CASE STUDY: USING A HIGH STRENGTH MEMBRANE BIOREACTOR FOR AN AFFORDABLE HOUSING PROJECT WITH STRINGENT TOTAL NITROGEN EFFLUENT STANDARDS

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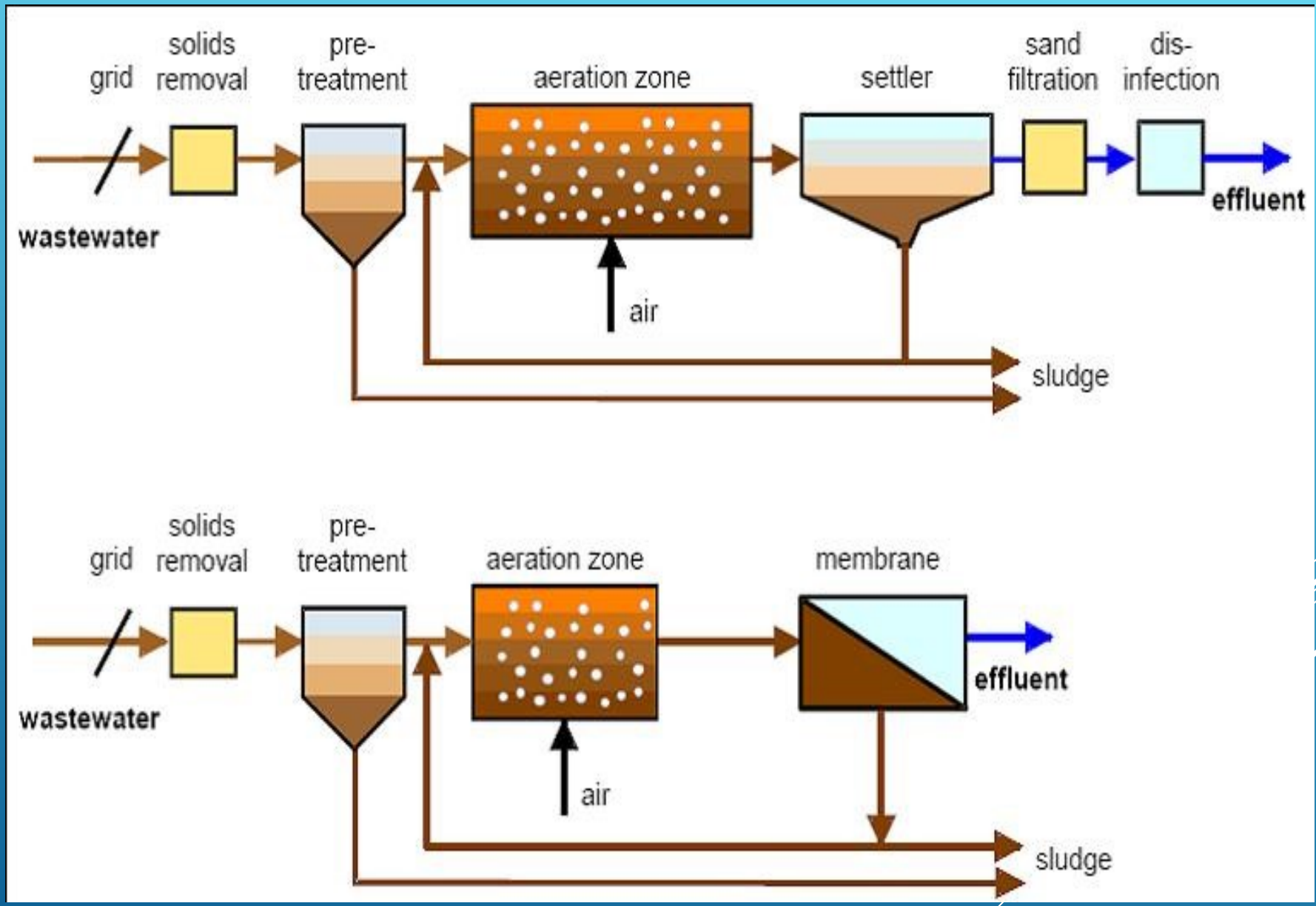
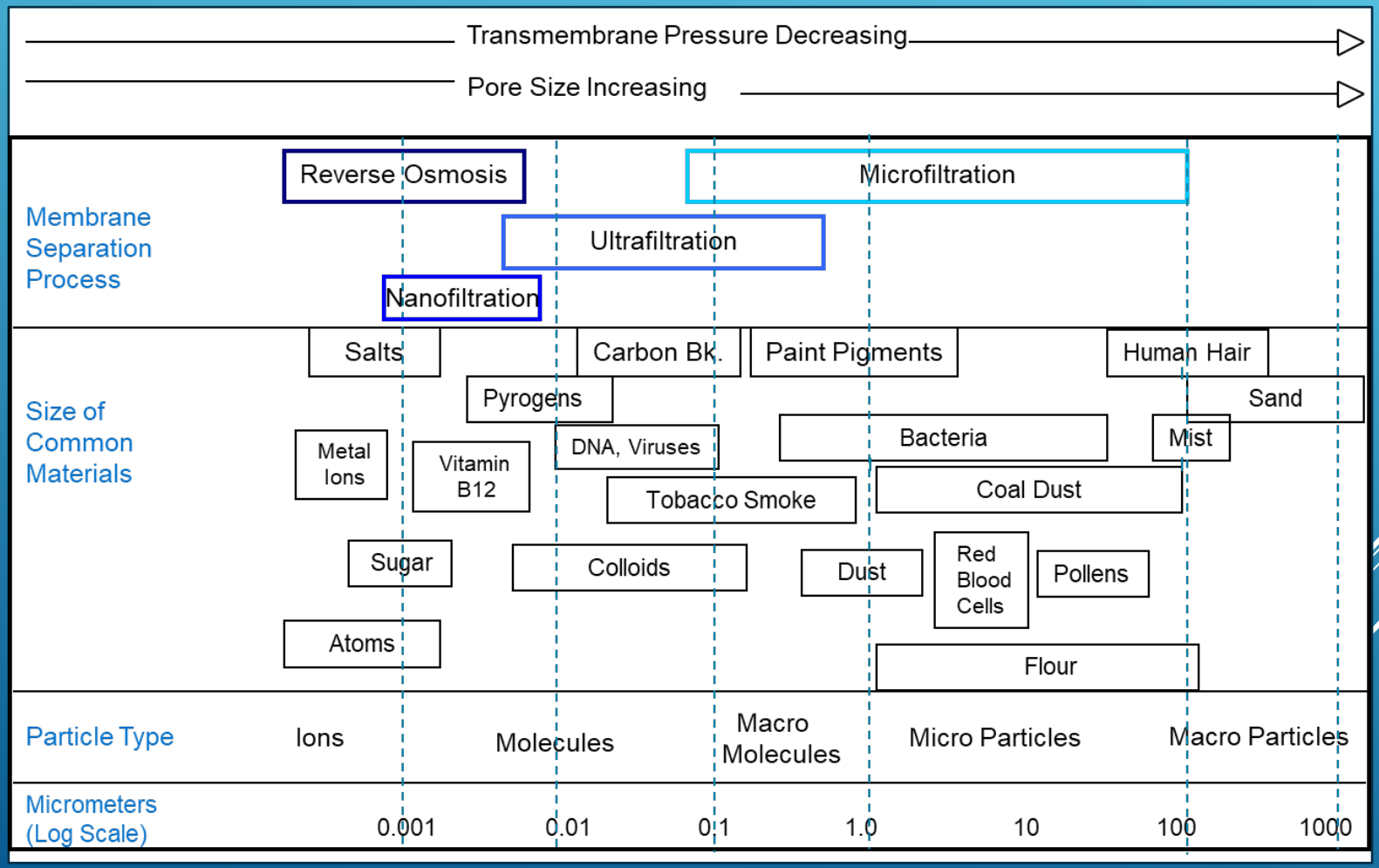
CASE STUDY – WESTPORT, MA

