Clear Lake Watershed Storm Water Improvement Project

Final Report (Revised)

Watershed Name: Clear Lake Watershed

Grant Agreement Number: 5035-012

Soil and Water Conservation District: Hancock

Reporting Period: January, 2008 – December, 2008

Date Report Prepared: May 19, 2009

Name and Title of Reporting Individual: David Knoll – CLEAR Project Coordinator

Practices and Activities:

A total of 12 storm water outlet sites were investigated to determine the most cost effective BMP at each site, which exceeded the grant application goal of 10 sites. Storm water BMPs were installed at a total of 10 outlet sites, which was twice that of the grant application goal of 5 sites. In addition to the practices that were installed, all activities were completed as stated in the grant agreement. Meetings took place throughout the length of the project to keep partners on task. More than 30 presentations were given to local community groups regarding lake restoration efforts that included information on the storm water improvements. Several newspaper articles mentioned the storm water improvements, including a feature in the Des Moines Register. All reporting required by WIRB was submitted in a timely manner.

Table 1. Practice Implementation

Practice or Activity	Unit	Approved Application Goal	Accomplishments	Percent Completion
Storm water BMP Investigation	Outlet sites	10	12	120%
Storm water BMP Installation	Outlet sites	5	10	200%

Financial Accountability:

An additional 5 for storm water improvement treatments were installed over what was planned in the grant application. The additional improvements led to more funds expended by partners and more funding partners than in the application, as shown in table 2. This provided a cost share ratio of 43% WIRB and 57% partner funding. Therefore, the WIRB funding dollars leveraged even greater amounts of partner funding than was expected and allowed for more storm water improvements to be completed. A total of 6 funding partners participated in the program, consisting of local, state, and federal agencies. All WIRB funding was fully expended.

Table 2. Total Project Funding

Funding Source	Approved Application Budget ($ cash)	Total Funds Expended ($ cash)	Difference ($ cash)
WIRB	225,000	225,000	0
City of Clear Lake	70,000	109,765	(39,765)
Cerro Gordo County	50,000	35,369	14,631
City of Ventura	0	1,932	(1,932)
EPA 319	50,000	78,224	(28,224)
EPA 66.606	55,000	54,961	39
Iowa DNR	0	17,239	(17,239)
Totals	**450,000**	**522,490**	**(77,508)**

Watershed Improvement Fund contribution:
Approved application budget: 50%
Actual: 43%

Line item expenditures were nearly identical to the grant agreement, a difference of only $37 between the two line items took place as indicated in table 3.

Table 3. WIRB Expenditures

Grant Agreement Budget Line Item	**Total Funds Approved ($)**	**Total Funds Expended ($)**	**Available Funds ($)**
Storm Water Investigation	42,000	42,037	(37)
Storm Water BMP Installation	183,000	182,963	37
Totals	**225,000**	**225,000**	**0**
Difference			**0**

The WIRB grant application stated that a storm water improvement would be considered cost effective if there was an estimated 5 lbs of phosphorus removal for each $50,000 expended. Of the ten sites installed, six of the sites met this requirement while 4 did not. The four sites that did not meet the requirement were very close to the cost effective ratio, and they also consisted of sites that were deemed high priority, so it was determined to move forward with installation. Two of the twelve sites did not have cost effective alternatives and were not deemed high priority, therefore they were not installed. In general, outlet sites with a drainage area of 5 acres or more were considered high priority. This is due to the fact that previous water sampling completed during the Clear Lake Storm Water Management Plan (2000) showed a strong correlation between the drainage area size and the amount of pollutant loading at the outlet site.

Environmental Accountability:

The three primary contaminants that the storm water improvements were designed to reduce were phosphorus, bacteria and suspended solids. Although there were no specific goals listed in the application for contaminant reductions, it was mentioned that the BMPs were expected to remove about 80% of Total Suspended Solids (TSS), 67% of Total Phosphorus (TP) and up to 97% of coliform bacteria from storm water runoff in the drainage area they treated. No water monitoring was conducted on the improvements that were installed due to the fact that previous monitoring of similar storm water improvements in the Clear Lake watershed could be utilized to determine the expected results of the environmental benefits the new practices had.

Table 4 below shows that the estimated removal rates for the storm water improvement projects installed did meet the expected goals of removal for TSS and TP. As a result of the improvements, nearly 15 tons of sediment and over 48 pounds of phosphorus are being kept out of Clear Lake annually. Bacteria reduction was not estimated, however previous research has shown that nearly all bacteria is removed where infiltration of storm water takes place (infiltration trenches, rain gardens), while sites without infiltration (grit collection) provide little to no reduction in bacteria. Other pollutants such as hydrocarbons are also removed by the installed practices, but a lack of data does not allow us to make estimates on the amounts removed.

