LOUDOUN WATER

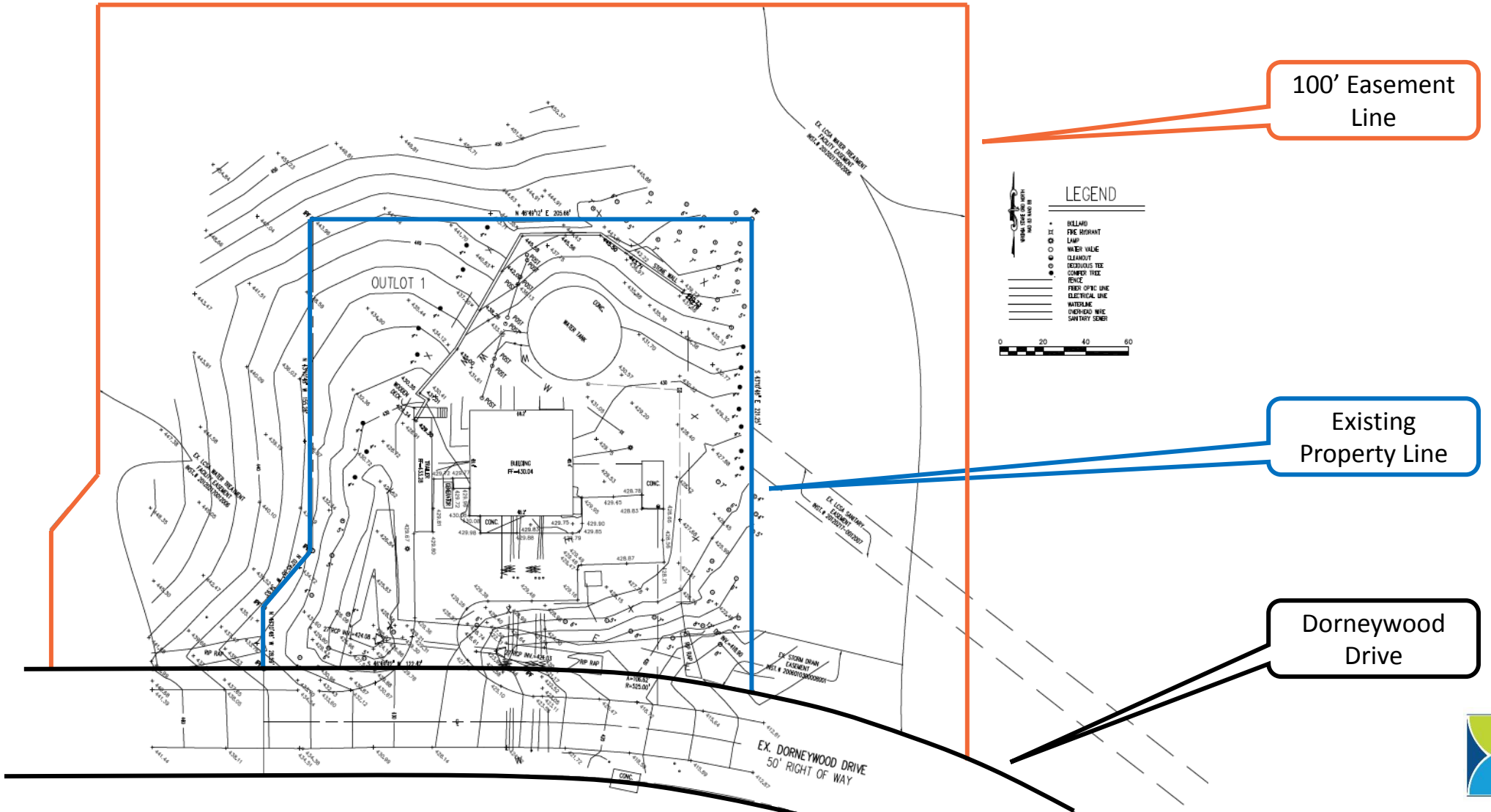
SELMA ESTATES AND RASPBERRY FALLS WATER SUPPLY SYSTEMS

Public Meeting

