



**Lakeview Park—
Proposed Water Quality Pond**

City of Golden Valley

**August, 2004
Bonestroo File No. 1438-04-105**

Lakeview Park-- Proposed Water Quality Pond

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I. Project Summary

Issues. This project focuses on the potential benefits and feasibility of constructing a water quality treatment pond in Lakeview Park. The City identified several issues of concern in this area, which are as follows:

- This area of Golden Valley drains to Medicine Lake directly without any water quality treatment or Best Management Practices (BMP's).
- The watershed area east of Medicine Lake is fully developed. Few opportunities remain to provide substantial water quality treatment to runoff from this area before it enters the lake.
- Low lying homes on the east side of the park have historically had flooding problems during large storm events.

This project included several steps to analyze problems in this area, and identify and evaluate options to address the water quality and flooding concerns:

- Assessment of existing land use and watershed conditions in the area
- Quantification of existing water quality and potential for improvement with proposed ponds in Plymouth and Lakeview Park in Golden Valley
- XP-SWMM modeling of the existing conditions to verify flooding conditions

Recommendations. This report summarizes the analysis, and recommends the following:

- **Based on the potential water quality benefits to Medicine Lake, construct a water quality pond in the current location of standing water within Lakeview Park**
- **Design the pond with a natural appearance that will serve as an amenity to the park and surrounding area.**

The analysis indicates that the proposed pond in Lakeview Park would provide a high level of sediment and phosphorus removal from the immediate watershed area, meeting the Bassett Creek Watershed's Level I requirements, and would substantially improve the performance of a water quality pond proposed downstream in Plymouth.

The location of the proposed water quality pond is currently all City parkland. A major portion of the park is not usable for recreational activities much of the time and difficult to maintain due to shallow standing water. This area was a wetland prior to development of the surrounding neighborhood. The proposed water quality pond would be constructed in that location.

The report also notes two issues related to development of the proposed water quality pond:

- **Constructability.** Construction plans will need to address the difficult soils in the area, and include an approach to address the asbestos-lined stormwater pipe and existing sanitary sewer pipe in the park.
- **Flooding issues.** The report identified some options to address flooding issues around the park. The City will need to evaluate the costs, advantages, and disadvantages of these options to determine whether flooding issues should be addressed along with development of the water quality pond.

II. Issues and Problems

A. Water Quality

The existing neighborhood and associated streets and storm sewer appear to have been constructed during the 1960's. Soils maps for the Lakeview Park area indicate that the area was at one time a low-lying wetland that was connected to Medicine Lake. As was standard at the time, much of the wetland area was filled to allow the construction of homes and associated streets. No features were included to provide any water quality treatment, which is also typical of development during that era.

This area of Golden Valley drains through storm sewer under Trunk Highway 169 (TH 169) into Plymouth and then into Medicine Lake. (See Figure 1). Over the years, large sediment deltas have formed at the storm sewer outlet to Medicine Lake. As a result, occasional maintenance is required to remove the sediment delta. The delta is also an indication that other pollutants, such as phosphorus, are entering Medicine Lake from this watershed. As is the case within Golden Valley, no water quality treatment exists within the watershed in Plymouth or along the TH 169 ROW.

The City of Plymouth has recently undertaken some efforts to improve the water quality entering Medicine Lake from this watershed. The City is planning to construct a water quality pond on City-owned land located just upstream from Medicine Lake. However, due to limited space, the pond is not designed to treat all the runoff from the watershed. Instead, a manhole that diverts smaller storms to the proposed water quality pond will be constructed. In this manner, the "first flush" of pollutants will be forced through the water quality basins. Modeling indicates that this configuration will remove approximately 38% of the Total Suspended Solids (TSS) and 23% of the Total Phosphorous (TP) from the runoff in the watershed. While an improvement over existing conditions, typical standards for new construction in the Bassett Creek Watershed would result in total TSS removals of 90% and TP removals of around 60%. Clearly, if more could be done to treat water in this watershed, there would be a benefit to Medicine Lake.

B. Flooding Issues

Lakeview Park is located over what was at one time a wetland that was filled during the 1960's. Filling activities raised much of the land surrounding the park to higher elevations to allow development of the current single-family homes. The natural topography also funneled most of the runoff in the area towards the park.

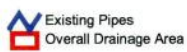
The park itself lies at the lowest elevations along the east side of TH 169. If no storm sewer existed in this area, all the water would naturally run towards the park. TH 169 is several feet higher than the park, effectively creating a closed basin if there were no storm sewer.

