenoid Valve		Controls flow of fuel into the Generator.	
12	FSV3		Upstream of the Furnace	Fuel Solenoid Valve		Controls flow of fuel into the Furnace.	
13	FV1		Downstream of the Oil Storage Tank	Fusible Valve		Fire protection.	
14	FV2		Upstream of Generator	Fusible Valve		Fire protection.	
15	FV3		Upstream of Generator	Fusible Valve		Fire protection.	
16	MF1		Upstream of the Furnace	Micron Filter	40 to 50 micron filter	To remove impurities from fuel oil prior to it entering the furnace.	
17	MF2		Upstream of the Furnace	Micron Filter	7 to 10 micron filter	To remove small particles from fuel oil prior to it entering the furnace.	
18	FG		Oil Storage Tank	Float Gauge		Measures fuel oil level in Oil Storage Tank.	
19	VL1		Oil Storage Tank	Vent Line	31 mm dia. c/w cap	Vents air from Oil Storage Tank.	
20	VL2		Day Tank	Vent Line	Same as Item No. 19	Vents air from Day Tank.	
21	FL		Upstream of the Oil Storage Tank	Fill Line	Schedule 40 steel pipe, 50 mm dia.	Access line to fill Oil Storage Tank.	

22	SL1		Upstream of the Generator	Fuel Oil Supply Line	12 mm dia. heavy walled copper tubing from fuel day tank. Reduces to 9 mm dia. at filters.	Supplies fuel to Generator.	
23	SL2		Upstream of the Furnace	Fuel Oil Supply Line	12 mm dia. heavy walled copper tubing from fuel day tank. Reduces to 9 mm dia. at filters.	Supplies fuel to Furnace.	
24	RL1		Between Day Tank and Generator	Fuel Oil Return Line	25 mm dia.	Returns oil back to Day Tank from Generator.	
25	RL2		Between Oil Storage Tank and Day Tank	Fuel Oil Return Line	25 mm dia.	Returns oil back to Oil Storage Tank from Day Tank.	



F OIL FIRED FURNACE

CIL1 COMBUSTION AIR INTAKE LOUVER. 200mm x 200mm DUCT LOCATED AT LOW LEVEL AND DUCTED TO OUTLET 300mm BELOW CEILING.

CIL2 COMBUSTION AIR INTAKE LOUVER INSULATED TO MANUFACTURE'S SPECIFICATION.

HRV FLOOR MOUNTED HRV UNIT. UNIT TO RUN CONTINUOUSLY.

EF CABINET TYPE EXHAUST FAN FROM CHLORINE ROOM.

LEF EXHAUST LOUVER.

DC 200mm FLEXIBLE DUCT CONNECTIONS AT RADIATOR DUCT COLLAR. FULL SIZE DUCT CONNECTION FROM RADIATOR AND TRANSITION TO 762mm X 762mm LOUVER.

IL ALL LOUVERS TO HAVE MODULATING ACTUATORS AS ROOM TEMPERATURE RISES.

EL EXTERNAL LOUVERS TO BE INSTALLED W/ TURNDOWN 90° WEATHERHOODS AND BIRDSCREENS.

T DAMPER CONTROL BY APPROPIATE HONEYWELL, PID THERMOSTAT

OST 4328L OIL STORAGE TANK TO BE INSTALLED ON NON COMBUSTIBLE STRUCTURE TO BUILDING FLOOR ELEVATION

FL 50mm (2") FILL W/ SECURED CAP.

FG FLOAT GAUGE

VL 31mm (1 1/4") VENT LINE W/ CAP

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Figure 4-4: Heating and Ventilation System

