LAKE FOREST ESTATES CLEAN WATER DISTRICT
PRELIMINARY ENGINEERING REPORT OUTLINE

WHY DO WE HAVE TO DO SOMETHING?

Big Bottom Creek (where we discharge) is on EPA's 303d list of impaired waterways. A Total Maximum Daily Load (TMDL) was prepared by EPA which set new lower limits for us. Limits provided by TMDL were phased as:

	Phase 1 (now)	Phase 2 (2022)	Phase 3 (2029)		Current Discharge 6/2017 - 9/2019
Parameter	mg/L	mg/L	mg/L	lbs/day	Avg. mg/L
BOD (C/N)	30	10	5.04/1.46	4.99/1.45	16.8
TSS	30	10	10	9.9	11.4
NH3 Summer	1.9	0.60	0.3	0.8	3.6
NH3 Winter	3.7	2.1	0.3	0.8	3.4
eColi		206	206		
Total Nitrogen			0.289	0.29	1.5
Total Phosphorus			0.007	0.01	8.0
DO			8		

The Association's system has been in violation of its permit for ammonia 15 months out of the past 2 years and will not be able to meet the future limits.

The collection system also has leaks that are contributing approximately 50,900 gpd and up to 445,000 gpd during rain events. The plant is designed for an average flow of 118,300 gpd and has received an average of 113,400 gpd over the past 2 years. The wastewater (collection and treatment) system also needs upgrading.

Failure to address this problem will lead to substantial DNR fines and court enforcement actions.

WHAT DO WE DO?

Look at upgrades to fix the leaks in the collection system and reduce the flows coming into the plant and upgrade the treatment plant to meet future limits and needs.

What limits do we meet? The phase 3 limits are unattainable with current treatment technologies so discussions with DNR has resulted in the agreement to treat towards the 2022 limits afterwhich DNR will perform a stream evaluation and see if those made stream improvements. If so, everything is good. If not, we can apply for a variance due to affordability.

ALTERNATIVE SOLUTIONS

Regardless of the solution, a fair method of billing must be implemented. This will require water meter installation in the District.

Collection System

Do Nothing - Not an option as flows will only increase until the treatment plant is unable to treat.
Line Pipes with CIPP (epoxy PVC liner) - Limited to 500-600 feet and must have openings in pipe at both ends for installation. This is not possible for lines below water level as Association will not drain the main lake.
Replace portions with Pressure System - Will require pump stations near the lake shoreline at approximately 76 locations and will require installation of forcemain along the lake edge. Also requires numerous easements.
Replace portions of the Gravity Main with new piping - Will require partial drainage of the main lake to install new ductile iron pipe (DIP) in the shallow areas of the lake.

Feasible solutions presented above and their costs are:

System Type	Construction Cost	Present worth of O&M	20 yr Project Cost
Pressure System Upgrade	$3,850,759.00	$791,275.00	$4,642,034.00
Gravity System Upgrade	$3,573,865.00	$104,447.00	$3,678,312.00

Best solution is Gravity System Upgrade and some CIPP repairs due to cost, ease of maintenance, & fewer easements.

Treatment System

Along with discharging at the current location, options also exist to pipe the discharge downstream to Indian Creek, or construct a No-Discharge (land application) system. Multiple treatment options exist for each of these.

At least 6 options were compared and narrowed down to the following three:

System Type	Construction Cost	Present worth of O&M	20 yr Project Cost
SBR Lagoon to Indian Creek	$2,463,800.00	$564,760.00	$3,028,560.00
SBR Lagoon w/ Tert. Filter	$2,366,600.00	$564,760.00	$2,931,360.00
Land Application	$3,984,050.00	$277,393.00	$4,261,443.00

While it's cost is the highest, Land Application is the ultimate solution because it will eliminate the discharge limits. It requires over 48 acres of ground to discharge the treated water. The Association previously attempted to locate available ground but was unable to. Therefore, the best and recommended solution is converting the existing lagoon into an activated sludge SBR plant with tertiary filtration for the low BOD, TSS, and phosphorus requirements.

FUNDING

Since the District has been formed, many funding sources exist; but, two low interest funding agencies stand out above the other options. Those agencies are the Missouri DNR State Revolving Fund and USDA Rural Development. Both have interest rates well below 3% and might be able to limit the user charge to 2% of the township/county Median Household Income with grants.

The total project cost is estimated at $5,771,465. Operational costs are also estimated at $105,300 annually. If funded through loan only at 2.375%, the estimated monthly cost for the average user would be $111.22 which is 3.0% of the median household income. If the funding could be obtained in a grant/loan split of $2,300,000/$3,475,000 the monthly cost would be $79.55 which is 2.14% of the MHI. **These are only estimates and subject to change.**

Ultimate project cost and ultimately monthly costs will not be determined until after the project is bid and bonds are issued. Cost estimates are provided to assist with scope of work, feasibility determination, and project funding; but, costs may vary depending on the bid timing, funding source, and economic conditions.

TIMELINE

Once approved by the District, the Preliminary Engineering Report should be submitted to DNR and USDA for approval. Funding applications should be submitted and an estimated timeline follows:

Submit report to funding agencies	02/06/2020
Receive approval of report and funding	10/31/2020
Complete Design	05/30/2021
Obtain approval of Design	12/31/2021
Advertise for Bids	01/06/2022
Issue Bonds for Project	04/07/2022
Authorize Construction	04/07/2022
Complete Treatment Plant Construction	02/28/2023
Complete Collection System Construction	08/30/2023

Project timeline is a best estimate at this time. Ultimate timeline may vary depending upon the financing used, approval process timing, contractor availability, etc. Timeline will be updated as needed to reflect conditions found.