

CAMPUS GROUNDWATER CONSERVATION PLANNING COMPREHENSIVE FINAL REPORT

PREPARED BY THE METROPOLITAN CONSERVATION DISTRICTS



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PROGRAM OVERVIEW

Historically, most of the Twin Cities Metropolitan Area (TCMA) population relied on surface water as the primary drinking water source. Since the early 1980s, the TCMA has transitioned to most of the population (~70%) relying on groundwater as the primary drinking water source. Because groundwater is a limited resource, practicing sustainable use and implementing conservation practices where possible are important for meeting current and future needs.

Opportunities for the public to conserve water are frequently discussed, particularly for individual homeowners. Water efficient fixtures and appliances are readily available and recommended. If significant reductions in water use are possible in individual residential settings, commercial and institutional settings can offer even greater potential. The Campus Groundwater Conservation Planning (CGCP) initiative implements a standardized protocol on large commercial and institutional campuses to identify and rank potential water conservation best management practices. While protocols currently exist for completing such efforts, widespread application of the protocols and implementation of the identified water conservation practices or modified behaviors is limited.

The Metropolitan Conservation Districts (MCD), through funding provided by a Clean Water Fund Accelerated Implementation Grant, created this CGCP protocol by adapting multiple existing protocols with the ultimate goal of water conservation project implementation. The CGCP protocol can be implemented by Soil and Water Conservation District (SWCD) staff throughout the state and produces a list of prioritized water conservation project opportunities. Project opportunities are ranked by cost-effectiveness and achieve water conservation through both reduced use as well as increased groundwater recharge. The straightforward work products produced by the CGCP protocol empower campus decision makers to confidently implement cost-effective water conservation projects.

The CGCP protocol provides a detailed analysis of all water using systems on a campus, both indoor and outdoor. Generally, commercial and institutional water use can be divided into four categories: water use meters and leak detection, domestic indoor, non-domestic indoor, and outdoor. The protocol ensures water using equipment in each category is analyzed for water conservation potential.

The CGCP protocol was implemented on 21 campuses throughout the 11-county TCMA with at least one analysis occurring in each county (Figure 1 and Table 1). The original grant application promised 11 analyses, ideally one in each county.

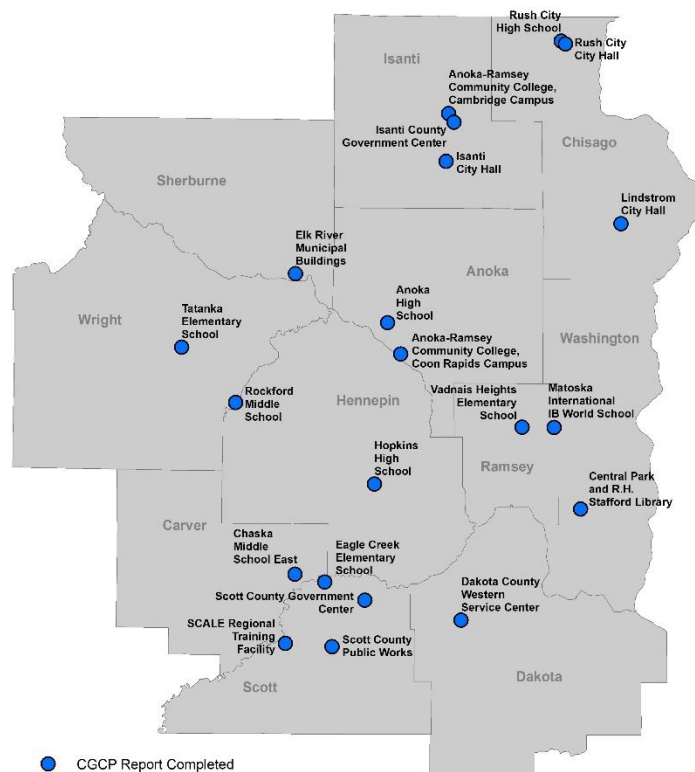


Figure 1: Locations of completed CGCP analyses throughout the 11-County TCMA

Table 1: Names and locations of completed CGCP analyses throughout the 11-County TCMA