Table 4.4: Heating and Ventilation System

Item No.	Item ID	Sec. 9 Tab	Location	Component Description	Make/Model	Function	Remarks/Notes
1	G		Power Room	Generator	Stamford UC1224F, 3.3 gph, 40kW, 120/240V, 1-phase, 60 Hz, 50 kVA standby	Provides secondary power in case of primary power loss.	
2	OST		Outside Water Treatment Plant	Oil Storage Tank	Westeel Fuel Vault, 4540 L	Stores fuel oil to supply generator and furnace.	To be installed on non-combustible structure
3	DT		Power Room	Day Tank	Tramont TRS Series, 40 Liters c/w 2 gpm pump	Provides fuel to generator and furnace.	Indoor fuel oil tank
4	F		Furnace Room	Furnace	Carrier 58CMA, oil-fired, 3450 rpm, 57 kBTUH heating capacity, 0.5 USgph firing rate	Provides heating for the WTP.	
5	HRV		Generator Room	Heat Recovery Ventilator	Lennox HRV-150-3	Recovers heat from exiting (stale) air to and provides heat to incoming (fresh) air.	Floor mounted
6	T		Generator Room	Thermostat	Totaline Easy 1H1C/2H/1C	Senses and transmits temperature readings to heating system.	
7	CIL1 & CIL2		Furnace Room	Combustion Air Intake Louver	EH Price DE635	Provides entry of air into Furnace.	200 mm x 200 mm
8	IL1		Generator Room	Intake Air	EH Price DE635	Provides entry of	2’ x 4’

				Louver		outside air into the Generator room.	
9	IL2		Generator Room	Intake Air Louver	EH Price DE635	Provides entry of outside air into the Generator room.	1’ x 0.5’
10	EL		Generator Room	Exhaust Air Louver	EH Price DE635	Allows air to be exhausted from the Generator room.	2’ x 4’
11	ID1		Generator Room	Intake Damper	EH Price TAMCO 9000, 1000	Allows outside air to enter the building to cool the Generator radiator.	
12	ID2		Generator Room	Intake Damper	EH Price TAMCO 9000, 1000	Modulates air intake to maintain required minimum combustion air temperature of Generator.	
13	ED		Generator Room	Exhaust Damper	EH Price TAMCO 9000, 1000	Exhausts hot air out of the building to cool the Generator radiator.	
14	OD		Generator Room	Outside Damper	EH Price TAMCO 9000, 1000	Modulates air intake to maintain required minimum combustion air temperature of Generator.	
15	RL		Generator Room	Gravity Relief Damper	EH Price TAMCO 9000, 1000	Allows exhaust air to exit the Generator room.	Complete with cap.
16	EF		Chlorine Room	Chlorine Room Exhaust Fan	80 cfm, 0.25 hp, belt-driven centrifugal inline, Hi-Pro polyester coated,	Exhausts gases from the Chlorine Room.	

					explosion proof motor, corrosion resistant fasteners		
17	DEF		Chlorine Room	Chlorine Room Fan Exhaust Damper		Modulates airflow in the Chlorine Room.	
18	LEF		Chlorine Room	Chlorine Room Exhaust Louvre		Allows gases in the Chlorine Room to exit the building.	
19	DC		Between radiator and louver	Duct Collar		Flexible duct connection from radiator to Louver.	
20	D1		Water Treatment Plant	Diffuser	6”, 120 cfm	Distributes fresh air in the building.	
21	D2		Water Treatment Plant	Diffuser	6”, 150 cfm	Distributes fresh air in the building.	
22	D3		Water Treatment Plant	Diffuser	6”, 100 cfm	Distributes fresh air in the building.	
23	D4		Water Treatment Plant	Diffuser	6”, 150 cfm	Distributes fresh air in the building.	
24	D5		Water Treatment Plant	Diffuser	6”, 150 cfm	Distributes fresh air in the building.	
25	D6		Water Treatment Plant	Diffuser	6”, 120 cfm	Distributes fresh air in the building.	
26	D7		Water Treatment Plant	Diffuser	6”, 130 cfm	Distributes fresh air in the building.	
27	D8		Water Treatment Plant	Diffuser	6”, 100 cfm	Distributes fresh air in the building.	
28	CD		Water Treatment Plant	Chlorine Gas Detection Control Panel and Sensor		Detects and controls levels of chlorine gas in the building.	

29	CAS		Water Treatment Plant	Chlorine Gas Alarm Strobe		Lights up if chlorine gas levels in building are above safe limits.	