- Affordable Housing Complex
- 50 apartments in 7 townhomes with mix of individuals and families (1 to 3 bedrooms)
- TN @ outlet < 5 mg/L. Net zero TN at edge of property
- Design flow 9,990 gpd
- High Strength Membrane Bioreactor
- Drip irrigation post treatment


grid
solids removal
pre-treatment
aeration zone
settler
sand filtration
dis-infection
wastewater
effluent
air
sludge
grid
solids removal
pre-treatment
aeration zone
membrane
wastewater
effluent
air
sludge

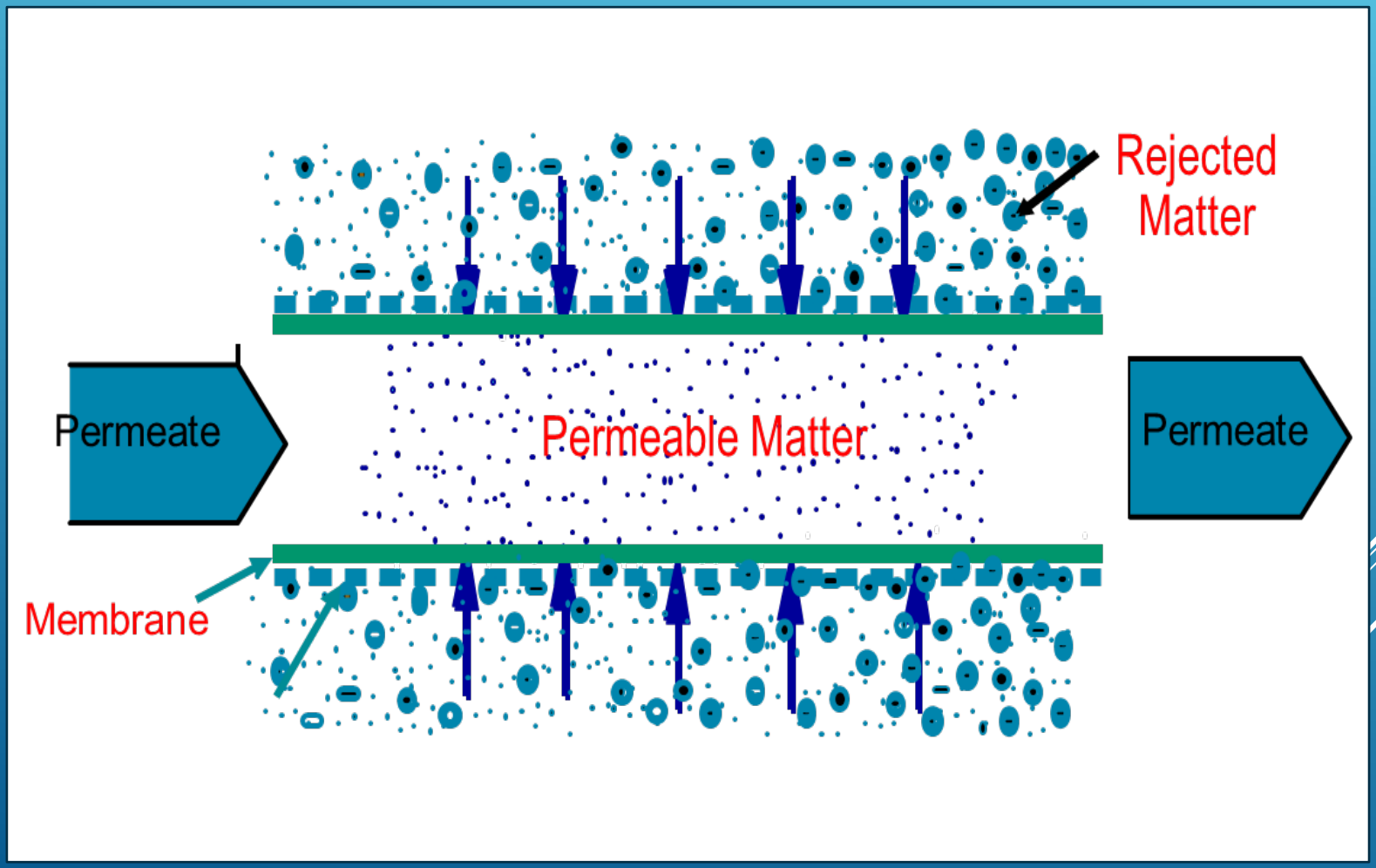
DESIGN CONCEPT - ULTRAFILTRATION