County	Campus Name	City	Address
Anoka	Anoka High School	Anoka	3939 N 7th Ave, Anoka, MN 55303
Anoka	Anoka-Ramsey Community College, Coon Rapids Campus	Coon Rapids	11200 Mississippi Blvd, Coon Rapids, MN 55433
Carver	Chaska Middle School East	Chaska	1600 Park Ridge Dr, Chaska, MN 55318
Chisago	Lindstrom City Hall	Lindstrom	13292 Sylvan Ave, Lindstrom, MN 55045
Chisago	Rush City City Hall	Rush City	325 S Eliot Ave, Rush City, MN 55069
Chisago	Rush City High School	Rush City	51001 S Fairfield Ave, Rush City, MN 55069
Dakota	Dakota County Western Service Center	Apple Valley	14955 Galaxie Ave, Apple Valley, MN 55124
Hennepin	Hopkins High School	Minnetonka	2400 Lindbergh Dr, Minnetonka, MN 55305
Isanti	Anoka-Ramsey Community College, Cambridge Campus	Cambridge	300 Spirit River Dr S, Cambridge, MN 55008
Isanti	Isanti City Hall	Isanti	110 1st Avenue Northwest, Isanti, MN 55040
Isanti	Isanti County Government Center	Cambridge	555 18th Ave SW, Cambridge, MN 55008
Ramsey	Matoska International IB World School	White Bear Lake	2530 Spruce Pl, White Bear Lake, MN 55110
Ramsey	Vadnais Heights Elementary School	Vadnais Heights	3645 Centerville Rd, Vadnais Heights, MN 55127
Scott	Eagle Creek Elementary School	Shakopee	6855 Woodward Ave, Shakopee, MN 55379
Scott	SCALE Regional Training Facility	Jordan	17706 Valley View Dr, Jordan, MN 55352
Scott	Scott County Government Center	Shakopee	200 4th Ave W, Shakopee, MN 55379
Scott	Scott County Public Works	Jordan	600 Country Trail E, Jordan, MN 55352
Sherburne	Elk River Municipal Buildings	Elk River	13065 Orono Pkwy NW, Elk River, MN 55330
Washington	Central Park and R.H. Stafford Library	Woodbury	8595 Central Park Pl, Woodbury, MN 55125
Wright	Rockford Middle School	Rockford	6051 Ash St, Rockford, MN 55373
Wright	Tatanka Elementary School	Buffalo	703 8th St NE, Buffalo, MN 55313

Targeted and selected campuses were required to be publicly owned and use groundwater as a water source. Initial outreach efforts to campuses were also prioritized based on campus age, with older campuses having a higher likelihood of inefficient fixtures.

Cumulatively, the 21 analyses identified significant opportunities for conserving groundwater and saving money. Potential projects from all campuses were compiled in a master spreadsheet, and summary statistics are presented in the tables below. A total of 2,043 potential projects were identified that would cumulatively save over 113 million gallons over the estimated life of the projects, which averages 8.4 years (Table 2). Not all 2,043 of the projects are financially favorable because the required payback period of some projects exceeds the project's lifespan.