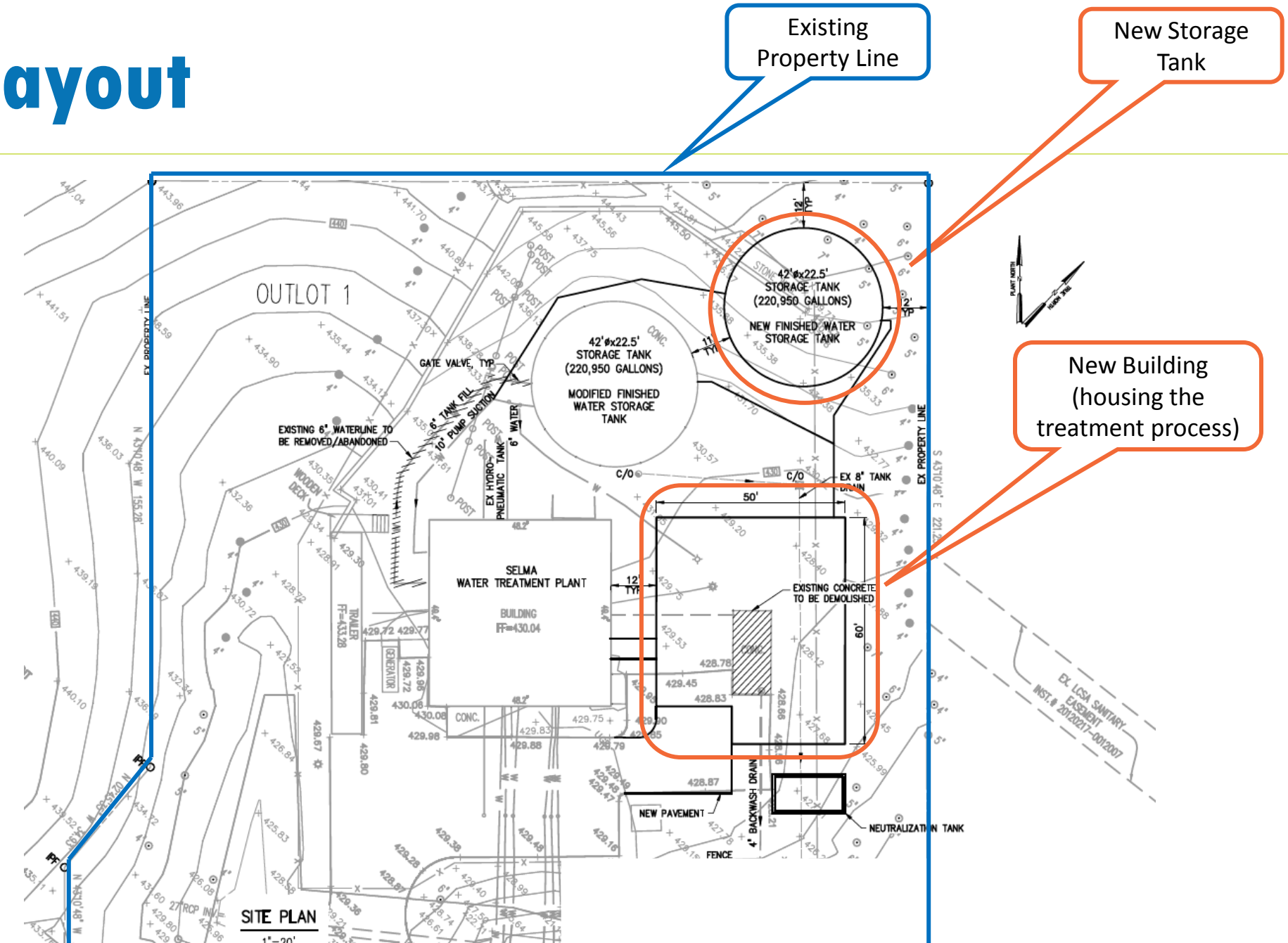
June 18, 2015

HAZEN AND SAWYER
Environmental Engineers & Scientists

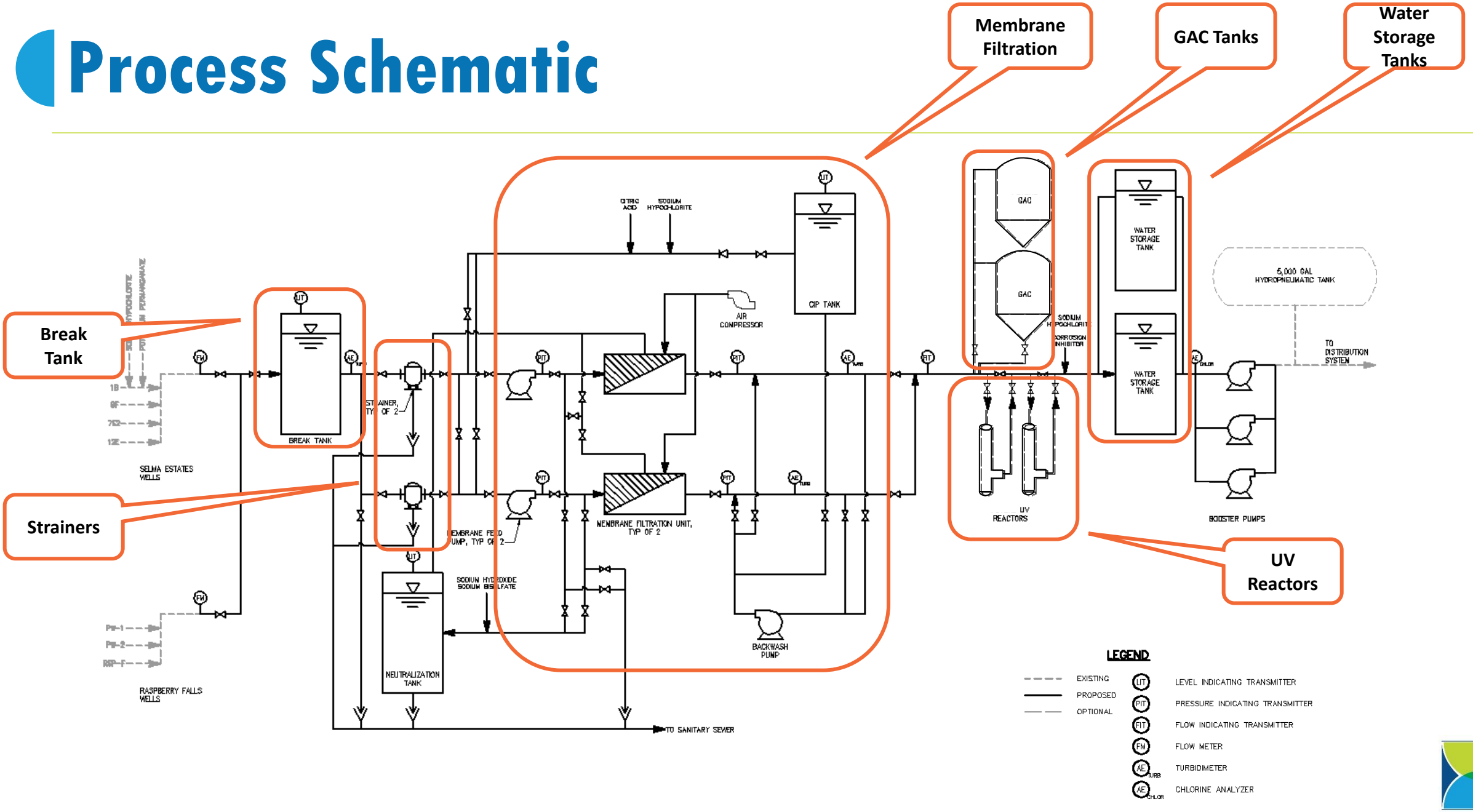
Site Layout


OUTLOT 1
EX. DORNEYWOOD DRIVE
50' RIGHT OF WAY
LEGEND
BUILDING
WATER TANK
100’ Easement Line
Existing Property Line
Dorneywood Drive