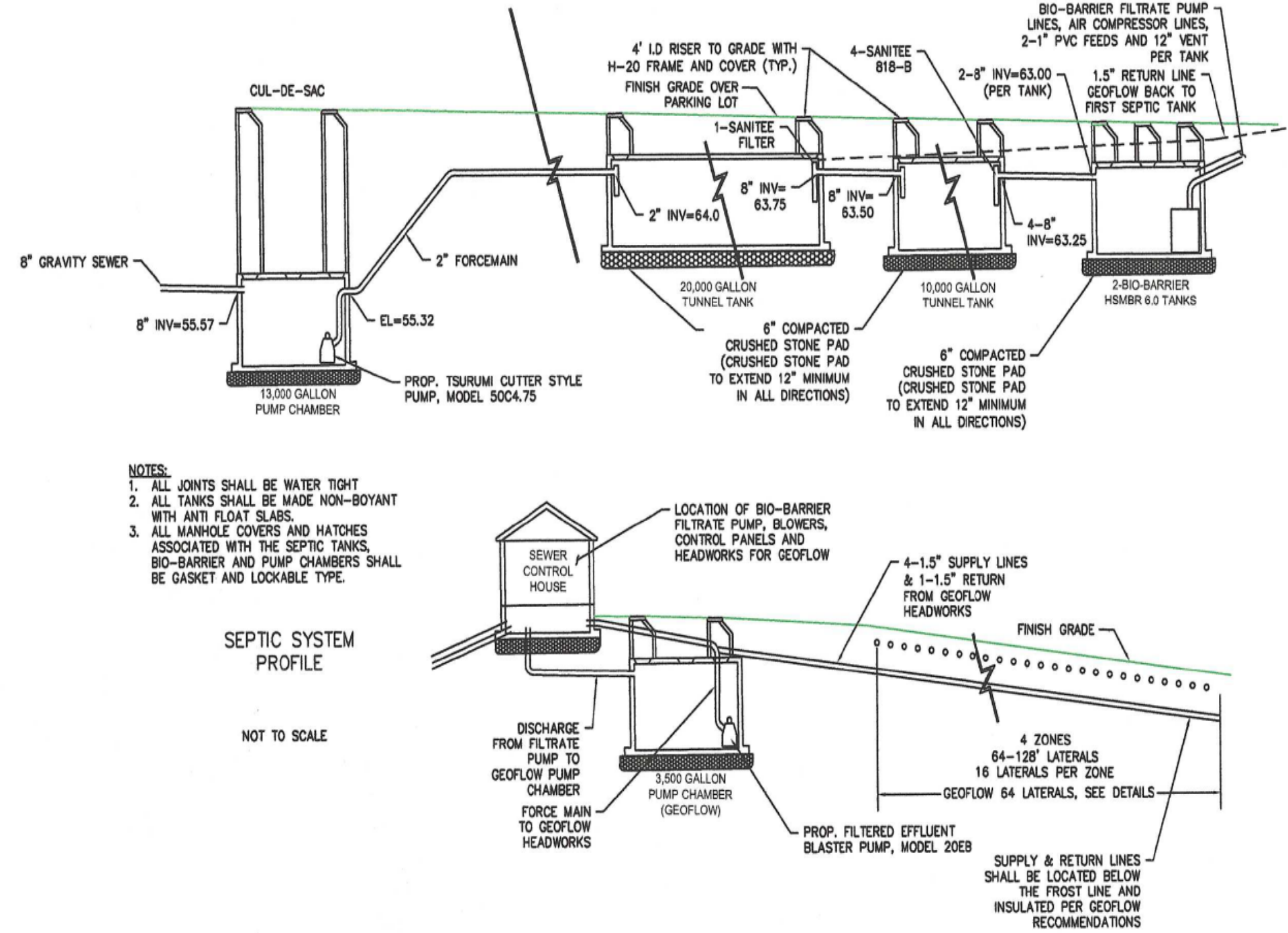
- Microscopic membrane pores 0.03 micron diameter provide disinfection by physical separation



DESIGN CONCEPT - ULTRAFILTRATION

- Ultrafiltration membrane pores block bacteria and larger molecules from leaving the system with the treated water





NOTES:
1. ALL JOINTS SHALL BE WATER TIGHT
2. ALL TANKS SHALL BE MADE NON-BOYANT WITH ANTI FLOAT SLABS.
3. ALL MANHOLE COVERS AND HATCHES ASSOCIATED WITH THE SEPTIC TANKS, BIO-BARRIER AND PUMP CHAMBERS SHALL BE GASKET AND LOCKABLE TYPE.

