

MARIETTA, OHIO CLASS EXERCISE

GRANT WEAVER, PE & WWTP OPERATOR
PRESIDENT
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55th Annual Wastewater Workshop
Operator Training Committee of Ohio
Columbus, Ohio
April 3, 2018



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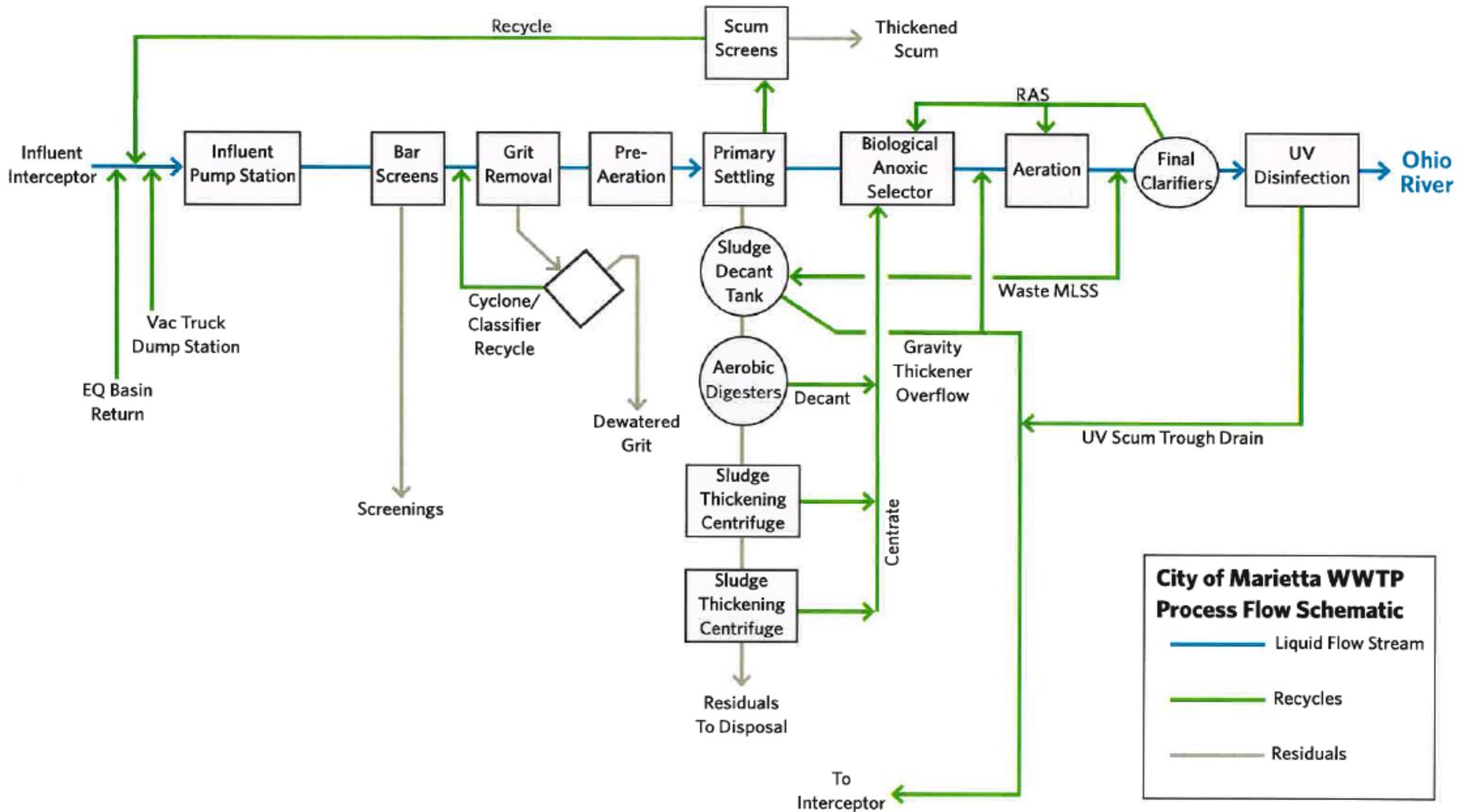
Marietta Wastewater Treatment Plant

River Trail

River Trail

River Trail



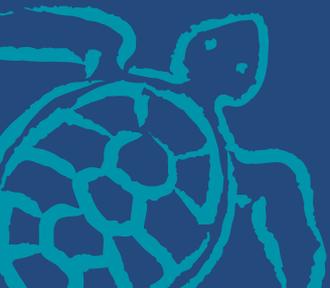




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Making sustainably clean water

