Prior Lake-Spring Lake Watershed Storage and Infiltration Study

Wenck File #1242-31

Prepared for:

Prior Lake-Spring Lake
Watershed District

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1.1 Introduction and Purpose

The Prior Lake-Spring Lake Watershed District Board of Managers is interested in increasing infiltration and stormwater storage in the upper watershed as a means of better managing water levels in Prior Lake and volumes of flow through its outlet to the Minnesota River.

This study identified potential locations for stormwater or infiltration ponding, with a priority given to potential locations within the areas identified by the City of Prior Lake for near future annexation. The Board of Managers and the District Administrator will consult with Scott County, the Scott County Soil and Water Conservation District, and the City of Prior Lake to determine if these identified locations are feasible and to develop a strategy for acquisition and management of key locations.

1.2 Methodology

This study was primarily a GIS analysis of topography, soils, bedrock sensitivity, land use, wetland status, potential annexation areas, and property ownership in the watershed. Spatial and other data were obtained from the City of Prior Lake, Scott County, the Metropolitan Council, and the Department of Natural Resources and used to identify locations that might be suitable for storage and infiltration basins.

The analysis focused on areas that were currently undeveloped or used for agriculture, under the assumption that those would be most likely to redevelop and provide an opportunity for acquisition. Another key distinction was current land cover. Sites that were currently forested were not considered, under the assumption that maintaining that land cover was of higher watershed and ecological priority.

The analysis was generally conducted using the following steps:

1. Land use review. The Metropolitan Council Year 2000 Land Use shapefile was used to identify areas currently undeveloped or agricultural.
2. Topographic review. A two-foot contour shapefile from Scott County was used to find low lying spots in the undeveloped or agricultural areas identified above. Other areas were also briefly reviewed to determine if there were any notable low lying areas in land uses other than undeveloped or agricultural.
3. General review. Potential areas identified through the steps above were then inspected more closely using 2003 aerial photography, wetland data, and Scott County parcel data to refine the area boundaries so they took into account realistic conditions such as property lines, proximity to structures, location relative to wetlands, ditches, or storm sewers, etc. Figure 1 illustrates some of the factors considered in the analysis.
4. Volume analysis. Using contour and soils information, each potential site was analyzed for potential storage and infiltration volumes.

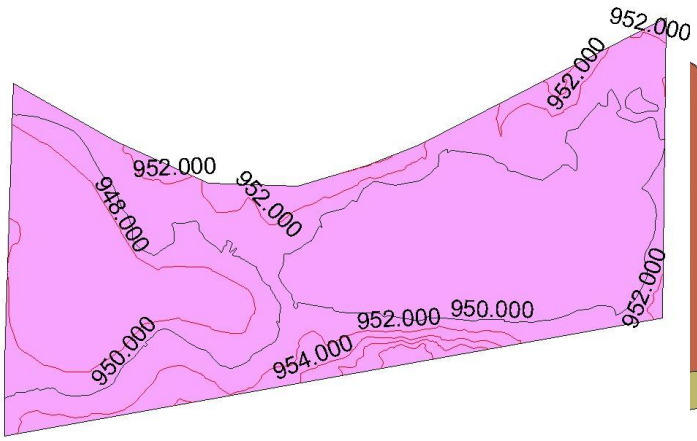

Figure 2: Contours were analyzed for each identified area.

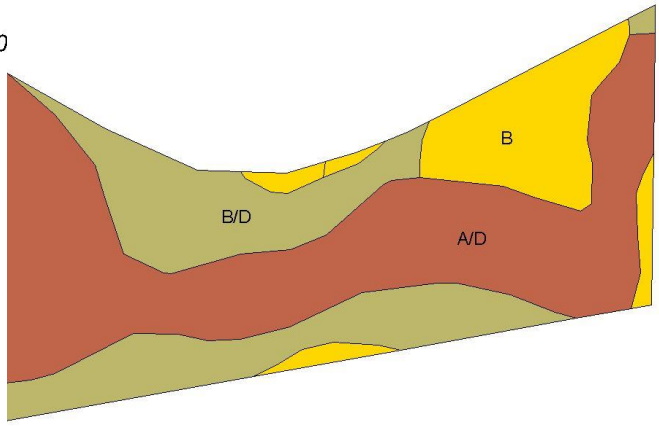

Figure 3: Soil hydrologic group data were reviewed to determine potential for infiltration.

