

Richfield Joint Recreational District Wastewater Treatment Alternatives

July 1, 2016

Introduction

Environmental Design Group is developing a Master Plan for land that the Richfield Joint Recreational District purchased from the Girl Scouts of Northeast Ohio (formerly the Crowell Hilaka Girl Scout Camp). The purpose of this report is to estimate the current and future flows and to evaluate possible alternatives for wastewater treatment.

Executive Summary

Four alternatives for wastewater treatment were developed and analyzed. The septic system Alternative No. 4 is the most cost effective solution if the soils are adequate. Approvals and permitting is required. Alternative No. 3 will be the best value for future expansion and the least costly for operation and maintenance (O&M). However, an agreement with the Village of Richfield is required. The wastewater treatment plant options (Alternative Nos. 1 and 2) will require permitting and monthly reporting to the Ohio EPA as well as ongoing O&M. The initial capital cost is also higher. Therefore, Alternatives No. 3 and No. 4 should be pursued first. Action items are listed in the conclusions.

Existing Conditions

Environmental Design Group made a site visit on Friday, December 18, 2015 and evaluated the condition of the existing 20,000 gallons per day (gpd) WWTP. The plant has not been in use and is in very poor condition. The existing sanitary sewers are also in very poor condition and need to be lined or replaced.

Richfield Wastewater Treatment Plant (WWTP) Evaluation

Environmental Design Group inspected and evaluated the Richfield Joint Recreational District WWTP, formerly the Crowell Hilaka Girl Scout Camp, in Richfield Township, Ohio. The site visit and discussion with Bob Becker at the WWTP is summarized below.

The existing WWTP has not had any sewage flow for more than 5 years. The infiltration and inflow (I & I) in the sewer system runs through the treatment system and discharges to the creek. AKE Lab monitors the site and reports to Ohio EPA.

The NPDES Permit that expires May 31, 2016 has been submitted for renewal. This permit has typical tertiary type limits. The Camp has obtained a modification to the permit with less reporting and monitoring because there is no sewage flow. When sewage flow begins, then the original permit will be in effect per Ohio EPA.

The existing WWTP consists of a comminutor flow splitter chamber (comminutor is missing) 2- 20,000 gpd steel extended aeration plants with circular clarifiers built in the 1950's or 1960's, a precast concrete dosing tank with surface sand filters and chlorination and de-chlor all added in the late 1970's. The steel plants are in disrepair, significant rusting and broken piping. The circular clarifier has the skimmer and sludge return and waste piping missing. The effluent weir is rusted, the v-notches are gone, and the baffles are rusted.

The dosing tank needs new pumps and controls, and surface sand filters need to be cleaned and checked for correct sand and have a significant amount of water run through them to confirm that there is no clogging in the sand, underdrain and effluent collecting piping to determine that they can be used or if any improvements are needed.

The Extended Aeration Plant should be replaced with a new trash trap, flow equalization, multiple cell aeration tanks, and a new clarifier. Fixed Media Filters should be considered as part of the improvement. The Chlorine contact tank should be replaced with an ultraviolet disinfection system and post aeration. The multiple cell aeration tanks would allow for multiple inlets based on the flow to the system. This would allow for growth of the park as development continues, flows increase, and use is expanded. Electrical upgrades, access road, and a new fence around system are necessary site improvements.

Current and Future Flow Projections

The current flow projections are summarized in the Table 1. As a banquet/meeting facility without a fully furnished commercial kitchen and a seating capacity of 300 people, Gund Hall would generate approximately 900 gallons per day (gpd) of wastewater flow. If Amity House is used as a 2 bedroom Bed and Breakfast, it would generate approximately 240 gpd of flow. The Welcome Center will contribute about 250 gpd based on 25 visitors/hikers per day. The total average daily flow (ADF) for these facilities is approximately 1,500 gpd.

In the future, if a commercial kitchen was installed in Gund Hall, another Bed and Breakfast facility was opened, visitors/hikers increased, or office space was created, then the flows could increase to approximately 3,000 gpd.