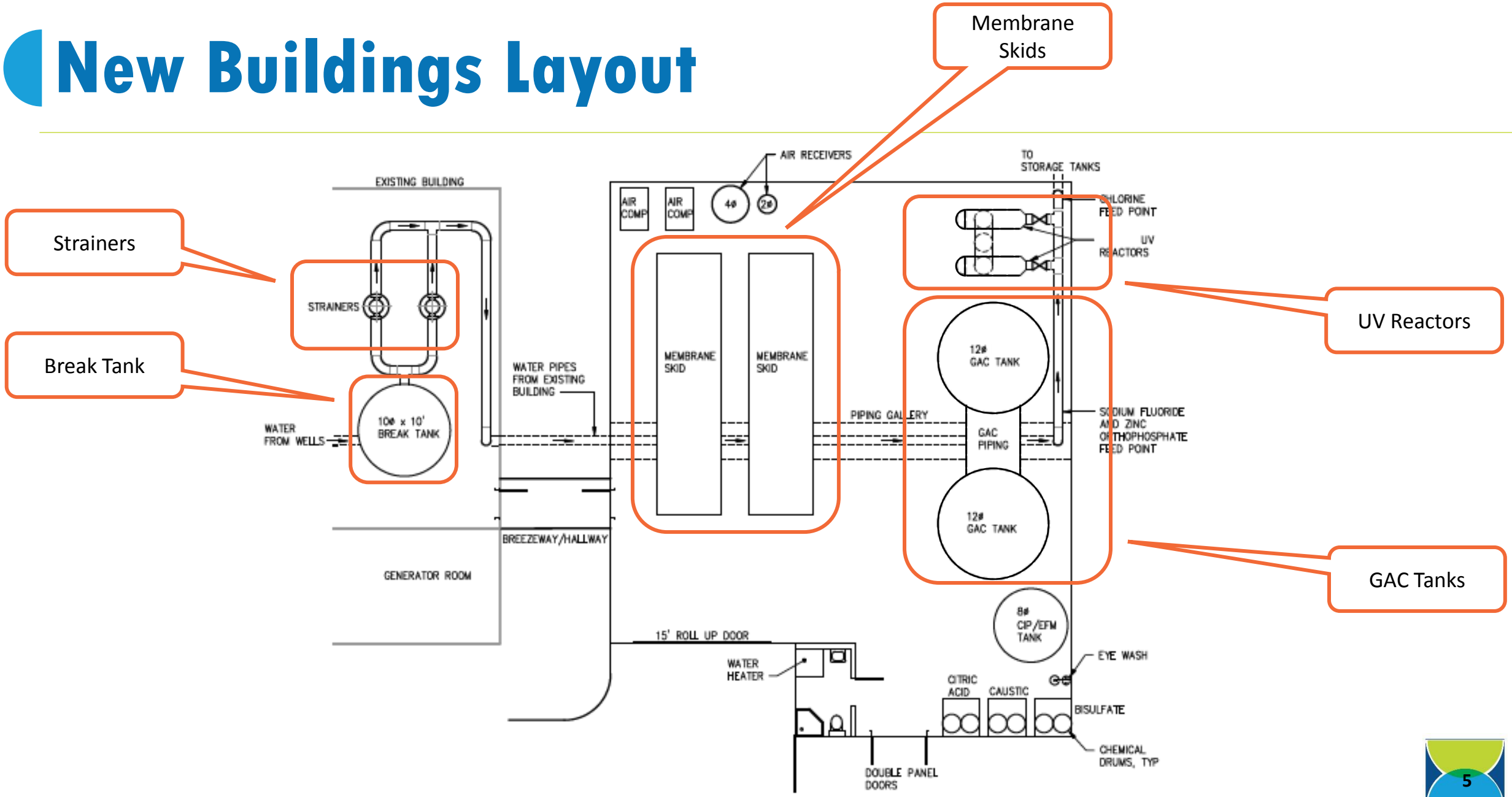
Site Layout


Existing Property Line
New Storage Tank
New Building (housing the treatment process)
OUTLOT 1
42'ϕx22.5' STORAGE TANK (220,950 GALLONS)
NEW FINISHED WATER STORAGE TANK
42'ϕx22.5' STORAGE TANK (220,950 GALLONS)
MODIFIED FINISHED WATER STORAGE TANK
SELMA WATER TREATMENT PLANT
BUILDING FF=430.04
EXISTING CONCRETE TO BE DEMOLISHED
NEW PAVEMENT
NEUTRALIZATION TANK
EX. LCSA SANITARY EASEMENT INST.# 20120207-0012007
SITE PLAN

Process Schematic



New Buildings Layout



Filtration

Membrane filtration is a water purification technology that uses a semipermeable membrane to remove particles that are larger than the pore openings from the water.

Advantages

- Removal of particulates, dissolved components and microorganisms (viruses, bacteria, cysts, etc.) based on the membrane type.
- Constant quality.
- Simple automation.
- No need for chemicals.
- Process and plant compactness.

