

SUMMARY OF THE ISTS DESIGN

For the Cluster Sewer System For
East Circle Lake

Owner: Jerry Anderson & Dan Wenstrom
Forest Township Subordinate Sewer District

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June 8, 2004

Number of homes: 33

Design Flow: 9900 gallons per day

The design flow equates to 33 -4 bedroom Type 11 homes at 300 gallons per home per day. MN Rules 7080 allows Type 11 flows to be used when more than 10 homes are on one system. The ordinance for the subordinate service district will allow the district to impose conditions of use if a household is using too much water or abusing the system. Each home is intended to have a telemetry unit with a cycle counter and an hour meter so actual flows from each septic tank can be individually monitored. The pretreatment system will also have flow metering by computer so flows can be continuously monitored for the entire system with telemetry controls for notifying the operator when flows or other thidgs are abnormal (whether high or low).

The proposed treatment system is as follows:

- I. A 2,000 gallon, 2 compartment septic tank/pump tank will be at each home. A pump vault is set into the end of the septic tank. The pump vault will have a biotube filter by Orenco. Studies have shown that a biotube filter reduces TSS & BOD levels by half when compared to a typical septic tank without the filter. Each filter has a high level and low level alarm. The low level alarm will go off if the filter starts plugging enough so the filter effluent does not keep up with the pump. Typically the filers are cleaned on an annual or semi annual basis and sludge levels checked in the septic tanks at that time. The filters will plug quicker than normal if the sludge level gets too high. Garbage disposals will be allowed to be used. Individual monitoring of individual filters will show if there is a problem with too many solids. Studies have shown that pumping the septic tank every 3 to 12 years is typical.
2. The septic tank effluent leaves the septic tank in a 1" PVC forcemain. The pump flows are between 5 and 10 gpm at heads of up to 150 feet. The mainline is a 2" forcemain. The forcemains are designed for 160 psi and PVC or HDPE will be used. The forcernain directs all flow to a septic tank just prior to the first recirc tank.
3. The pretreatment system is 3 pods of recirculating packed bed media filter which are sized for 36.5 homes at a peak flow of 400 gpd per home. The major components of this system are as follows:
2 - 5,000 gallon recirc tanks
3 pods recirc filter

The septic tank effluent enters the end of one 5,000 gallon recirc tank and mixes with treated effluent at a ratio of 4 parts treated recirc effluent to one part of septic tank effluent. This provides an oxygen rich environment for the S.T.E. and ample mixing so the recirc filter won't plug up. The sludge layer is checked periodically in the first recirc tank and pumped when it reaches a 16" depth. The first tank is connected to the second recirc tank with an 8" pipe 18" from the bottom. The second tank has a triplex station which cycles at 5 to 15 minute intervals depending on average flows. The cycles are set to have a typical recirc rate of 5 times. A biotube filter is used for each pump.

The Advantex filter is set up into 3 pods. There are 3 pumps with one pump serving each filter. The filters are built to certain specs to prevent plugging and facilitate proper biological growth is used to treat the sewage. An underdrain system collects the treated sewage and returns 80% (if the recirc tanks are full) to the recirc tanks and 20% drains to a duplex pumping tank. The recirc filter typically achieves less than 10 mg/l BOD, 10 mg/l TSS, and less than 1,000 ppm fecal coliform. Reductions in total nitrogen of 40 to 50% is expected from the recirc filter. A septic tank in front of the recirc tanks allows influent sampling and a splitter valve will be placed in the effluent line that can be used to direct some of the treated effluent to the septic tank for increased nitrogen reduction.

A 3,000 gallon pump tank with duplex pumps delivers the r.f.e. to for final disposal. The proposed final disposal is to a drainfield where a minimum of 12" of separation is maintained between the drainfield and redox features. The drainfield is sizing using performance systems standards which allows a sizing factor of 1.65 for a clay loam which is the predominant layer just bellow the A horizon. A total area of 16,335 square feet of drainfield is required. This is split up into 18 zones of 304' of drainfield trench in each zone. The disposal system is divided into 3 sections with each section having 6 zones. A 6 way splitter valve is used for each of the 3 sections. A 3' wide trench with rock or EZ flow will be used for the drainfield.

For the alternate sewer mounds have been shown with For the alternate systems a 36" separation distance from the bottom of the rock bed to the redox features will be maintained. With a design flow of 9,900 gallons each mound is designed to handle 990 gallons each day (10' x 82.2' rock bed). Each section will have a 5 way distribution valve that automatically switches to the mound between cycles. Each mound will be pressurized.

Because the r.f.e. is so well treated (>90% removals) the drainfields or mounds will not plug up with a typical biomat.

All soil borings and perc testing work has been done by Halling Engineering, Inc. Miller Environmental, Inc., Peter Miller, Soil Scientist License # 42636 prepared a soil investigation study in accordance with MPCA recommendations.