Alternative No. 1

Since the evaluation of the existing WWTP concluded that it should be replaced at that site or at some site in close proximity to the existing effluent discharging location. Although the existing plant is rated for 20,000 gallons per day (gpd), and the NPDES Permit issued by Ohio EPA is written for that amount of discharge, the proposed future flows as shown in Exhibit A are much less than 20,000 gpd. Therefore, the new WWTP should be sized for 5,000 gpd with a large enough foot print to be expanded in 5,000 gpd increments as flows increase in the future. The preliminary opinion of construction cost for a 20,000 gpd WWTP is approximately \$400,000 and for a 5,000 gpd WWTP is approximately \$175,000. In addition to the replacement of the WWTP, the existing sanitary sewers would need to be lined at a cost of approximately \$150,000. These costs do not include a contingency or engineering fees.

In order to serve the priority area of the recreational district surrounding Gund Hall including the Welcome Center and Amity House. In addition to the WWTP and the pipe lining, a new grinder pump station, force main, and laterals would be required to properly connect all of the buildings. The Engineer's Preliminary Opinion of Probable Construction Cost for this alternative is approximately \$891,250 as detailed in Table 2. If only a 5,000 gpd was installed initially, then the cost would be approximately \$200,000 less or \$575,000 plus contingency and engineering fees.

Alternative No. 2

This alternative includes installing a small WWTP in the vicinity of Gund Hall and discharging onsite or to the nearby stream if Ohio EPA would approve the point of discharge. The plant would be designed for an ADF of 1,500 gpd with the ability to be expanded to 3,000 gpd in the future. In order to serve the existing buildings, a grinder would be installed at the low point between Gund Hall and Amity House. The buildings would be connected by 6-inch laterals and 8-inch sanitary sewers. The grinder pump could pump to any desired location for the WWTP. The Engineer's Preliminary Opinion of Probable Construction Cost for this alternative is approximately \$402,500 as detailed in Table 2.

Alternative No. 3

After identifying the location of existing sanitary sewers in the Village of Richfield on Broadview Road near the cemetery, it was determined that the distance was approximately 6,000 feet from the projected location of the grinder pump station. A sanitary sewer service agreement would be required between the Village and the District. The existing buildings would be connected to the grinder pump station as described in Alternative No. 2. Therefore, a grinder pump and approximately 6,000 feet of 2-inch force main could be installed to serve the 4 facilities. The Engineer's Preliminary Opinion of Probable Construction Cost for this alternative is approximately \$373,750 as detailed in Table 2.

Alternative No. 4

Since the current estimated flow of these 4 facilities is under 2,500 gpd an on lot septic system might be acceptable if the soil conditions are adequate. This option would require analysis by a soil scientist during the preliminary design phase and approval by the Summit County Health Department (SCHD). Also, it would require a Permit to Install (PTI) from the Ohio EPA. In addition, a commercial kitchen in the future would not be acceptable and any expansion would need approvals.

If the soil conditions are marginal, then an off lot discharging system may be possible under the Nationwide NPDES Permit. This system would require the same approvals listed above. Therefore, an approved 1,500 gpd off lot discharging system under the Nationwide NPDES Permit is proposed to serve all 4 facilities. The Engineer's Preliminary Opinion of Probable Construction Cost for this alternative is approximately \$258,750 as detailed in Table 2.

Analysis

When evaluating the alternatives, Alternative No. 4 is the least expensive and would require similar operation and maintenance (O&M) as Alternative No. 3. However, both of these alternatives require additional investigation and approvals. Alternative No. 4 is very dependent on the natural soil conditions while Alternative No. 3 is dependent on negotiating an agreement with Village. If any expansion of services is envisioned for the future, then pumping the wastewater to the Village's system is the best long range value for the future because it won't require an NPDES Permit and minimal O&M is required. Alternatives No. 1 and No. 2 will require an NPDES Permit and stricter discharge requirements as well as more extensive O&M.

Conclusions

In conclusion, the best alternative based on cost is Alternative No. 4 and should be pursued through the preliminary design phase. A meeting with the Village of Richfield to discuss a possible agreement and the terms of such an agreement should take place while the soil testing is being conducted. If neither of these options work out, then Alternative No. 2 should be implemented.

Recommendations

The following recommendations summarize the required action items.

1. Determine the best locations for a septic system, a wastewater treatment plant, and a grinder pump to serve the property.
2. Evaluate the soils for an on lot discharging septic system.
3. Discuss the septic system alternatives and analysis with the SCHD and OEPA.
4. Discuss entering into a Sanitary Sewer Service Agreement with the Village of Richfield.
5. Depending on the results of Items 3 and 4, hire an engineering consultant to perform preliminary and detailed design of the selected alternative.