Microfiltration to be installed at Selma Estates and Raspberry Falls

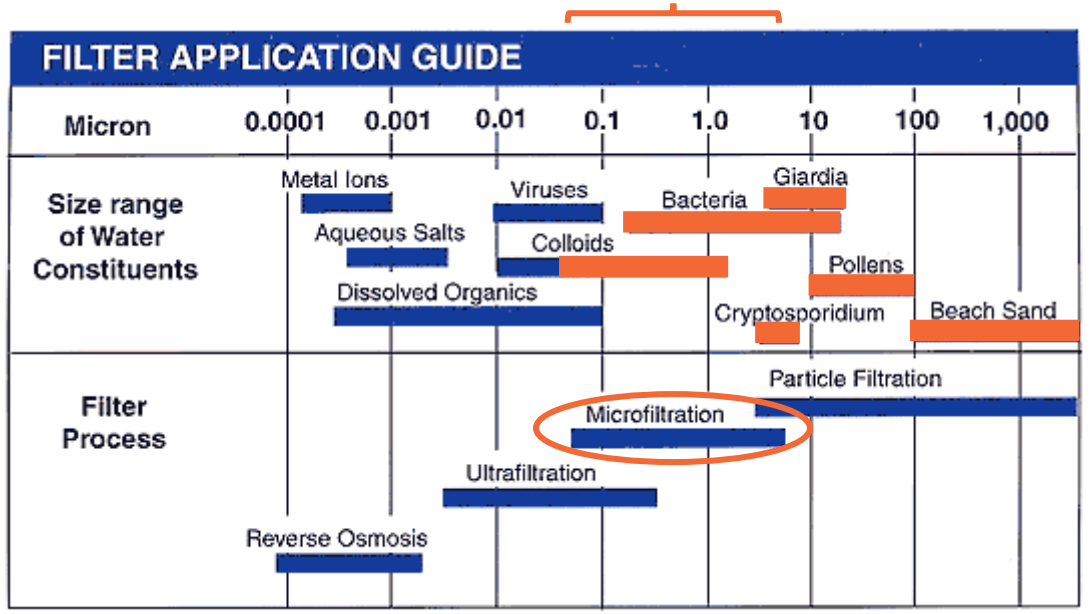


Image courtesy of: water-technology.net

Microfiltration

Selected Membrane Specifications

Parameter	Design Value
Number of Skids	2
Nominal Pore Size	0.1 µm
Design Flow per Skid	307 gpm

Image courtesy of: pall.com

Adsorption

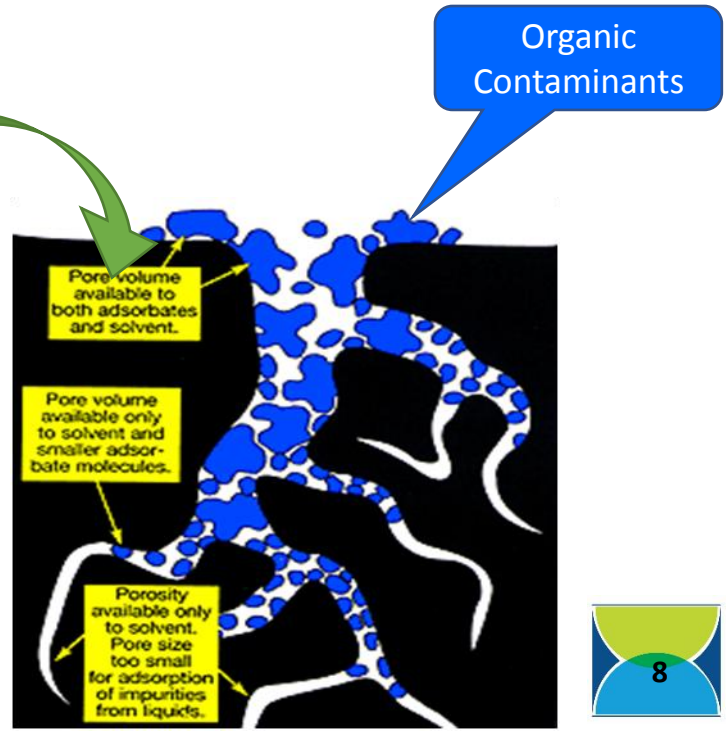
Granular activated carbon (GAC) is used to adsorb soluble organics. Adsorption occurs when molecules adhere to the internal walls of pores in carbon particles that are produced by thermal activation.

