

BIO 111 - Laboratory # 11: Cortland Wastewater Treatment Plant

- **Assigned pages:** Mader, S., et al. 2008. Inquiry of Life. pp. C69-C76
 ✓ You must wear closed shoes for the tour; closed shoes are required for entrance into the plant

I. Wastewater Treatment - Introduction:

1. GOALS:

Objectives - at the end of laboratory #11 you should be able to:

- 1.) understand why it is important to treat wastewater
- 2.) know the path and understand the successive steps of the treatment process from influent to effluent
- 3.) understand the difference between physical and biological processes in the treatment process
- 4.) know what happens to solids during the treatment process, when and where solids are removed

Key terms - you should be able to define:

General Treatment Vocabulary:	Process Steps Vocabulary:
influent	raw sewage
effluent	bar screen
leachate	pumping
eutrophic/ eutrophication	grit removal
biological oxygen demand (BOD)	primary clarifier - physical process:
physical process	floatables
biological process	primary sludge
settleable	aeration basin - biological process:
suspension	aeration
dissolved	microorganisms
anaerobic digestion	secondary clarifier - physical process:
solids	activated sludge
nitrogen (N)	waste activated sludge
carbon dioxide (CO ₂)	chlorination
methane (CH ₄)	dechlorination
oxygen (O ₂)	aeration
disinfection	anaerobic digestion
million gallons per day (MGD)	dewatering
belt dewatering press	sludge removal
landfill	

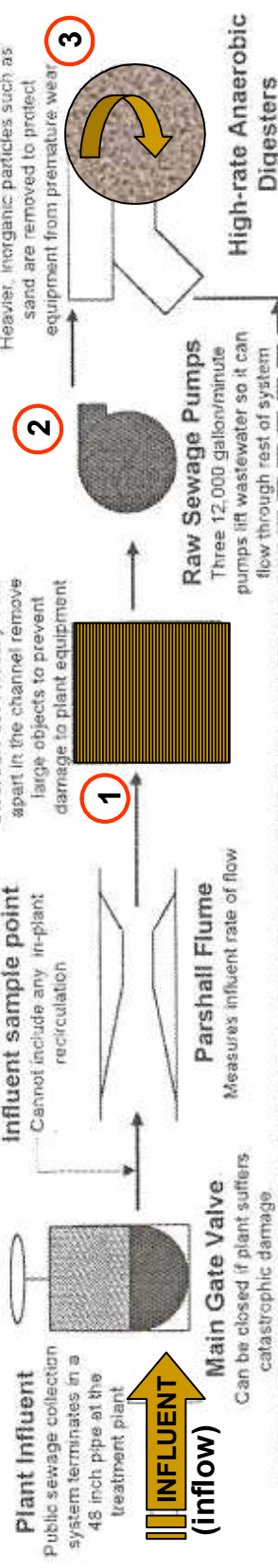
2. **Plant tour:**

- 1.) **pp. C69-C76:** Read through the steps of the tour
- 2.) **p. 75:** Use the attached map while on the tour to keep track of the steps of the treatment process
- 3.) **Tour stops ("P" = Physical treatment process; "B" = Biological treatment process):**
 - (1.) **Bar Screen:** removes items larger than one inch
 - (2.) **Influent Wet Well/Raw Sewage Pumps:** Monitor flow rates; pumps send flow to grit removal chamber
 - (3.) **P Grit Removal Chamber:** Heavier particles removed from flow
 - (4.) **P Primary Clarifier:** "Settleable" organics removed from tank bottoms and "floatables" skimmed off
 - (5.) **B Aeration Basins:** Microbe-assisted digestion of organic material
 - (6.) **P Secondary Clarifier:** Live microbes removed from tank bottom and recycled to aeration basin
 - (7.) **Chlorine Contact Basins:** Chlorine kills any remaining microbes (15 May-15 Oct); dechlorinated by addition of SO₂ gas bubbled through effluent. ALL YEAR O₂ gas bubbled through effluent.
 - (8.) **B High-rate Anaerobic Digesters:** 104°F, NO oxygen => kills toxic microbes; converts organic material to complex organics then into inert (nonreactive) material; BYPRODUCT= methane (used to heat digester)
 - (9.) **P Belt Dewatering Press:** Anaerobic digester sludge dewatered by being pressed on belt roller => sludge "cake" which is buried in the landfill