Storm sewer does collect runoff from the streets surrounding the park, slightly altering the drainage patterns in the area. A large storm sewer drains to the west at a relatively flat grade, under TH169, and then to Medicine Lake. This storm sewer also collects runoff from TH 169 and Plymouth before discharging to the lake.



600 0 600 Feet

Legend



City of Golden Valley
Overall Watershed Map

Lakeview Park Pond

Figure 1



June 2004



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During large storm events, water pools and ponds within the park. When this occurs, it sometimes rises to elevations that cause damage to homes located on the east side of the park. City staff reports that these homes have been flooded several times and remain an ongoing concern.

C. **Park Conditions**

Lakeview Park currently is home to several active recreational activities, such as ice-skating, soccer, basketball, and softball. However, a large portion of the park, located in the northeastern half, remains relatively unusable for active recreation. The ground in this area is often wet, and it is not unusual for shallow water to remain standing in this area for long periods of time.

Within the area of shallow water, the predominant vegetation at this time appears to be grass that is mowed when possible. The existing trees include several willow trees and several large cottonwood trees. This vegetation is typical of an area that is wet for extended periods of time.

A berm extended north to south through the central portion of the park. This berm indicates the location of existing storm sewer and sanitary sewer that run through the park.

These current conditions create an area of the park that is difficult to maintain and includes a large area that is of limited benefit to the neighborhood.

III. Goals and Options to Address the Issues

A. Project Goals

The City identified the following goals for its efforts to address the issues identified in the project area:

- Improve water quality protection for Medicine Lake
- Reduce the potential for the flooding of adjacent residents
- Create an amenity for Lakeview Park

Bonestroo staff identified potential options for meeting the goals in this area, and discussed the pros and cons of each item with City Staff. These options are described in the sections that follow.