5. Prioritization. Figures 4 and 5 illustrate the 46 areas identified using the analysis steps above. As a final step, prioritization factors were developed to identify high priority areas for further consideration:

   - Upcoming annexation
   - At least 10 acres in size
   - Limited number of property owners
   - Storage at least 2 feet deep
   - Potential for wetland banking credits

Table 1
Prioritization Factors By Area
Within Annexation Area

Area Number	Area (Acres)	# Owners	Annex Year	Wetland Status	Potential Depth (feet)	Comments
1	3.9	1	2006	Type 1	2-4	Not farmed
2	2.4	1	2006	Part type 3	4-6	Not farmed
3	5.3	1	2006	Part type 3	2-4	Not farmed
4	10.7	1	2006	Type 3	2-4	Not farmed
5	4.5	1	2014	Upland	2-4	Farmed
6	10.9	2	2010	Part type 3	2-6	
7	8.6	1	2010	Upland	2-4	
8	5.2	7	2024	Mostly type 1, small type 3, 6	2-4	
9	2.9	6	2024	Type 3	2-4	
10	34.8	3-4	2012	Small type 1	2-8	Farmed
11	38.8	2-3	2012	Largely type 3 with some type 1	2-4	Hwy 13 wetland
12	32.5	2	2012	Half upland, some type 1, some type 3	2-4	Farmed
13	6.2	1	2014	Some type 3	2-10	
14	7.3	3	UEXA	Type 3	2	

Table 2
Prioritization Factors By Area
Outside of Annexation Area

Area Number	Area (Acres)	# Owners	Wetland Status	Potential Depth (feet)	Comment
1	29.1	2	Part type 1	2-4	Currently farmed
2	5.3	2	Upland	2-4	
3	9.6	2	Part upland, type 1, type 3	4	Currently partly farmed, receives ag drainage
4	3.4	1	Mostly type 3, some type 1, upland	2-4	Currently partly farmed, receives ag drainage
5	24.2	3	Mostly type 1, 3, 7	4-6	
6	27.3	2	Part type 3	2	Currently unfarmed
7	8.4	2	Mostly type 3	2-4	Mostly unfarmed
8	15.6	3	Mostly type 3 and type 1	4-6	Currently partly farmed, receives ag drainage
9	12	3	Some type 3	2	Mostly unfarmed, receives ag drainage
10	7.2	2	Some type 3	2	Mostly unfarmed, receives ag drainage
11	13	2	Mostly type 1	2-4	
12	57.3	6	Mostly type 3 and type 1	2-4	
13	18	1	Mostly type 3 and type 1	2-4	
14	57.6	5-6	Mostly type 3 and type 1	2-4	
15	11.7	1	Some type 1	2-4	Receives ag runoff to Fish Lake
16	6.6	2	Mostly upland, some type 3	2-6	
17	7.3	1	Half upland, half type 3	2	
18	3.5	2	Mostly type 3, some upland	2	
19	3.5	3	Mostly type 3, some upland	2-4	
20	6.2	3	Mostly type 3, some type 1	2	Mostly unfarmed, receives ag drainage
21	2	1	Half upland, half type 3	4	Mostly unfarmed, receives ag drainage
22	2.5	4	Half upland, half type 3	2-4	Mostly unfarmed, receives ag drainage
23	3.2	2	Mostly type 3	2	Mostly unfarmed, receives ag drainage
24	9.3	2	Mostly type 3, some upland, type 7	4	
25	22.6	3	Mostly type 3, type 7	4	
26	17.9	3	Mostly type 3, 7	2-4	
27	16.5	1	Mostly type 3	2	
28	16.4	5	Mostly type 3	2-4	
29	4.3	1	Mostly type 3, some upland, type 4	2	
30	53.1	5	Complex with type 1, 3, 5, 6	2-4	
31	47.7	9	Mostly type 3 and type 1	2	
32	19.1	1	Mostly type 3 and type 1	2-4	

1.3 Findings

One of the significant findings of the study is that only a few sites in the study area could provide any significant additional infiltration as for the most part the soils in the upper watershed have poor infiltration potential. Most of the potential storage sites are currently wetlands, either seasonal or shallow marshes, or were previously wetlands that in the past were tiled for agriculture. Several of those sites could potentially be restored for wetland banking credits similar to the Sandey wetland banking project undertaken in 2003-04.

Based on the prioritization factors identified above, the 46 potential sites were reduced to fifteen key sites shown on Figure 6. Some of the best potential sites would also be the most difficult to implement as they would require assembly from numerous property owners. However, among the key sites are some that could provide significant storage as well as potentially treat agricultural runoff.

The process identified the following priority areas for further consideration. While other areas may be considered if an opportunity arose, these areas ranked highest based on a combination of cost effectiveness, administrative simplicity, and watershed impact.

Table 3
Estimated Storage and Infiltration Volume
Priority Areas

Area Number	Surface Area (Acres)	Estimated Storage Volume (Acre-Ft)	Estimated 72 hr Infiltration (Acre-Ft)
Within Annex Area			
1	3.95	6.79	1.77
2	2.35	5.57	0.54
3	5.29	9.84	2.94
4	10.71	14.49	10.54
5	4.5	8.64	2.62
10	34.80	81.32	25.25
11	38.82	120.64	251.49
12	32.45	83.34	30.23
Outside Annex Area			
1	29.12	86.46	11.03
6	27.34	65.88	23.06
7	8.43	16.36	15.12
8	15.56	41.00	15.86
9	12.01	15.24	3.38
10	7.15	18.69	7.48
15	11.65	20.09	15.19