Table 2: Summary of all projects

County and Campus	Number of Projects Identified	Total Cost of Recommended Actions	Total Net Savings (Water + Energy) Over Life of Projects	Average Lifespan of Projects (Years)	Total Water Savings Over Life of Projects (Gallons)
Anoka	486	\$100,246.00	\$135,459.96	8.6	43,123,724
Anoka High School	224	\$47,750.00	\$34,695.16	8.2	15,687,024
Anoka Ramsey Community College, Coon Rapids - Main Campus	221	\$44,694.00	\$94,929.02	9.0	25,032,822
Anoka Ramsey Community College, Coon Rapids - Professional Training Center	12	\$2,074.00	-\$423.01	8.5	292,468
Anoka Ramsey Community College, Coon Rapids - Visual Arts Center	29	\$5,728.00	\$6,258.78	8.8	2,111,409
Carver	150	\$11,670.00	\$31,820.00	7.6	4,694,844
Chaska Middle School East, Chaska	150	\$11,670.00	\$31,820.00	7.6	4,694,844
Chisago	171	\$27,301.00	\$28,905.07	8.6	6,740,258
Lindstrom City Hall	21	\$4,548.00	\$295.48	8.9	387,361
Rush City City Hall	19	\$4,175.00	-\$1,955.27	8.9	280,310
Rush City High School	131	\$18,578.00	\$30,564.86	8.6	6,072,587
Dakota	52	\$23,400.00	\$22,776.45	8.6	6,336,376
Dakota County Western Service Center, Apple Valley	52	\$23,400.00	\$22,776.45	8.6	6,336,376
Hennepin	283	\$70,500.00	-\$1,548.78	8.6	11,557,095
Hopkins High School	283	\$70,500.00	-\$1,548.78	8.6	11,557,095
Isanti	180	\$32,511.00	\$19,571.96	8.2	4,730,875
Anoka Ramsey Community College, Cambridge	103	\$17,493.00	\$12,831.10	7.9	2,975,978
Isanti City Hall and Community Center	26	\$5,279.00	-\$2,138.12	8.7	233,341
Isanti County Government Center	51	\$9,739.00	\$8,878.98	8.6	1,521,557
Ramsey	170	\$36,209.93	\$45,224.04	8.8	12,030,842
Matoska International IB World School	84	\$11,991.80	\$25,362.17	8.4	5,860,465
Vadnais Heights Elementary School	86	\$24,218.13	\$19,861.87	9.1	6,170,377
Scott	230	\$30,463.00	\$15,975.04	8.4	9,135,067
Eagle Creek Elementary School	107	\$16,706.00	\$5,377.49	8.3	3,648,331
SCALE Regional Training Facility	64	\$10,276.00	\$6,765.07	8.1	1,152,508
Scott County Government Center	41	\$2,817.00	-\$121.59	9.0	4,014,564
Scott County Highway Department	18	\$664.00	\$3,954.07	8.7	319,664
Sherburne	64	\$15,836.00	-\$2,189.03	8.3	1,459,698
Elk River Municipal Buildings	64	\$15,836.00	-\$2,189.03	8.3	1,459,698
Washington	86	\$13,322.00	\$3,702.21	8.2	3,747,504
Woodbury Central Park and R.H. Stafford Library	86	\$13,322.00	\$3,702.21	8.2	3,747,504
Wright	171	\$46,025.00	\$97,383.39	8.3	9,795,409
Rockford Middle School	71	\$18,950.00	\$44,956.59	8.5	5,363,995
Tatanka Elementary School	100	\$27,075.00	\$52,426.80	8.1	4,431,414
Grand Total	2043	\$407,483.93	\$397,080.30	8.4	113,351,693

Table 3 shows all projects with a positive net financial savings (i.e. the payback periods for the projects are shorter than the estimated lifespan of the projects, so implementation results in a net financial savings). There are 1,182 such projects that cumulatively reduce water use by over 101 million gallons over the estimated lifespan of the projects, which averages 8.6 years. Implementing all 1,182 projects would cost approximately \$250,000, but the net savings over the life of the projects is over \$485,000.

Table 3: Summary of projects with a positive net financial savings (i.e. payback period shorter than lifespan of project)