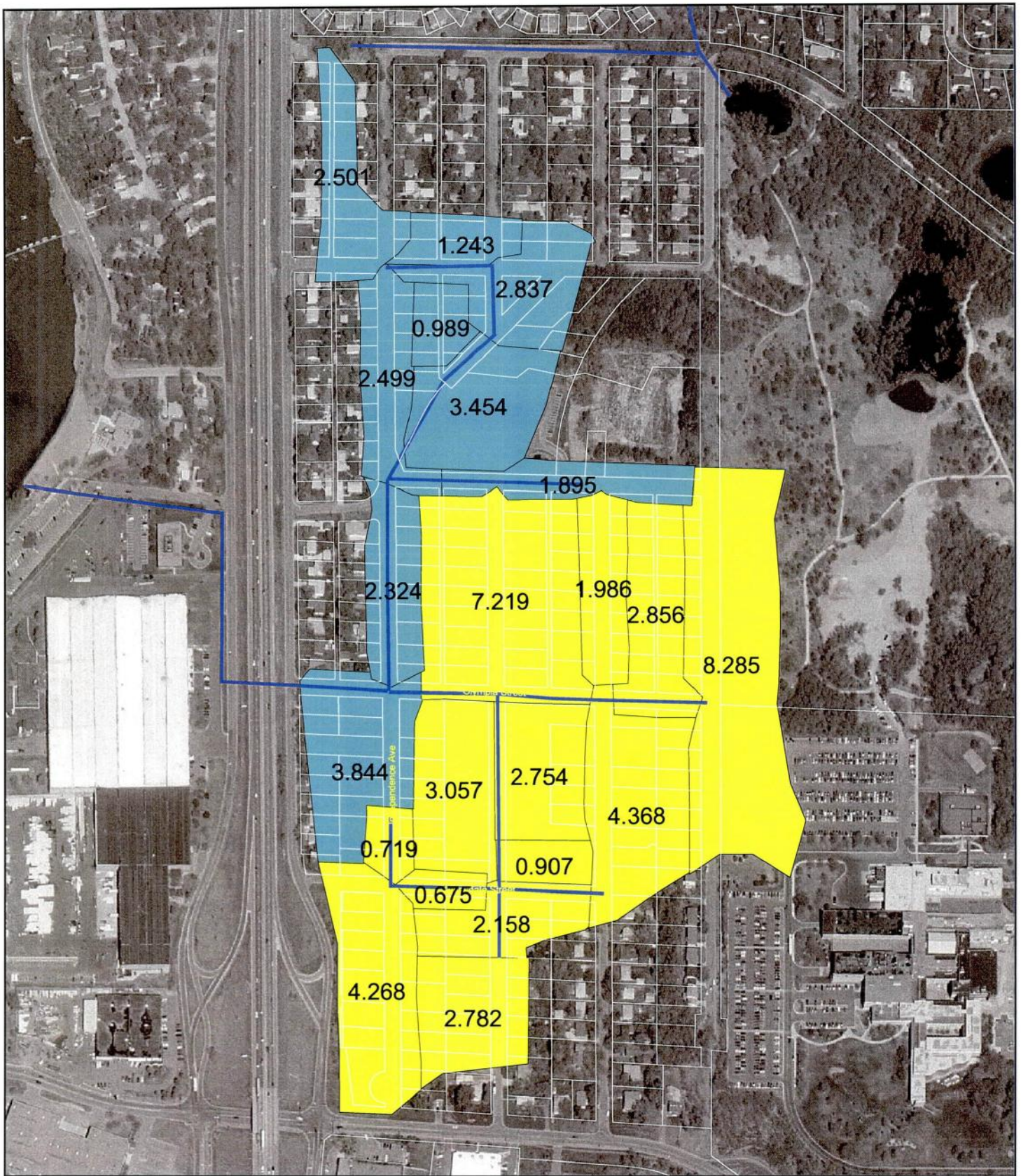
B. Proposed Water Quality Pond

If new development were to occur in this area, it would require a water quality pond that meets the Bassett Creek Watershed Management Commission's Level I Water Quality requirements. Specifically, this requires that the pond have the dead storage volume (or water quality storage volume) equal to or larger than the runoff from a 2.5" rainfall event falling over the watershed. This was used as the baseline for sizing the proposed water quality pond. While not technically required in this case, it is the City's intention to meet the Level I requirements.

The potential drainage area that could be served by the proposed water quality pond is shown on Figure 2. Based on the Bassett Creek Level I requirements, the proposed pond must have the dead storage volume equal to or greater than 3.6 acre-feet (total excavation required is approximately 6000 Cubic Yards). The preferred alignment of such a pond to maximize detention time is to have a length to width ration of 3:1. To size the pond, it was assumed the pond would have a 10:1 aquatic vegetation bench for the first foot below the normal water level (NWL), with 4:1 slopes beneath the bench to a maximum depth of 8 feet.

These calculations result in a pond with a surface area of 0.7 acres. A rough footprint of this size is shown on Figure 3. This footprint is purely shown to give an approximation of the area required to meet the Level I requirements. The pond could be designed and constructed with a more irregular, natural shape. As the figure shows, a pond meeting the Level I requirements could easily fit into the portion of the park that is not currently used for active recreational purposes. The water quality pond would not eliminate or reduce the area of the park available for active recreational pursuits.

The water quality model P8 was used to predict the impacts of constructing a water quality pond of this size. Based on treating the area shown on Figure 3, the proposed pond provides 83% TSS Removal and 52% TP removal for this drainage area. In conjunction with the pond proposed by Plymouth, the overall removal efficiencies from the entire watershed draining to Medicine Lake are raised to 51% TSS removal (an 34% increase from Plymouth's ponds alone) and 32% TP removal (a 39% increase in removals).



City of Golden Valley

Legend

Parcels
 Existing Pipes
 Approximate Drainage Boundaries
 Untreated
 Treated

XP-SWMM Drainage Boundaries

Figure 2

400 0 400 Feet







June 2004

Bonestroo
 Rosene
 Anderlik &
 Associates
 Engineers & Architects

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Legend


-  Proposed Pipes
-  Proposed Pond.shp
-  Parcels
-  Existing Pipes

City of Golden Valley
Lakeview Park Modifications

Figure 3

Figure 1

50 0 50 Feet




June, 2004

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 Rosene
 Anderlik &
 Associates**
 Engineers & Architects

The following table demonstrates the impacts of existing conditions, Plymouth's proposed ponds, and the additional impact Golden Valley's ponds could have.

Scenario	TSS to Medicine Lake (lbs/year)	% Removed	TP to Medicine Lake (lbs/year)	% Removed
Existing	47,100	0%	171	0%
Plymouth Pond Only	29,000	38%	132	23%
Plymouth and Lakeview Park Ponds	23,200	51%	117	32%

Clearly, there are benefits to constructing a water quality pond in this location.