Reduction amounts for TSS and TP were estimated using a combination of data from water monitoring of storm water runoff and storm water BMPs that previously took place in the Clear

Lake watershed. The studies used to determine the amounts of contaminants in storm water runoff were the Clear Lake Storm Water Management Plan (2000), The Clear Lake Diagnostic and Feasibility Study (2001), and the Infiltration Trench Assessment Report for Clear Lake City Beach (2003). These studies included: a one rain event snap shot sampling at all 68 outlet sites; a one season, ten rain event, sampling at one outlet site; and a two season, roughly 20 rain event, sampling at about 40 outlet sites. These studies indicated that TSS loading typically ranged from about 250 to 350 lbs/acre/year and TP typically ranged from 0.5 to 0.75 lbs/acre/year depending on the land use of the drainage area. Engineers determined the drainage area size and land use for each outlet investigated and then applied the most likely corresponding TSS and TP loading rate. Reduction amounts for TSS and TP were then determined by using data collected during the Infiltration Trench Assessment Report for Clear Lake City Beach (2003), and also by certified reduction rates from the manufacturers of the grit collection chambers. This data was combined with hydrological data that determined what percentage of the annual rain events would be captured by the storm water improvement. The final result was a reduction rate that was generally in the 80% range for TSS and 70% range for TP.

Table 4. Contaminant Removal Estimates

Site Number	**Drainage Area**	**BMP Type***	**Est. Annual TSS Removal lbs.**	**Est. Annual TSS Removal %**	**Est. Annual Tot P Removal lbs.**	**Est. Annual Tot P Removal %**
A1	7.6	GC & IT	1,700	82	4	80
B2	3.2	GC & IT	700	84	1.5	82
B8	16.6	GC	3,500	84	7	70
D9	17.0	GC	4,800	84	9	70
D11	11.6	GC	3,100	81	5	70
E1	12.2	GC & IT	2,850	85	6.5	80
F5	0.9	RG	150	60	0.4	60
G4	12.2	GC	2,800	84	6	70
H8	4.5	GC	1,000	84	2	70
M1	48.5	VS	9,200	70	7	30
TOTAL	**134.3**		**29,800**	**80**	**48.4**	**68**

*BMP Type Codes: GC = Grit Collection; IT = Infiltration Trench; RG = Rain Garden; VS = Vegetated Swale

Program Accountability:

The storm water improvement project was only one part of a large scale lake restoration effort at Clear Lake. Lake restoration work has focused on making improvements in watershed developed areas, watershed agricultural areas, Ventura Marsh, and Clear Lake. Several activities took place to move lake restoration forward during the time of this WIRB grant. These activities included wetland restoration, shoreline stabilization, rough fish removal, and lake dredging.

The original grant agreement was only for a two year time period, but the project took a full three years to complete. Part of the reason for this was the large amount of time it took to follow all the necessary procedures that is necessary when spending public funds and installing practices on city and county owned property. It was learned that it took nearly a full year

between when engineering and design of the practice began until construction would commence. The other reason the project was extended was due to the fact that bids on the improvement projects came in under the engineer's estimates, which allowed funding to be available for more improvements.

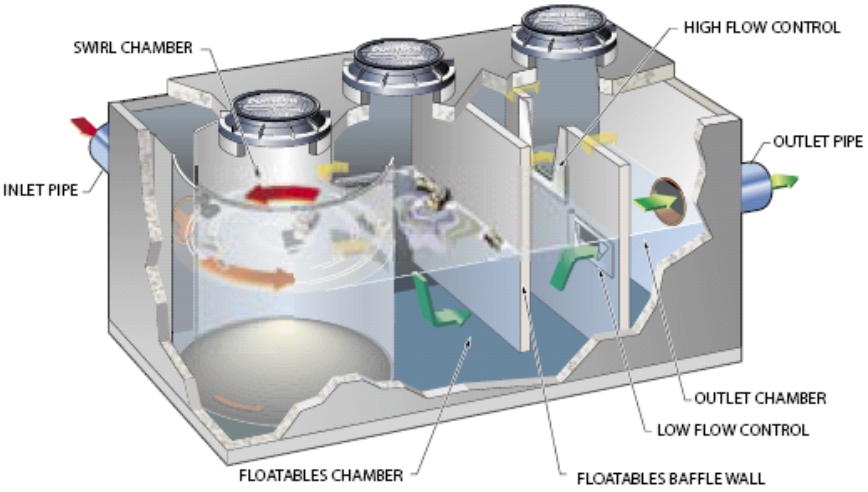
This project could certainly be replicated by other communities. The main piece of background information that needs to be in place is a ranking of storm water outlets around the lake for pollutant loading amounts. This will allow a community to target the most critical areas, which WIRB is more likely to fund. With this data and hopefully a WIRB grant in hand, the next step is to perform engineering and design work on the outlets to determine the most cost effective treatment alternative at each outlet site. In our case, we utilized a private engineering firm as city and county engineers did not have experience with this type of work. After engineering is completed and cost estimates are determined, the city council or board of supervisors can determine which practices at which outlets to collect bids on. All aspects of the bidding procedure were performed by the engineering firm. The low bids were accepted and the improvements moved into the construction phase. The engineering firm continued to be retained to oversee construction, payments, and process the construction close out information. This was beneficial in making sure the project was completed as designed.