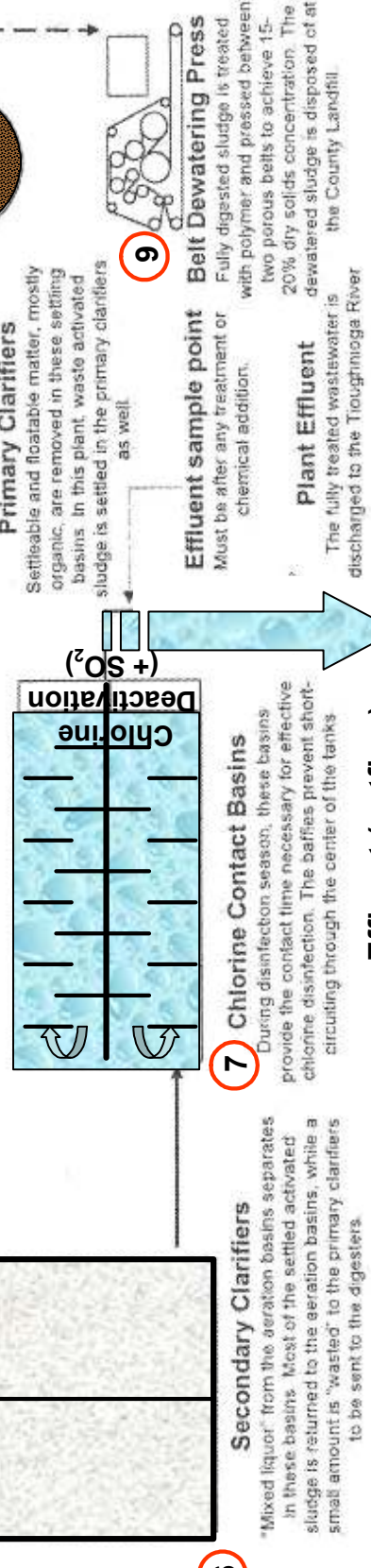
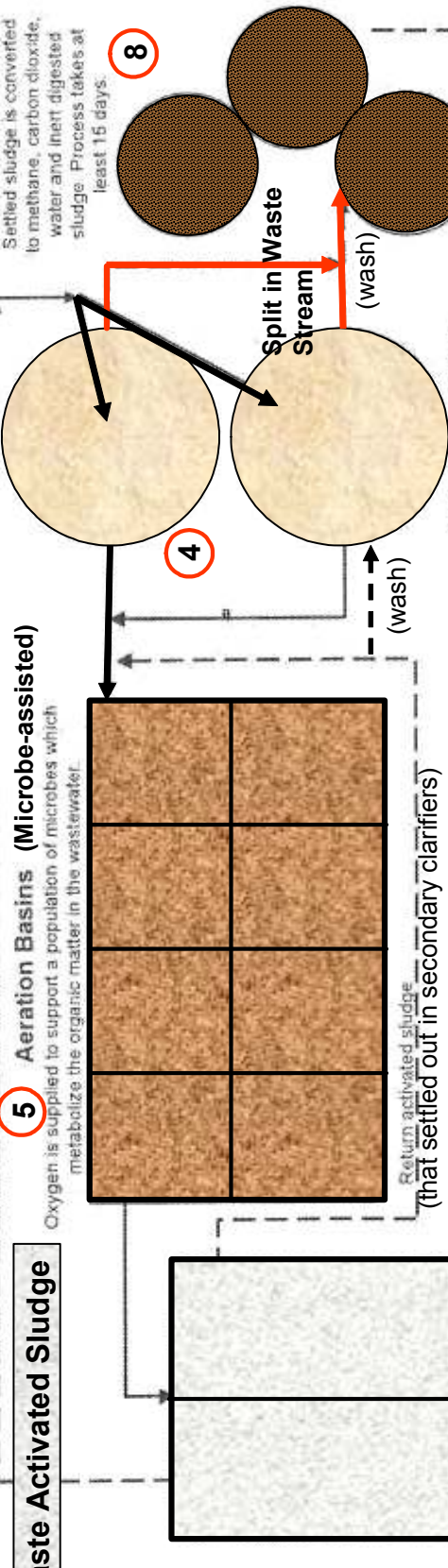
3. **Review:**

- 1.) **p. C74:** Answer the study questions 1 - 6, using the information presented in the manual and from the tour

Cortland Wastewater Treatment Facility



On roof of building:
Grit Removal Chamber
Heavier, inorganic particles such as sand are removed to protect equipment from premature wear



Effluent (outflow) :

Effluent dissolved oxygen = 10 – 11 mg/mL (River diss. O₂ = 7.5-8.5 mg/mL)

Effluent sample point
Must be after any treatment or chemical addition.

Plant Effluent
The fully treated wastewater is discharged to the Troughmoga River