If the size of the proposed water quality pond were increased even more, the removal efficiencies would be even higher. However, at the volume described above, additional excavation will result in proportionally smaller and smaller increases in removal efficiencies. Effectively, there is a point of diminishing returns with increased volume, and the proposed pond is reaching the upper end of removal efficiencies.

C. Flooding Impacts

To evaluate the potential impacts or benefits of constructing a water quality pond, the existing network of storm sewers and drainage areas was modeled using the software program XP-SWMM. XP-SWMM is a powerful hydrologic and hydraulic modeling tool used to evaluate storm sewer networks with potentially difficult hydraulics, such as pipe surcharging, localized street flooding, and flow reversals.

After completing the modeling, a 100-year high water level (HWL) of approximately 897.0 was found for the 100-year, SCS Type II storm with a total rainfall of 6.0 inches. Based on the contour data provided, it appears this would be sufficient to impact some of the homes located on the east side of the park.

The existing flooding condition is created by two factors. The first is the local drainage making its way into the low area. This by itself likely would not be enough to cause the observed flooding. However, in conjunction with the pipes downstream of the pond surcharging and reversing flow, water that makes its way to the low area cannot drain until the downstream pipe system has capacity. Effectively, the water is held in place and forced back into the low area until the peak flows from TH 169 and Plymouth pass through the system. The combination of the two factors causes the existing flooding problems.

In order to reduce flooding in this situation, there are four ways to "fix" or reduce flooding. They are, in no particular order, reduce the drainage area to the problem, install a bigger outlet to remove the water faster, provide additional flood storage, or remove the problematic structures.

In this case, reducing the drainage area is not an option. The drainage area that affects the flooding in this area is effectively everything tributary to the outlet pipe to Medicine

Lake. Simply reducing the direct drainage area to the park does not fix the surcharging problem there today. It also runs contrary to the idea to providing water quality treatment for as large an area as possible.

Installing a bigger outlet is possible as rate control is not an issue for this pond. Medicine Lake is immediately downstream which provides more than enough rate control for Bassett Creek. However, the required pipes would be large. The existing pipes are 54" equivalent arch pipes for much of the way, and these would need to be enlarged. The fact that they are arch pipes suggests that ground cover over the pipes is a concern, and larger pipe may not be feasible from that standpoint. Installing larger pipes would also require jacking beneath TH 169 and enlarging pipes in Plymouth. Essentially, the pipe would need to be replaced all the way from Lakeview Park to Medicine Lake.

Increasing the storage area is a possibility within the park. In some cases, this can be accomplished by lowering the normal water level of the low area. In this case, the invert of the pipes leaving the park is only about a foot lower than the existing outlet invert. This small increase in storage is not sufficient to dramatically lower water levels. If more storage is desired, this could be accommodated by using more of the active recreation areas of the park or by acquiring and removing the adjacent homes with flooding issues, and enlarging the proposed pond.

As a final alternative, the flooding problem could be addressed by removing the homes with openings below the high water level, while creating no additional storage.

Given conditions in the study area, creation of a water quality pond in the proposed location would not change the 100- year high water level. The dead storage created in the water quality pond (storage below the normal water level) does little to increase flood storage.

Thus, the proposed water quality pond would do little to reduce the potential for flooding in the area. Flooding could be addressed, by 1) increasing the size of the outlet pipes, 2) increasing the storage area of the pond by expanding it into the area devoted to active recreation or existing structures, or 3) purchase and removal of affected structures.

D. The Pond as a Park Amenity

Water quality ponds are frequently designed as amenities in new neighborhoods. The pond proposed for Lakeview Park could serve as an amenity to the park and surrounding development or redevelopment. Space is available in the low, wet area of the park to create an attractive pond, add plantings, and perhaps a walking path around the pond that will enhance the park and provide additional passive recreation for neighborhood residents. At the same time, the City could consider the need for redesign or renovation of other areas in the park to meet current and future needs of the neighborhood.

The pond could be extended into low areas in the northwest portion of the park, to create a pond with natural shape. This would require removal of existing storm water pipes and relocation of the existing sanitary sewer pipes within the park, and reconstruction of the existing pathway.