Advantages

- Reliable technology for the removal of organics
- Small space requirement
- Easily incorporated to an existing system

Disadvantages

- Regeneration/replacement costs.



Images courtesy of: TIGG.com, norit.com

GAC Adsorption

Selected GAC Specifications

Parameter	Design Value
Configuration	Two parallel pressure vessels
Flow Direction	Downflow
Design Flow per Reactor	307 gpm
EBCT (5-30 min. typ.)	15.4 min
Filtration rate (2-5 gpm/ft^2 typ.)	2.7 gpm/ft^2

Image courtesy of: calgoncarbon.com

UV Disinfection

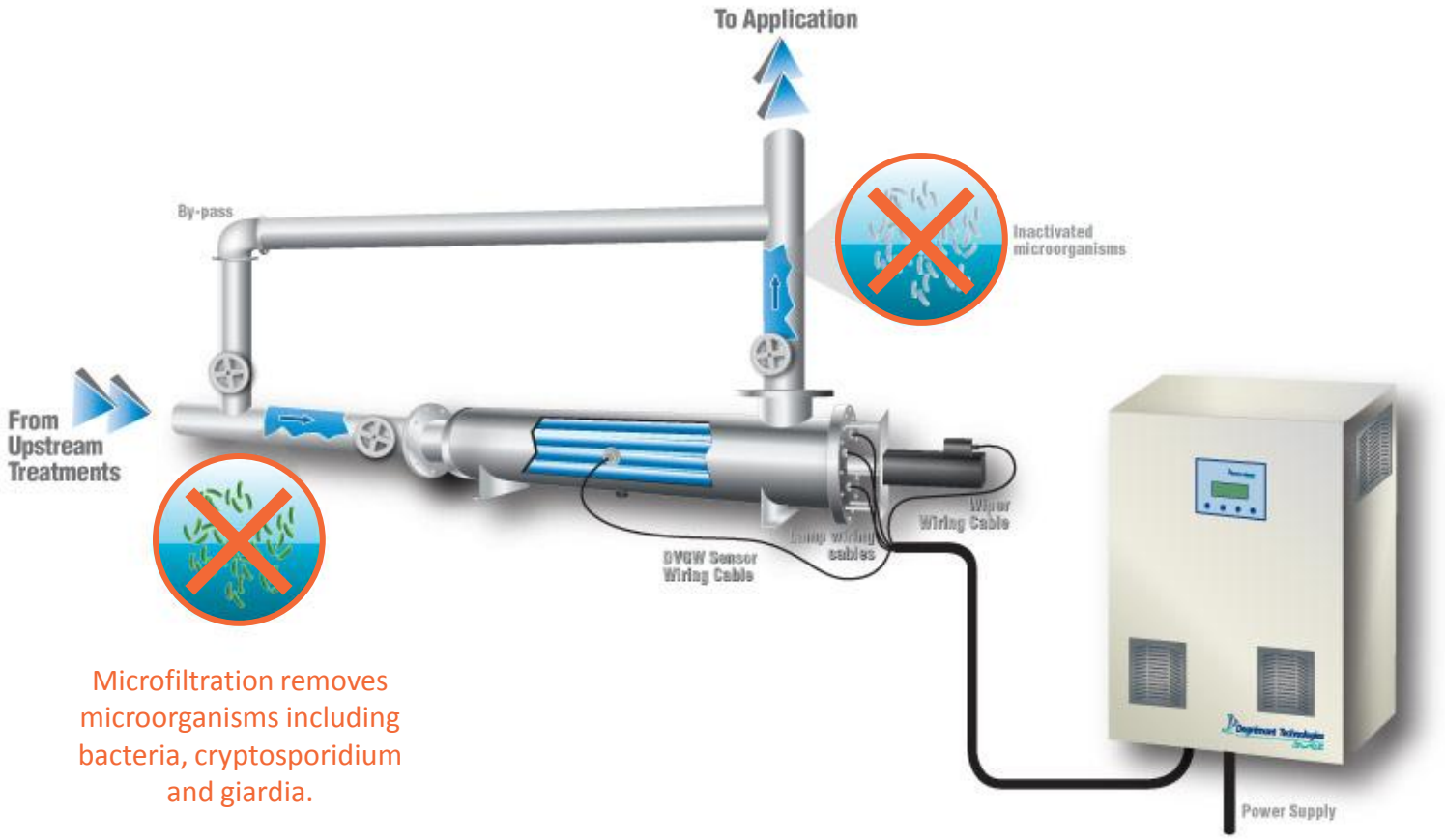
Ultraviolet (UV) disinfection is used in water treatment to inactivate pathogenic organisms that may be present.