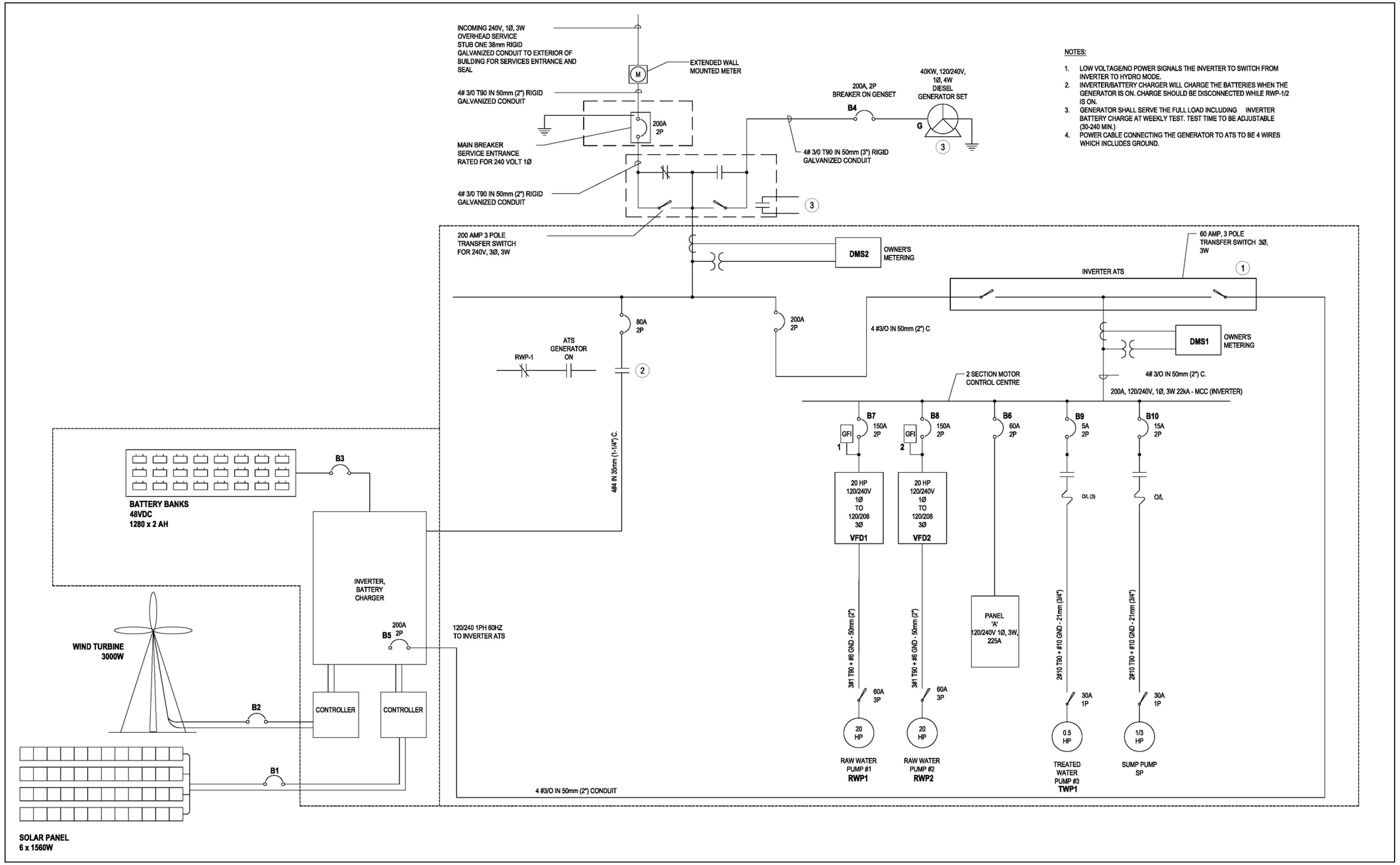

Figure 4-5: Single Line Diagram

Table 4.5: Single Line Diagram

Item No.	Item ID	Sec. 9 Tab	Location	Component Description	Make/Model	Function	Remarks/Notes
1			Overhead Service Pole	Overhead Grid Power	120/240VAC, 200A, 1-phase, 60Hz	Supplies additional primary power to building from the overhead transmission line and transformer.	Owned by Nunavut Power Corp. (NPC)
2	DMS1			Digital Metering Unit #1	200A, 2-phase, 240V	Measures overhead grid power consumed by the WTP.	
3	DMS2			Digital Metering Unit #2		Measures power consumption by the WTP.	
4	B			Main Breaker	240V, 200A	Breaks power entering WTP. Diverts power to Ground.	
5				Alternative Energy System (AES)		Provides primary power to WTP. Consists of Photovoltaic (PV) modules, wind turbine and battery bank.	
6	B1			Breaker	200A, 2-phase	Breaks power from Solar Panels to the Controller.	
7	B2			Breaker	200A, 2-phase	Breaks power from the Wind Turbine to the Controller.	
8	B3			Breaker	200A, 2-phase	Breaks power from the Battery Bank to the Inverter.	
9	C1			Controller		Controls power from the	