RICHFIELD JOINT RECREATIONAL DISTRICT FLOW PROJECTIONS

TABLE 1

July 1, 2016

Current Flows

Description	Number of People	Flow Guide (gpd)	Total Flow (gpd)
Gund Hall			
Banquet/Meeting Facility without kitchen	300	3	900
Amty House Bed & Breakfast			
Bedrooms	2	120	240
Welcome Center			
Daytime Visitors	25	10	250
TOTAL			1,390

Future Flows

Description	Number of People	Flow Guide (gpd)	Total Flow (gpd)
Gund Hall			
Banquet/Meeting Facility with kitchen	300	7	2,100
Amity House Bed & Breakfast			
Bedrooms	2	120	240
North House Bed & Breakfast			
Bedrooms	2	120	240
Welcome Center			
Daytime Visitors	50	10	500
TOTAL			3,080

RICHFIELD JOINT RECREATIONAL DISTRICT COST PROJECTIONS

TABLE 2

July 1, 2016

Alternative No. 1

Item Description	Quantity	Unit	Unit Cost	Total Cost
Wastewater Treatment Plant	1	LS	\$ 400,000	\$ 400,000
Lining Sanitary Sewers	1	LS	\$ 150,000	\$ 150,000
Grinder Pump Station	1	LS	\$ 25,000	\$ 25,000
2-inch Force Main	500	LF	\$ 20	\$ 10,000
8-inch Gravity Sewer	200	LF	\$ 65	\$ 13,000
6-inch Wye and Lateral	300	LF	\$ 40	\$ 12,000
48-inch Manhole	2	EA	\$ 5,000	\$ 10,000
Subtotal				\$ 620,000
25% Contingency				\$ 155,000
15% Survey, Engineering, Permitting				\$ 116,250
GRAND TOTAL				\$ 891,250

RICHFIELD JOINT RECREATIONAL DISTRICT COST PROJECTIONS

TABLE 2

July 1, 2016

Alternative No. 2

Item Description	Quantity	Unit	Unit Cost	Total Cost
Wastewater Treatment Plant	1	LS	\$ 125,000	\$ 125,000
Grinder Pump Station	1	LS	\$ 25,000	\$ 25,000
2-inch Force Main	1500	LF	\$ 30	\$ 45,000
8-inch Gravity Sewer	600	LF	\$ 75	\$ 45,000
6-inch Wye and Lateral	500	LF	\$ 40	\$ 20,000
48-inch Manhole	4	EA	\$ 5,000	\$ 20,000
Subtotal				\$ 280,000
25% Contingency				\$ 70,000
15% Survey, Engineering, Permitting				\$ 52,500
GRAND TOTAL				\$ 402,500

RICHFIELD JOINT RECREATIONAL DISTRICT COST PROJECTIONS

TABLE 2

July 1, 2016

Alternative No. 3

Item Description	Quantity	Unit	Unit Cost	Total Cost
Grinder Pump Station	1	LS	\$ 25,000	\$ 25,000
2-inch Force Main	6,000	LF	\$ 25	\$ 150,000
8-inch Gravity Sewer	600	LF	\$ 75	\$ 45,000
6-inch Wye and Lateral	500	LF	\$ 40	\$ 20,000
48-inch Manhole	4	EA	\$ 5,000	\$ 20,000
Subtotal				\$ 260,000
25% Contingency				\$ 65,000
15% Survey, Engineering, Permitting				\$ 48,750
GRAND TOTAL				\$ 373,750

RICHFIELD JOINT RECREATIONAL DISTRICT COST PROJECTIONS

TABLE 2

July 1, 2016

Alternative No. 4

Item Description	Quantity	Unit	Unit Cost	Total Cost
Septic System	1	LS	\$ 32,500	\$ 32,500
Grinder Pump Station	1	LS	\$ 25,000	\$ 25,000
2-inch Force Main	1,500	LF	\$ 25	\$ 37,500
8-inch Gravity Sewer	600	LF	\$ 75	\$ 45,000
6-inch Wye and Lateral	500	LF	\$ 40	\$ 20,000
48-inch Manhole	4	EA	\$ 5,000	\$ 20,000
Subtotal				\$ 180,000
25% Contingency				\$ 45,000
15% Survey, Engineering, Permitting				\$ 33,750
GRAND TOTAL				\$ 258,750