Advantages

- Effective for Giardia and Cryptosporidium.
- Simple automation.
- Process compactness.

Disadvantages

- Not effective for viruses.
- No residual disinfectant to prevent regrowth of microorganisms.



Microfiltration removes microorganisms including bacteria, cryptosporidium and giardia.

Images courtesy of: degremont-technologies.com

UV Disinfection

Selected UV Reactor Specifications

Parameter	Design Value
Vessel Type	Closed Reactor
Number of Reactors	2 (1 duty + 1 spare)
Design Flow per Reactor	307 gpm
Minimum Validated UV Dose	40 mJ/cm^2

Image courtesy of: TrojanUV.com

Water Storage

Provide water storage that can meet the water demand, provide contact time for disinfection, and provide emergency supply.

Finished Water Storage

Total Storage Requirements

Parameter	Storage Volume
Equalization[3] =	89000 gallons
Fire Flow =	60000 gallons
Emergency[1,2] =	220950 gallons
Regulatory (CT)[4] =	75270 gallons
Summation =	**445220 gallons**

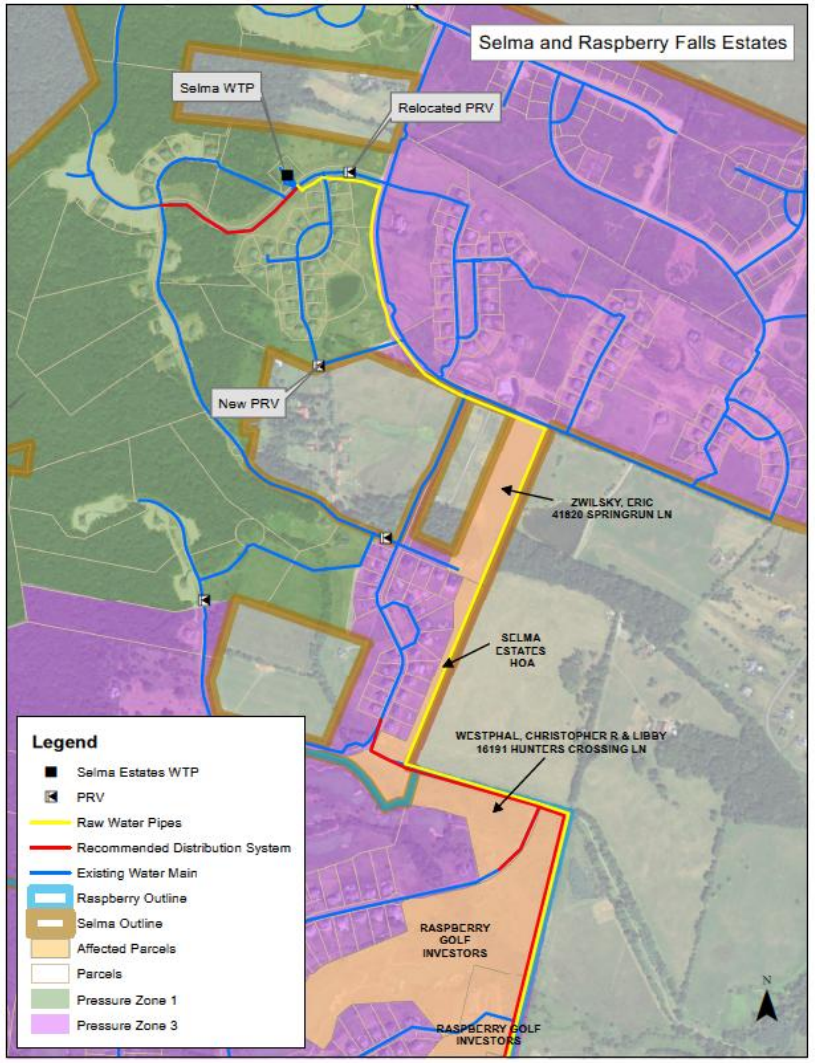
1. VDH- Regulations (pending amendment calls for a minimum of 1/2 max day demand).
2. Locally accepted design standard for Community Water System storage tanks.
3. Equalization storage is based on 24-hour supply pumping.
4. Disinfection with free-chlorine.