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Options for Monitoring Nitrogen and Phosphorus Removal

Cheapest

Good

Better

Best

Ideal

Environmental conditions

DO	hand held membrane DO meter	hand held LDO meter	hand held LDO with thumb drive	in-line DO probe	in-line connected to SCADA
ORP	pen/stick measure	hand held ORP meter	hand held ORP meter with thumb drive	in-line ORP probe	in-line connected to SCADA
pH	test strips	pen/stick measure	benchtop pH	in-line pH probe	in-line connected to SCADA
Alkalinity	test strips	test strips	spectrophotometer	benchtop pH w/ titration	benchtop pH w/ titration

Nitrogen

TKN	estimate: Ammonia + 2.0 mg/L	estimate: Ammonia + 2.0 mg/L	spectrophotometer	spectrophotometer	spectrophotometer
Ammonia	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)
Nitrate	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)
Nitrite	test strips	test strips	spectrophotometer	spectrophotometer	spectrophotometer

Phosphorus

total-P	estimate: TSSx0.05 + test strips	estimate: TSSx0.05 + test strips	spectrophotometer	spectrophotometer	spectrophotometer
ortho-P	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)

Options for Monitoring Nitrogen and Phosphorus Removal: Small Plants – Less than 1.0 MGD

Cheapest

Good

Better

Best

Ideal

Environmental conditions

DO	hand held membrane DO meter	hand held LDO meter	hand held LDO with thumb drive	in-line DO probe	in-line connected to SCADA
ORP	pen/stick measure	hand held ORP meter	hand held ORP meter with thumb drive	in-line ORP probe	in-line connected to SCADA
pH	test strips	pen/stick measure	benchtop pH	in-line pH probe	in-line connected to SCADA
Alkalinity	test strips	test strips	spectrophotometer	benchtop pH w/ titration	benchtop pH w/ titration

Nitrogen

TKN	estimate: Ammonia + 2.0 mg/L	estimate: Ammonia + 2.0 mg/L	spectrophotometer	spectrophotometer	spectrophotometer
Ammonia	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)
Nitrate	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)
Nitrite	test strips	test strips	spectrophotometer	spectrophotometer	spectrophotometer

Phosphorus

total-P	estimate: TSSx0.05 + test strips	estimate: TSSx0.05 + test strips	spectrophotometer	spectrophotometer	spectrophotometer
ortho-P	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)

Options for Monitoring Nitrogen and Phosphorus Removal: 2-5 MGD

Cheapest

Good

Better

Best

Ideal

Environmental conditions

DO	hand held membrane DO meter	hand held LDO meter	hand held LDO with thumb drive	in-line DO probe	in-line connected to SCADA
ORP	pen/stick measure	hand held ORP meter	hand held ORP meter with thumb drive	in-line ORP probe	in-line connected to SCADA
pH	test strips	pen/stick measure	benchtop pH	in-line pH probe	in-line connected to SCADA
Alkalinity	test strips	test strips	spectrophotometer	benchtop pH w/ titration	benchtop pH w/ titration

Nitrogen

TKN	estimate: Ammonia + 2.0 mg/L	estimate: Ammonia + 2.0 mg/L	spectrophotometer	spectrophotometer	spectrophotometer
Ammonia	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)
Nitrate	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)
Nitrite	test strips	test strips	spectrophotometer	spectrophotometer	spectrophotometer

Phosphorus

total-P	estimate: TSSx0.05 + test strips	estimate: TSSx0.05 + test strips	spectrophotometer	spectrophotometer	spectrophotometer
ortho-P	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)

Options for Monitoring Nitrogen and Phosphorus Removal: 5+ MGD ... or, 6 mg/L tN limit or 0.5 mg/L tP limit

Cheapest

Good

Better

Best

Ideal

Environmental conditions

DO	hand held membrane DO meter	hand held LDO meter	hand held LDO with thumb drive	in-line DO probe	in-line connected to SCADA
ORP	pen/stick measure	hand held ORP meter	hand held ORP meter with thumb drive	in-line ORP probe	in-line connected to SCADA
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Nitrogen

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Nitrate	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)
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Phosphorus

total-P	estimate: TSSx0.05 + test strips	estimate: TSSx0.05 + test strips	spectrophotometer	spectrophotometer	spectrophotometer
ortho-P	test strips	test strips	spectrophotometer	in-line instrument (\$\$)	in-line connected to SCADA (\$\$)