County and Campus	Number of Projects Identified	Total Cost of Recommended Actions	Total Net Savings (Water + Energy) Over Life of Projects	Average Lifespan of Projects (Years)	Total Water Savings Over Life of Projects (Gallons)
Anoka	345	\$70,997.00	\$151,782.23	8.8	40,784,807
Anoka High School	113	\$26,950.00	\$48,706.59	8.6	14,470,805
Anoka Ramsey Community College, Coon Rapids - Main Campus	200	\$38,876.00	\$96,666.57	8.9	24,287,218
Anoka Ramsey Community College, Coon Rapids - Professional Training Center	5	\$75.00	\$105.40	7.0	23,100
Anoka Ramsey Community College, Coon Rapids - Visual Arts Center	27	\$5,096.00	\$6,303.68	8.7	2,003,684
Carver	111	\$7,140.00	\$33,128.00	6.8	4,398,028
Chaska Middle School East, Chaska	111	\$7,140.00	\$33,128.00	6.8	4,398,028
Chisago	102	\$17,815.00	\$35,594.25	8.9	6,458,148
Lindstrom City Hall	9	\$1,561.00	\$2,067.92	8.3	280,727
Rush City City Hall	4	\$698.00	\$762.06	8.5	180,890
Rush City High School	89	\$15,556.00	\$32,764.27	8.9	5,996,531
Dakota	22	\$14,550.00	\$29,795.29	9.9	6,115,340
Dakota County Western Service Center, Apple Valley	22	\$14,550.00	\$29,795.29	9.9	6,115,340
Hennepin	89	\$21,400.00	\$20,244.82	8.4	6,883,233
Hopkins High School	89	\$21,400.00	\$20,244.82	8.4	6,883,233
Isanti	101	\$19,061.00	\$28,092.82	8.7	4,400,606
Anoka Ramsey Community College, Cambridge	43	\$8,437.00	\$17,922.90	9.0	2,698,460
Isanti City Hall and Community Center	7	\$885.00	\$1,290.94	7.9	180,589
Isanti County Government Center	51	\$9,739.00	\$8,878.98	8.6	1,521,557
Ramsey	89	\$28,806.72	\$48,922.85	9.8	11,637,725
Matoska International IB World School	45	\$9,797.80	\$26,825.03	9.5	5,760,280
Vadnais Heights Elementary School	44	\$19,008.92	\$22,097.82	10.1	5,877,445
Scott	107	\$15,738.00	\$24,710.12	9.0	6,890,740
Eagle Creek Elementary School	37	\$9,038.00	\$9,663.90	9.2	3,096,932
SCALE Regional Training Facility	38	\$5,627.00	\$10,023.37	8.5	1,062,888
Scott County Government Center	19	\$636.00	\$935.21	10.0	2,417,244
Scott County Highway Department	13	\$437.00	\$4,087.64	8.8	313,676
Sherburne	27	\$3,710.00	\$6,385.13	9.4	1,102,614
Elk River Municipal Buildings	27	\$3,710.00	\$6,385.13	9.4	1,102,614
Washington	45	\$6,309.00	\$8,133.71	8.0	3,173,590
Woodbury Central Park and R.H. Stafford Library	45	\$6,309.00	\$8,133.71	8.0	3,173,590
Wright	144	\$43,580.00	\$98,649.81	8.4	9,704,969
Rockford Middle School	47	\$16,550.00	\$46,200.46	9.0	5,274,407
Tatanka Elementary School	97	\$27,030.00	\$52,449.35	8.1	4,430,562
Grand Total	1182	\$249,106.72	\$485,439.04	8.6	101,549,801

Nearly 200 of the projects had estimated payback periods of less than one year. Implementation of these projects would save over 15 million gallons of water over the estimated lifespan of the projects and requires an investment of just over \$7,500. That initial investment is recouped within the first year, and over the lifespan of the projects, an additional \$100,000 would be saved in water and energy costs.