Residents are often concerned that ponds may serve as mosquito-breeding areas. Research related to West Nile Virus and stormwater management facilities suggests that wet meadows or semi-permanent wetlands are the ideal conditions for mosquito development, and that typical storm water ponds with large areas of open water are poorer habitat for mosquito breeding. This research suggests that elimination of the damp meadow area in the park and replacement with a permanent area of open water may be of benefit in eliminating a prime mosquito breeding location as well as providing water quality benefits to Medicine Lake and additional passive recreation for the neighborhood. (Ramsey-Washington Metro Watershed District, *West Nile Virus and Stormwater Management*, July 2003)

E. Potential Issues

There are three constructability issues that the City should consider when in designing a water quality pond in this location: 1) the condition of the existing soils, 2) the presence of asbestos materials in some of the existing storm sewer, and 3) the existing sanitary sewer line within the park.

Record plans for the storm sewer serve as an indicator of the soils under the park, as do the soils maps. The soils maps show the presence of wetland soils, and the storm sewer record plans show that nearly all the pipe in the park was placed on pilings to support it in the soft soil.

This suggests that the soils in the area of the proposed pond may have difficulty supporting heavy loads, such as earthmoving equipment. It is likely that any pond excavation work would need to be completed during the winter under frozen ground conditions, which can support heavier loads. Thus, the timing of pond excavation should be considered in scheduling any project.

The second issue is the presence of Asbestos Bonded Corrugated Metal Pipe. The storm sewer running through the park is all made of this material, while the pipes in the surrounding streets are all reinforced concrete. This pipe material was used in the park as the soils were poor and corrugated metal pipe is lighter, and thus "floats" better in the poor soils. The asbestos bonding was used to provide resistance to corrosion.

While relatively uncommon, the asbestos bonded corrugated metal pipe is present here according to record plans. In general, there are two ways to deal with this material—work around it and avoid disturbance, or remove it.

The first option is to work around the pipes. In this case, an existing manhole in the park could be modified to reroute stormwater into the new water quality pond, rather than only serving as a drain from the existing shallow water area. The section south of the manhole would remain in use, and the section north would be bulk-headed and left in place. The outlet from the water quality pond would connect to the existing concrete pipe north of the park.

Removal of the asbestos bonded CMP, would substantially increase the costs of the proposed project (see cost estimate). A trained crew would be required to remove the hazardous materials safely and dispose of them properly. The advantage of this approach is that it would permanently eliminate a potential problem from the park. The disadvantage is the extra cost associated with removal of the asbestos material. The

City can evaluate the alternatives and chose to avoid or remove the asbestos bonded CMP if it moves forward with design and construction of the proposed pond.

If the City chooses to design the pond to extend to the low area in the northwest portion of the park, across the existing storm sewer and sanitary sewer lines, it would need to remove both the storm sewer and sanitary sewer pipes. The storm sewer pipe could be removed permanently and disposed, as described in the preceding paragraph. The sanitary sewer could be removed and replaced to the east near the back property lines of the homes on Gettysburg Avenue. The cost of removing the existing pipe and replacing this service is included in the cost estimate on page 13.

IV. Conclusions, Cost Estimate and Next Steps

Based on the analysis and discussions completed for this project, the following improvements are recommended to address the problems identified in the area and meet the City's goals:

- Construct a water quality pond in Lakeview Park to meet the enhance water quality in Medicine Lake
- The pond should be sized to meet the Bassett Creek Watershed District's Level I standards for the area
- The pond should be designed as an amenity to the park and surrounding neighborhood

The estimated cost of creating the proposed pond and restoring the park is approximately \$145,670, including contingencies, engineering and administration. The cost estimate is shown on the next page. If costs are incurred to remove the asbestos pipe and remove and relocate the sanitary sewer pipe along with construction of the pond, the total estimated project cost is \$416,990.

The following additional issues should be considered in sizing and completing a final design for the proposed pond:

- Obtain the actual low entry elevations of the adjacent residences to determine how susceptible to flooding they are
- Consider options to increase the size of the pond or purchase and remove threatened structures to reduce flooding concerns in the area
- Consider winter excavation of the pond due to difficult soil conditions.