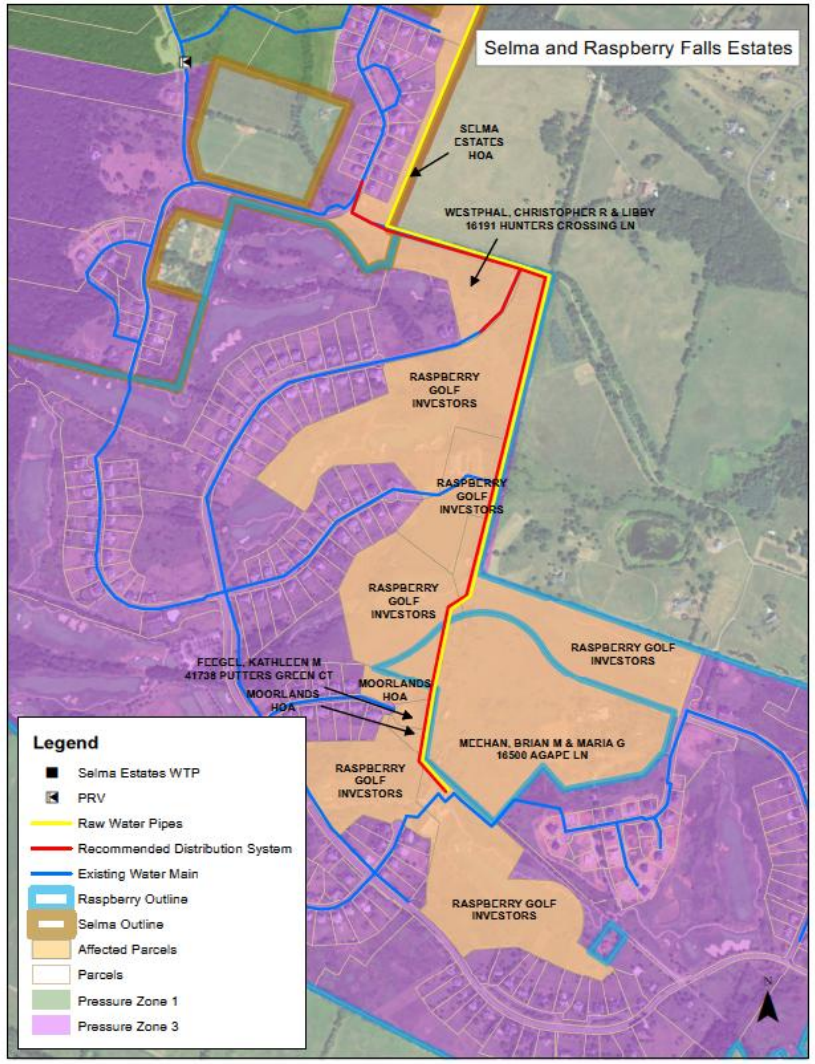
Storage Tanks Specifications

Parameter	Existing Finished Water Storage Tank	New Finished Water Storage Tank
Diameter, ft	42	42
Number of Rings	5[a]	5
Height, ft	22.5	22.5
Capacity, gallons	223,000	223,000

a. The existing storage tanks height will be increased from 18 feet to 22.5 feet with the addition of a new ring.

Raw Water Force Main & Distribution System Improvements





Project Schedule

ID	Task Name
1	**Raspberry Falls and Selma Estate Water Supply System**
2	NTP
3	Prepare Draft Preliminary Engineering Report (PER)
4	Review and Revise PER
5	Submit PER to VA Department of Health
6	Select Membrane Filtration Equipment Manufacturer
7	Prepare 50% Plans and Specifications
8	Prepare 90% Plans and Specifications
9	Obtain Permits
10	Prepare Final Plans and Specifications
11	Solicit Bids
12	Award Contract
13	Construct Raspberry Falls Selma Estates Water System Improvements