A limitation to the WIRB process is requiring a final report to be submitted prior to the release of the final 10% of funding. This makes it very difficult to fully complete the project when significant funding is not available to the applicant. It also makes it difficult to complete the final report because the project is not actually finalized since not all funds have been made available for expenditure. WIRB may want to consider implementing a draft final report policy due a few months prior to the project end date so funds can be released at that time if the draft report is satisfactory. A revised final report can then be submitted after the project is completed.

Practice Installation Pictures:

Grit Collection Chamber (Site G4)

Grit Collection Chamber (Site H8)



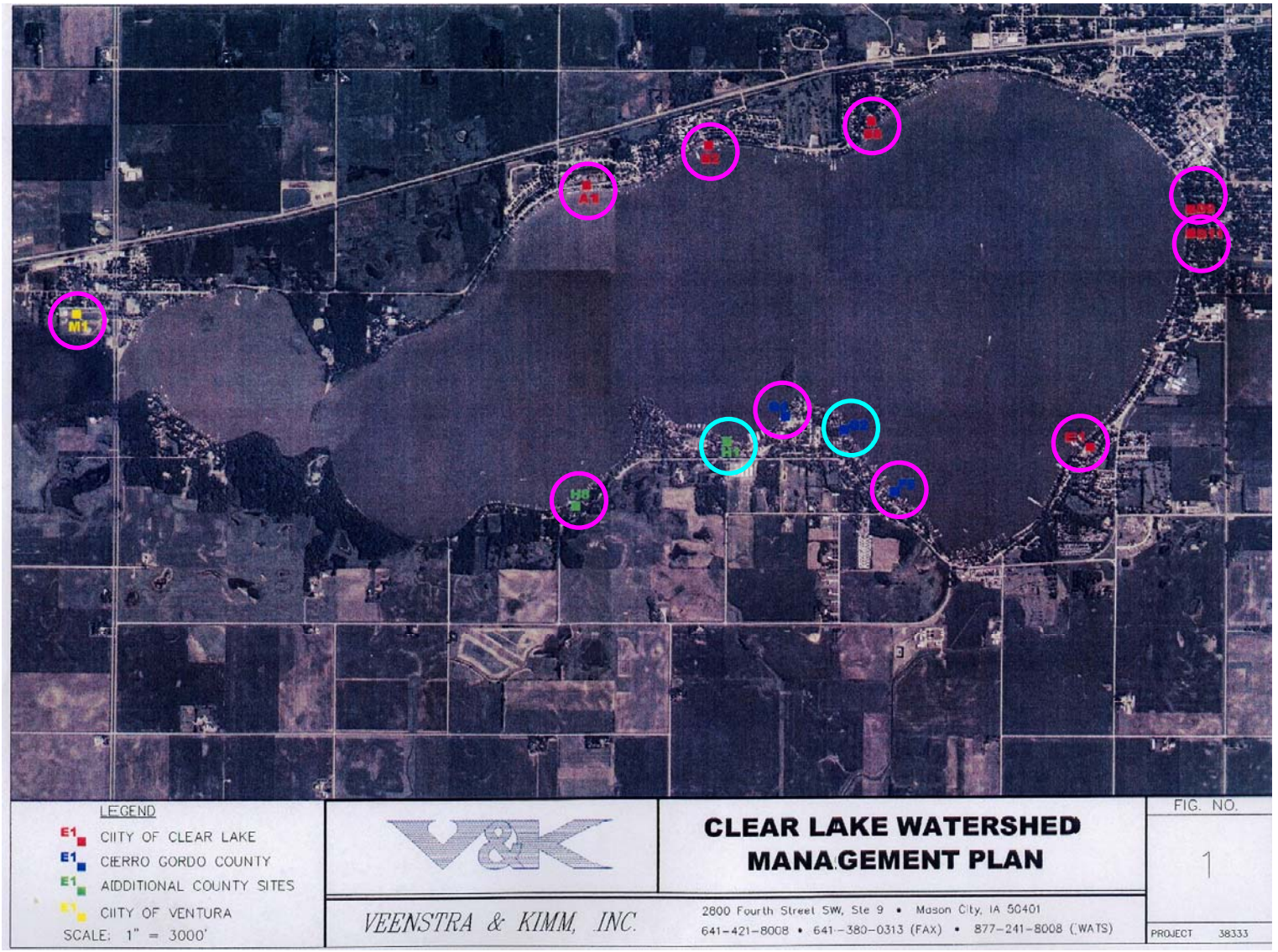
Grit Collection Chamber Diagram

Vegetated Swale (Site M1)

Infiltration Trench (Previous Project)

Rain Garden (Site F5)

Map of Storm Water Improvement Investigations and Implementation



Pink circles indicate storm water outlet sites that both an investigation and an improvement took place on.
Blue circles indicate storm water outlet sites that an investigation took place on but not improvement was installed.