Oxic chamber

s.w.d. 4.5 m

CM tank model

		mgd						
wastewater flow	37850 m3/day	10.000						
BOD in (mg/L)	204		17013.6 lbBOD/day		25520.4 lbO2/day			
TKN in (mg/L)	34		2835.6 lbTKN/day		13043.8 lbO2/day			
				AOR	38564.2 lbO2/day	1606.8 lbO2/hr		

cell I

length	68 m				HP/mg	HP for mixing	if CFM for mixing	
width	68 m	tank volume	residence (days)		50	274.9	5971 CFM	
s.w.d.	4.5 m	20808.0 m3	0.55		60	329.8		
	14.76 (feet)	5.497 mg			70	384.8		

lbBOD/day 1000 cu.ft.	23.2	MLSS	3500
lbBOD/day acre	14890.6	f/m	0.106

hi speed	low speed
918.2	706.3

total tankage volume	5.497	mg
total residence time	0.55	days

AOR	AOR/SOR	SOR	HP at 2.5 lb/h per HP	de-rate 5	de-rate 10	de-rate 15	HP/mg	HP for mixing
1606.8	0.7	2295.5	918.2	966.5	1020.2	1080.2	50	274.9
1606.8	0.6	2678.1	1071.2	1127.6	1190.3	1260.3	60	329.8
1606.8	0.5	3213.7	1285.5	1353.1	1428.3	1512.3	70	384.8

quick-and-dirty diffused aeration estimates

CFM for diffused aeration/oxygen transfer 17920 CFM AOR/SOR = .37 1.7% per feet **23296** CFM **39581 m3/h**

HP estimate for oxygen 849.9 HP with 1.3 safety factor

7.48 psig 516 mbar

notes: 7.98 psig(PeakOverdesign) 550 mbar

3. approach would be extended/activated sludge alternative using f/m= c. 0.1 and 300 gpd/sq.ft. for a secondary clarifier
4. Possible preliminary quote (low speed):

about **755.0** HP if low speed units

about **2912** 1-m tubes at 8 CFM per tube with 1.3 safety factor

1104.9 HP blowers

other related calcs:

secondary clarifier diameter at 300 gpd/sq.ft. **62.8** m **63664** ft lb torque

waste sludge flow Qw for various sludge age values, 30 mg/L SSout, underflow SS at 0.7 % Hammer.412

	WAS (see footnote # 1)						*RAS (see foot note #2)*		*tentative at*	8 *hr/day*	*thickener*	
age days	Qw mgd	Qw gpd	Qw gpm	lb/day dry	Qw/flow in		Qr mgd	Qr/Q	BFP gpm at 4%	*regime*	*diam. (m)*	*thickener*
5	0.5069	506892	352.0	29556.9	5.1	%	8.9005	89.0 %	184.8		26.5	94116 ft lb torque
10	0.2320	232017	161.1	13528.9	2.3	%	9.4503	94.5 %	84.6		17.9	43079 ft lb torque
14.5	0.1467	146711	101.9	8554.7	1.5	%	9.6209	96.2 %	53.5		14.2	27240 ft lb torque
15	0.1404	140393	97.5	8186.3	1.4	%	9.6335	96.3 %	51.2		13.9	26067 ft lb torque
25	0.0671	67093	46.6	3912.2	0.7	%	9.7801	97.8 %	24.5		9.6	12457 ft lb torque

dry weight sludge as predicted by Hammer.440 Figure 11-40 as a function of f/m known to be "reasonable" for municipal but may

lb/day dry 11740.4 2 * K * mgd * 8.33 * BOD5 mg/L differ considerably if industrial ww

tentative BFP gpm for possible inlet SS settings ballpark/alternate figures at above specified *net* BFP hours per day

97.9	3%	46980 gpd
83.9	3.5%	40269 gpd
73.4	4%	35235 gpd

sludge yield (lb/day dry / lbBOD/day) = 0.69

dewatering block subject to review/actual operating regime

foot note # 1 Assuming treated wastewater exits clarifier with say 30 mg/L SS and using entered/calculated tank MLSS,V
solving for Qw in sludge age equation (11-12- Hammer.412) for various age settings results in WAS estimates as shown

foot note # 2 Tentative Qr's result from performing somewhat crude mass balance around secondary clarifier (solving for RAS):
(Q+Qr) * MLSS = Q * 30 mg/L + (Qw+Qr) * underflow SS in mg/L
Return sludge rates to be fine tuned as will probably operate in an A2/O fashion - more later
(It all depends how lucky we are with underflow SSs: 0.5 - 2%)

Although not shown, it is assumed some thickener/DAF is used to concentrate settler underflow up to 4%
(Hammer.443: "As a general rule, the solids content must be at least 4 percent for feasible dewatering")

quotables/summary

low speed aerators, e.g. DBS

retrievable tubes & blowers local sourcing of PE/PVC pipe/panel/other

tentative BFP upon review, entry level if at least to break new ground www.balestie.com