SEPTIC SYSTEM PROFILE

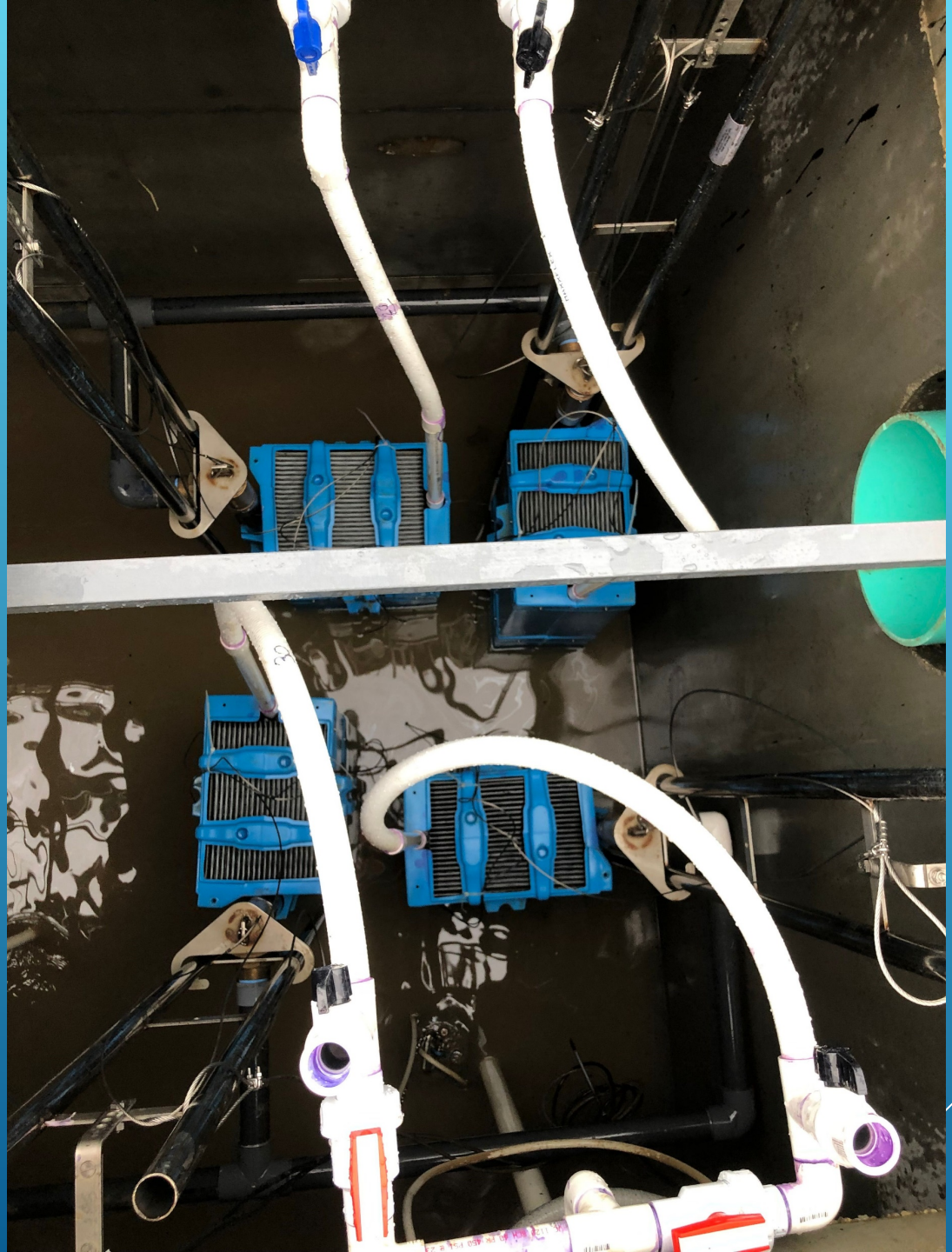
NOT TO SCALE

FOR HIGH STRENGTH WASTES

- Aeration of membrane filters scours the membrane material to prevent fouling
- BioRobic coarse bubble aerators at the bases of the bioreactor stacks provide the oxygen transfer necessary for high BOD loads
- Conventional suspended growth aeration operates with MLSS up to 3,000 mg/L
- HSMBR works well with MLSS up to 10,000 mg/L
- Higher biomass increases removal efficiency of organic material


