

Municipal Engineering – Engi. 8713  
Assignment #7  
Not to be handed in

- 1) A single clarifier with a surface area of  $500 \text{ m}^2$  will treat a maximum flow of  $28,000 \text{ m}^3/\text{day}$  and the raw wastewater being fed to the clarifier contains  $220 \text{ mg/L}$  SS and  $200 \text{ mg/L}$   $\text{BOD}_5$ . What is the minimum tank depth required? Estimate the effluent  $\text{BOD}_5$  and SS at the maximum daily flow. If the sludge is 95% water what is the maximum amount of sludge production in one day?
- 2) A circular primary clarifier is treating  $12,000 \text{ m}^3/\text{day}$  of raw wastewater with a  $\text{BOD}_5$  strength of  $230 \text{ mg/L}$  and a SS concentration of  $240 \text{ mg/L}$ . Determine the clarifier dimensions and detention time while respecting the Newfoundland guidelines.
- 3) A two stage rock media trickling filter will be used for a wastewater flow of  $3,000 \text{ m}^3/\text{d}$  and a wastewater temperature of  $20^\circ\text{C}$ . After the wastewater undergoes primary sedimentation it contains a  $\text{BOD}_5$  of  $150 \text{ mg/L}$ .
  - a. For the case where the effluent quality is required to be  $20 \text{ mg/L}$ ,  $E_1 = E_2$  and the recirculation ratio is 2:1 what will be the diameters of the two filters and what will be the BOD and hydraulic loading rates for each of the filters?
  - b. If the larger diameter obtained for the second filter in part a) is used for both of the filters and the recirculation ratio is changed to 1:1 what will be the  $\text{BOD}_5$  of the effluent and what will be the BOD and hydraulic loading rates for each of the filters?
  - c. If the temperature is  $15^\circ\text{C}$  and what will be the effluent  $\text{BOD}_5$  for the filter system of part b)?