LAKEVIEW PARK POND

GOLDEN VALLEY

BRAA File No. 1438-04-105

PRELIMINARY COST ESTIMATES

ITEM	UNIT	QTY	UNIT PRICE	TOTAL
POND AND RESTORATION				
POND EXCAVATION	CY	5,000	\$10.00	\$50,000.00
INLET STRUCTURES	EA	3	\$1,000.00	\$3,000.00
PIPE	LF	100	\$40.00	\$4,000.00
OUTLET STRUCTURE	EA	1	\$5,000.00	\$5,000.00
TRAIL RESTORATION AND EXPANSION	LF	1,300	\$16.00	\$20,800.00
RESTORATION & PLANTINGS				
Native Seed	AC	1.25	\$5,000.00	\$6,250.00
Trees	EA	30	\$300.00	\$9,000.00
Shrubs	EA	100	\$40.00	\$4,000.00
Wetland plants	EA	200	\$10.00	\$2,000.00
SUBTOTAL				\$104,050.00
10% CONTINGENCIES				\$10,405.00
30% ENGINEERING AND ADMINISTRATION				\$31,215.00
SUBTOTAL POND				\$145,670.00
PIPE REMOVAL AND DISPOSAL				
ASBESTOS STORM PIPE REMOVAL				
Pipe removal	EA	600 ft.	\$8,000.00	\$8,000.00
Wrapping for transport	EA	600 ft.	\$3,000.00	\$3,000.00
Transport and Disposal	EA	600 ft.	\$3,000.00	\$3,000.00
SANITARY PIPE REMOVAL AND REPLACEMENT				
Mobilization	LS	1	\$20,000.00	\$20,000.00
Clearing	Tree	3	\$350.00	\$1,050.00
Grubbing	Tree	3	\$250.00	\$750.00
Rem Bit Pavement	SY	400	\$5.00	\$2,000.00
Rem Conc C&G	LF	70	\$10.00	\$700.00
Rem Exist Sew Pipe	LF	625	\$10.00	\$6,250.00
Rem Exist MH/CB	EA	1	\$200.00	\$200.00
Crushed Rock for Stab	TON	50	\$20.00	\$1,000.00
8" DIP	LF	715	\$50.00	\$35,750.00
12" RC Pipe, CL5	LF	15	\$40.00	\$600.00
Const CG Des 2'x3'	EA	1	\$800.00	\$800.00
Const MH Des F	EA	2	\$2,000.00	\$4,000.00
Helical Piling	LF	980	\$30.00	\$29,400.00
Pipe caps	EA	14	\$1,500.00	\$21,000.00
MH Foundation	EA	1	\$1,500.00	\$1,500.00
Connect to Exist MH	EA	2	\$500.00	\$1,000.00
C&G Replacement	LF	70	\$15.00	\$1,050.00
Type 41 Bit Patch Mix	Ton	110	\$75.00	\$8,250.00
Sodding w/4" Topsoil	SY	11000	\$4.00	\$44,000.00
Relocate Exist Park Sign	LS	1	\$500.00	\$500.00
SUBTOTAL				\$193,800.00
10% CONTINGENCIES				\$19,380.00
30% ENGINEERING & ADMINISTRATION				\$58,140.00
TOTAL PIPE REMOVE/REPLACE				\$271,320.00
GRAND TOTAL FOR PROJECT				\$416,990.00

Lakeview Heights Sanitary Sewer Relocation

Spec No.	Description	Units	Est. Quan	Unit Price	Amount
	Mobilization	LS	1	\$20,000.00	\$20,000.00
	Clearing	Tree	3	\$350.00	\$1,050.00
	Grubbing	Tree	3	\$250.00	\$750.00
	Rem Bit Pavmnt	SY	400	\$5.00	\$2,000.00
	Rem Conc C& G	LF	70	\$10.00	\$700.00
	Rem Exist Sew Pipe	LF	625	\$10.00	\$6,250.00
	Rem Exist MH/CB	EA	1	\$200.00	\$200.00
	Crushed Rock for Stab	TON	50	\$20.00	\$1,000.00
	8" DIP	LF	715	\$50.00	\$35,750.00
	12" RC Pipe, CL5	LF	15	\$40.00	\$600.00
	Const CG Des 2' x 3'	EA	1	\$800.00	\$800.00
	Const MH Des F	EA	2	\$2,000.00	\$4,000.00
	Helical Piling	LF	980	\$30.00	\$29,400.00
	Pile Caps	EA	14	\$1,500.00	\$21,000.00
	MH Foundation	EA	1	\$1,500.00	\$1,500.00
	Connect to Exist MH	EA	2	\$500.00	\$1,000.00
	C&G Replacemt	LF	70	\$15.00	\$1,050.00
	Type 41 Bit Patch Mix	Ton	110	\$75.00	\$8,250.00
	Sodding w/ 4" Topsoil	SY	11000	\$4.00	\$44,000.00
	Relocate Exist Park Sign	LS	1	\$500.00	\$500.00
	Const Cost				\$179,800.00
	10% Contingencies				\$17,980.00
	30% Admin				\$59,334.00
	Project Total				\$257,114.00