HOLE


CAUTION




CAUTION


NO
PARKING
Service
Manager
Only


Train 3 Biobarrier Filtrate Pump
Train 1 Biobarrier Filtrate Pump


Noquochoke Village
NOQUOCHOKE
VILLAGE

MONITORING RESULTS (INFLUENT & EFFLUENT)

Date	daily flow	BOD	TSS	TN	Alk.	pH
7/19/2021	5588	196	54	48	290	6.6
6/28/2021	6315	216	2110	264	394	6.5
5/25/2021	4591	1150	1780	168	395	6.6
4/30/2021	4570	390	310	97.3	371	6.6
3/16/2021	4901	COVID	COVID	COVID	COVID	COVID
2/12/2021	5133	COVID	COVID	COVID	COVID	COVID
1/22/2021	4970	COVID	COVID	COVID	COVID	COVID
5/28/2020	5515	COVID	COVID	COVID	COVID	COVID
5/1/2020	3878	COVID	COVID	COVID	COVID	COVID
4/1/2020	4975	330	56	86.5	345	6.9
2/28/2020	7932	31.3	88	30.48	167	6.9
1/27/2020	6202	COVID	COVID	COVID	COVID	COVID
12/18/2019	6491	146	70	75	284	6.8
11/22/2019	5068	408	140	90.4	337	6.5
10/29/2019	3255	403	848	118.45	286	6.9
8/30/2019	2530	295	54	97.3	329	6.9
7/29/2019	1822	520	590	146	333	7
6/28/2019	1289	105	16.5	36.7	202	7.3
min value	1289	31.3	16.5	30.48	167	6.5
max value	7932	1150	2110	264	395	7.3
average	4,723.6	349.2	509.7	104.8	311.1	6.8
median	4972.5	312.5	114	93.85	331	6.85
std. dev	1678.4	290.0	720.3	64.8	70.5	0.2
n (pseudo)	18	12	12	12	12	12
Notes						
COVID = influent samples were not taken this month						

Date	daily flow	BOD	TSS	TN	Alk.	pH
7/19/2021	5588	2	2	4.25	56.9	7.4
6/28/2021	6315	2	2	2.9	73.6	7.2
5/25/2021	4591	2	2	0.92	85.9	7.5
4/30/2021	4570	2	2	5.28	43.5	7.5
3/16/2021	4901	2	2	9.33	97.1	7.5
2/12/2021	5133	2	2	7.15	69	7.5
1/22/2021	4970	2	2	2.41	78	7.5
5/28/2020	5515	2	2	3.9	63.7	7.5
5/1/2020	3878	2	2	8.83	63.5	7.4
4/1/2020	4975	2	2	3.64	80.6	7.7
2/28/2020	7932	2	2	3.59	81.4	7.4
1/27/2020	6202	COVID	COVID	COVID	COVID	COVID
12/18/2019	6491	4.4	2	5.43	81	7.7
11/22/2019	5068	2	2	1.68	260	7.8
10/29/2019	3255	2	2	1.9	108	7.9
8/30/2019	2530	2	2	3.91	229	8.1
7/29/2019	1822	2	2	6.8	94.2	7.8
6/28/2019	1289	2	2	10.65	56.6	7.6
min value	1289	2	2	0.92	43.5	7.2
max value	7932	4.4	2	10.65	260	8.1
average	4,723.6	2.1	2.0	4.9	95.4	7.6
median	4972.5	2	2	3.91	80.6	7.5
std. dev	1678.4	0.6	0.0	2.8	58.6	0.2
n (pseudo)	18	17	17	17	17	17
nd= not detected < data reported as 0.5 detection limit					(<4 reported as 2)	