Table 4: Summary of projects with a simple payback period of less than one year

County and Campus	Number of Projects Identified	Total Cost of Recommended Actions	Total Net Savings (Water + Energy) Over Life of Projects	Average Lifespan of Projects (Years)	Total Water Savings Over Life of Projects (Gallons)
Anoka	74	\$2,006.00	\$25,603.30	7.5	4,455,214
Anoka High School	11	\$550.00	\$7,263.52	8.6	1,394,568
Anoka Ramsey Community College, Coon Rapids - Main Campus	51	\$1,276.00	\$16,932.30	7.4	2,857,366
Anoka Ramsey Community College, Coon Rapids - Visual Arts Center	12	\$180.00	\$1,407.48	7.0	203,280
Carver	36	\$1,170.00	\$23,891.95	6.0	2,632,346
Chaska Middle School East, Chaska	36	\$1,170.00	\$23,891.95	6.0	2,632,346
Chisago	3	\$99.00	\$1,925.72	7.0	193,975
Rush City City Hall	1	\$33.00	\$391.06	7.0	45,123
Rush City High School	2	\$66.00	\$1,534.67	7.0	148,852
Dakota	3	\$1,050.00	\$13,801.59	10.0	2,054,162
Dakota County Western Service Center, Apple Valley	3	\$1,050.00	\$13,801.59	10.0	2,054,162
Hennepin	8	\$400.00	\$2,851.02	7.0	358,025
Hopkins High School	8	\$400.00	\$2,851.02	7.0	358,025
Isanti	3	\$96.00	\$1,126.98	10.0	129,828
Anoka Ramsey Community College, Cambridge	3	\$96.00	\$1,126.98	10.0	129,828
Ramsey	13	\$916.69	\$11,016.08	8.6	1,803,607
Matoska International IB World School	10	\$889.00	\$10,192.77	9.1	1,720,398
Vadnais Heights Elementary School	3	\$27.69	\$823.31	7.0	83,209
Scott	32	\$1,189.00	\$6,975.11	9.5	2,861,551
Eagle Creek Elementary School	1	\$33.00	\$256.32	7.0	33,055
SCALE Regional Training Facility	7	\$359.00	\$2,492.32	8.7	169,575
Scott County Government Center	19	\$636.00	\$935.21	10.0	2,417,244
Scott County Highway Department	5	\$161.00	\$3,291.26	9.4	241,677
Sherburne	4	\$138.00	\$1,663.33	8.5	196,561
Elk River Municipal Buildings	4	\$138.00	\$1,663.33	8.5	196,561
Wright	22	\$505.00	\$14,204.02	6.5	728,373
Rockford Middle School	2	\$30.00	\$751.60	7.0	37,633
Tatanka Elementary School	20	\$475.00	\$13,452.42	6.5	690,740
Grand Total	198	\$7,569.69	\$103,059.09	7.6	15,413,641

Irrigation systems often represent the largest single water use category on a campus. While detailed irrigation audits (e.g. catch can tests) were beyond the scope of this effort, potential reductions in groundwater use associated with increased efficiency of irrigation systems were considered.

Table 5 provides a summary of campus irrigation systems, including whether one was present at the time of the analysis, the current average annual use, and the potential annual reduction associated with increased efficiency. The total annual use for irrigation is estimated to be 28,128,189 gallons across the 12 campuses on which irrigation systems were present and usage was analyzed. Estimated potential annual water use reductions totaled 12,953,655 gallons, which represents a 46% reduction. Additional details on each of the systems are available in the individual reports.

Table 5: Campus irrigation system summary

County	Campus Name	City	Irrigation System (Y/N)	Annual Average Use (gallons)	Potential Annual Reduction (gallons)	Notes
Anoka	Anoka High School	Anoka	Y	9,900,000	4,455,000	
Anoka	Anoka-Ramsey Community College, Coon Rapids Campus	Coon Rapids	Y	9,140,000	4,113,000	
Carver	Chaska Middle School East	Chaska	Y	-	-	Irrigation water supplied by reuse pond
Chisago	Lindstrom City Hall	Lindstrom	N	-	-	
Chisago	Rush City City Hall	Rush City	N	-	-	
Chisago	Rush City High School	Rush City	N	-	-	
Dakota	Dakota County Western Service Center	Apple Valley	Y	1,503,333	-	System actively managed, only supplement about 10"/year
Hennepin	Hopkins High School	Minnetonka	Y	4,850,000	3,395,000	
Isanti	Anoka-Ramsey Community College, Cambridge Campus	Cambridge	Y	-	-	Separate well - system not analyzed
Isanti	Isanti City Hall	Isanti	Y	184,322	127,182	
Isanti	Isanti County Government Center	Cambridge	Y	40,000	-	System actively managed
Ramsey	Matoska International IB World School	White Bear Lake	N	-	-	
Ramsey	Vadnais Heights Elementary School	Vadnais Heights	Y	552,250	165,675	
Scott	Eagle Creek Elementary School	Shakopee	Y	-	-	Separate well - system not analyzed
Scott	SCALE Regional Training Facility	Jordan	Y	264,000	132,000	System was audited using the catch can method
Scott	Scott County Government Center	Shakopee	Y	189,000	-	System use meets water conservation standards
Scott	Scott County Public Works	Jordan	N	-	-	
Sherburne	Elk River Municipal Buildings	Elk River	Y	1,023,284	511,642	
Washington	Central Park and R.H. Stafford Library	Woodbury	Y	420,000	54,156	
Wright	Rockford Middle School	Rockford	Y	62,000	-	System actively managed
Wright	Tatanka Elementary School	Buffalo	N	-	-	