						Solar Panel to the Inverter.	
10	C2			Controller		Controls power from the Wind Turbine to the Inverter.	
11				Wind Turbine	Whisper 500, 3 kW, 48 VDC	Converts wind energy to electricity.	
12				Photovoltaic (PV) Panels	Sharp NT175UC1, 6 X 1560W	Converts solar energy to electricity.	
13				Battery Bank	Unigy II AVR95-27-SL, 2 X 1280Ah, 48 VDC	Stores unused electricity from AES for use in periods where more power is required or AES/Overhead Service Pole power loss.	
14	B4			Breaker	Square D Model JDS36175, 175A, 2P	Breaks power from the Generator.	
15	G			Generator	Stamford UC1224F, 3.3 gph, 40kW, 120/240V, 1-phase, 60 Hz, 50 kVA standby	Provides secondary power in case of primary power loss.	
16	ATS01			Automatic Transfer Switch	ASCO 7000 Series, 200A, 2-pole	Controlled by AES and ATS02. Transfers between primary power and secondary power supply.	
17	ATS02			Automatic Transfer Switch	ASCO 7000 Series, 200A, 2-pole	Controlled by utility power and generator. Transfers power usage from primary to secondary power supply.	

18				Inverter/Charger	Xantrex XW, 120/240VAC, 1-phase, 24kW	Converts Direct Current (DC) from AES to Alternating Current (AC).	
19	B5			Breaker	200A, 2-phase	Breaks power from the Inverter/Charger to ATS01.	
20	B6			Breaker	60A, 2P	Breaks power to Panel 'A'.	
21				Panel 'A'	120/240V, 1-phase, 2W, 225kA	Distributes power to equipment in the WTP.	
22	B7			Breaker	150A, 2P	Breaks power to RWP1.	
23	VFD1			Variable Frequency Drive	Yaskawa F7 Drive, 0.5 to 500 hp, 120/240V, 1-phase to 120/208V, 3-phase	Switches power for RWP1.	
24	GFI1			Ground Fault Interrupter		Grounds RWP1 to protect personnel from electrical shocking.	
25	RWP1			Raw Water Pump	Goulds 320L20, 20 hp	Pumps water out of Canso Lake to WTP.	
26	B8			Breaker	150A, 2P	Breaks power to RWP2.	
27	VFD2			Variable Frequency Drive	Yaskawa F7 Drive, 0.5 to 500 hp, 120/240V, 1-phase to 120/208V, 3-phase	Switches power for RWP2.	
28	GFI2			Ground Fault Interrupter		Grounds RWP2 to protect personnel from electrical shocking.	
29	RWP2			Raw Water Pump	Goulds 320L20, 20 hp	Pumps water out of Canso Lake to WTP.	

30	B9			Breaker	5A, 2P	Breaks power to TWP1.	
31	O/L			Overload Switch		Stops power to TWP1 when circuit overloads.	
32	TWP1		Truck Fill Line	Truck Fill Water Pump	Shurflo Park Model 2088-492-444, 0.5 hp	Boosts pressure in water supply lines to distribute domestic water throughout the WTP.	Consists of a booster pump with integrated pressure control
33	B10			Breaker	15A, 2P	Breaks power to SP.	
34	O/L			Overload Switch		Stops power to SP when circuit overloads.	
35	SP			Sump Pump	Hydromatic SKV40AW110, 1/3 hp	Pumps water from Sump Tank into the Wastewater Storage Tank.	
36	MCC			Motor Control Centre	Moeller MCC 3000, 600 VDC	Controls motor starters, houses relays and fuses.	
37				Generator Control Panel	Controls Inc. Genmaster Plus P/N GMPLUS-C40125	Controls Generator operation.	