FINAL DELIVERABLES

The following deliverables are organized in order of occurrence throughout the CGCP process and presented in appendices. They include everything from initial planning presentations among district and county staff to the final reports.

Level 1 Member Meeting Presentations - APPENDIX A

SWCD and county staff from the 11-County TCMA gathered to set the direction for the CGCP initiative (Table 6). Two meetings were held to determine workload distribution, develop a task force to assist with protocol development, and review proposed protocol materials.

Table 6: Level 1 members

Organization	Name	Title
Anoka Conservation District	Chris Lord	District Manager
Anoka Conservation District	Mitch Haustein	Stormwater and Shoreland Specialist
BWSR	Dan Fabian	Board Conservationist
Hennepin County	Randy Anhorn	Land and Water Unit Supervisor
Isanti SWCD	Tiffany Determan	District Manager
Ramsey County	Ann WhiteEagle	SWCD Director
Scott SWCD	Troy Kuphal	District Director
Sherburne SWCD	Francine Larson	District Manager
Washington Conservation District	Jay Riggs	District Manager

TAC Meeting Presentations - APPENDIX B

A 13 member TAC was assembled to assist with guiding development of the CGCP protocol. The TAC consisted of the SWCD and non-SWCD members shown in Table 7.

Table 7: TAC members

Level 1 SWCD CGCP Task Force Members		
SWCD	Name	Title
Anoka	Mitch Haustein	Conservation Specialist
Isanti	Tiffany Determan	District Manager
Ramsey	Andrea Prichard	Environmental GIS Technician
Scott	Troy Kuphal	District Manager
Sherburne	Daniel Cibulka	Water Resource Specialist
Washington	Jay Riggs	District Manager
Non-SWCD CGCP Task Force Members		
Organization	Name	Title
Anoka-Hennepin School District	Doug Bonar	Sites and Grounds Supervisor
Metropolitan Council	Brian Davis	Senior Engineer, Water Supply Planning
Minnesota Technical Assistance Program (MnTAP)	Mick Jost	Team Leader & Senior Scientist
Scott County	Tim McGovern	Facilities Manager
Minnesota DNR	Carmelita Nelson	Water Conservation Consultant
Washington County Department of Public Health & Environment	Stephanie Grayzeck Souter	Associate Planner
City of Woodbury	Jim Westerman	Utilities Supervisor/Environmental Resource Coordinator

Staff Trainings - APPENDIX C

Three CGCP protocol trainings were provided to SWCD and county staff.

Campus Application - APPENDIX D

Prior to implementing the CGCP protocol on a campus, an application was submitted to the host district (ACD) for campus approval. A basic overview of the proposed campus and required funding details (i.e. grant and match) were presented.

Protocol - APPENDIX E

The CGCP protocol document outlines all steps necessary for implementation on a selected campus. The protocol is a 10-step process.

Protocol Summary - APPENDIX F

This document provides a one-page overview of the 10-step CGCP protocol.

Promotional Handout - APPENDIX G

When recruiting campuses for participation, this one-page summary can be used to introduce campus staff to the CGCP initiative.

Initial Data Request Form - APPENDIX H

Prior to beginning the on-site data collection step, this document should be reviewed and populated by campus staff to ensure proper preparation for the on-site data collection effort.

On-Site Data Collection Forms - APPENDIX I

These documents were developed to streamline the on-site data collection process. Forms exist for all water using equipment that are typically encountered.

Spreadsheet Calculators - APPENDIX J

Following the on-site data collection step, data are entered into the corresponding spreadsheet calculators to develop estimates of water use based on the measurements and population data obtained.

Final Reports - APPENDIX K

All 21 CGCP reports are presented in this appendix.