

Watershed Improvement Review Board Grant Request

Project Title: Storm Lake Water Quality Project
Grant Applicant: Buena Vista Soil & Water Conservation District

Narrative:

Project Purpose

The purpose of this project is to install two infiltration/detention basins to capture 80 acres of urban runoff from the City of Alta. Currently, there is no management plan for this runoff. The city has grown, and so has its runoff problems. This runoff consists of both residential and industrial sources. The adjacent picture shows where urban runoff flows onto agricultural land, which in turn flows to Storm Lake.



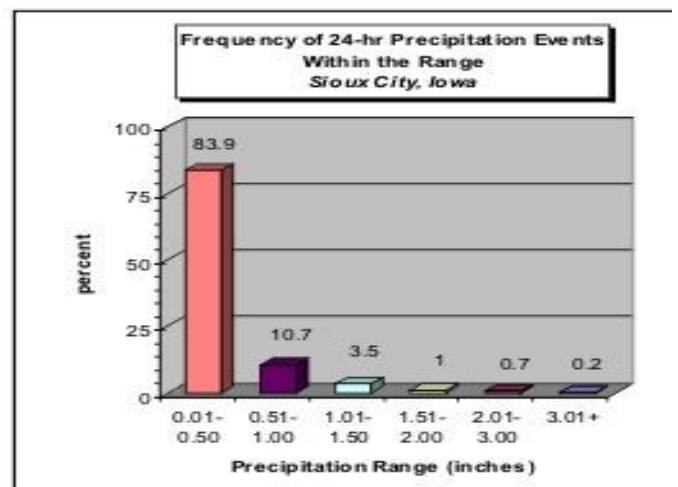
There are approximately 130 acres of the City of Alta's stormwater that flows into Powell Creek, the main tributary that drains into Storm Lake. This project will address 80 acres of urban runoff that drains from the City of Alta through the Alta Municipal Utility (AMU) subdivision. This project will reduce pollution entering Storm Lake from parking lots, streets, lawns, commercial and industrial areas in Alta. A large assortment of pollutants flow from these areas, examples include various forms of sediment, paper, plastic, gravel and metal as well as less visible potentially toxic pollution from lawns, streets, gas stations and other commercial and industrial areas.

Background information and justification of project design

The goal of stormwater management has been focused on flood control in the past. Flood control detention basins are installed to temporarily impound runoff from large storms. The release of detained water is managed to prevent downstream flooding. Flood control basins generally do not provide water quality protection since they don't manage runoff from small rainfall events. The vast majority of annual precipitation comes as small rains. It is the frequent, small rainfall events that transport most of the pollutants that move in stormwater runoff. It is the runoff from these small storms that need to be managed to protect water quality.

Flood control basins typically are designed to impound runoff from a 100 year storm (~7"/24 hours). They typically throttle down the release of impounded runoff to the equivalent runoff that would be generated by a 5 year storm (about 4"/24 hours). Runoff from smaller rainfall events moves through a standard detention basin as if it were not there. The new storm water management paradigm includes managing stormwater to protect water quality. This is primarily

Rainfall data from 1948 through 2004 is summarized in the bar graph. About 94% of rainfalls in the past were 1"/24 hours or less and 99.8% of rainfall would be less than most flood control basin would manage.



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accomplished through infiltration-based practices designed to manage the frequent, small rainfall events.

Project Assessment Factors:

1. Accountability:

The Buena Vista County Soil and Water Conservation District (SWCD) will be accountable for the financial responsibilities of this project funded through the Watershed Improvement Review Board grant program. The Buena Vista County SWCD has managed both local and state financial programs for many years. The SWCD has maintained money raised for the local SWCD through various ongoing fund raisers and donation programs. The SWCD board also administers the EPA 319 funds for the Storm Lake watershed project as well as other watershed funds. The board meets monthly to review financial business and has regular audits completed.

2. Assessment:

Runoff from the City of Alta carries urban debris onto agricultural land adjacent to Alta. The local agricultural producers have ongoing problems with plugged tile intakes and washed out waterways due to this urban runoff. Pollution from Alta's urban area as well as sediment from gully erosion caused by high velocity urban runoff onto ag land, is carried either as surface water or through tile intakes and subsurface drains directly into Powell Creek and then Storm Lake (*see appendix for photos*).

The City of Alta is laid out in a way that does not allow for retro-fitting in the urban watershed area. The City of Alta understands this problem, and has purchased potential development land adjacent to the northeast side of the City. This is also the proposed location for the infiltration/detention basin that will address their urban runoff problem for 80 acres of the City. The City will not allow commercial development of this land until this project is fully designed, implemented and functioning correctly (*see NRCS map in appendix for AMU subdivision location in watershed*).

The natural resource being protected is Storm Lake. It is a 3,147 acre natural lake, which includes a 200 acre marsh called Little Storm Lake. The lake's drainage area including the City of Alta is 13,770 acres. The City of Alta contributes 260 acres to the lakes watershed. Storm Lake is listed on the Clean Water Act 303d impaired waters list due to sedimentation problems. Storm Lake has received funding from Federal, State and local sources for continued dredging of the lake and watershed protection showing the concern for protecting this valued natural resource (*see NRCS map in appendix for watershed location*).

A natural resourced-based economic development project, called Project AWAYSIS, is the result of Storm Lake's Water Quality initiative. This is a \$30 million project to enhance the lakefront and encourage vacationers to spend time in the area. It is also an effort to retain and encourage new business for the area and provide a healthy community to live and raise a family.

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3. Goals:

The goal for this project is to construct two infiltration/detention basins to protect water quality and reduce the peak volume of the City of Alta's urban runoff (*see drawings by Kuehl and Payer, LTD in appendix*).

Each basin is designed with two functions: Control gully erosion and surface erosion with detention, while incorporating water quality through infiltration. The downstream erosion control provided by detaining runoff will reduce sediment delivery to Powell Creek and protect downstream agricultural land from urban runoff. The infiltration features designed into the basins will capture pollutants commonly associated with urban stormwater runoff (hydrocarbons, particulate matter, heavy metals, nutrients, etc). Microbial activity in the soil profile will breakdown urban pollutants. With installation of infiltration/detention basins, 10% of the AMU subdivision is devoted to impervious infiltration practices.

Each basin will contain a subsurface infiltration system. As stormwater enters the infiltration basin, it will percolate through the ground into an infiltration trench. A tile is in the base of the trench, designed to convey the stormwater out of the system. Since the stormwater is being transported underground, surface and gully erosion seen in previous years will no longer be a problem (*see appendix for photos*). Surrounding the tile is a layer of aggregate topped with wood chips. This infiltrating drain will filter the stormwater and remove sediment and other debris from the watershed. Previously road sand, gravel, and salt have been found in the tile lines and sediment structure on the adjacent agricultural land (*see appendix for photos*).

Compaction is always an issue in construction zones. In order to maintain infiltration and porosity of the soil, we are improving soil quality of each of the basins as construction is completed. Six inches of the top soil will be removed before construction is started. Once the basins are installed, we will spread two inches of wood chips on the subsoil and complete deep tillage to incorporate the organic matter into the soil profile. Nitrogen will also be incorporated to prevent a high carbon to nitrogen ratio, and aid in the decomposition of the wood chips. The goal is to increase soil organic matter content, pore space and increase permeability by improving soil structure. After the subsoil is amended, the top six inches of top soil will be replaced.

The importance of well managed and properly installed lot by lot erosion control practices will be stressed to lot purchasers in the subdivision. In order to keep the infiltration functions of the basins, excess sediment should be prevented from silting in these basins. Annual maintenance will be required by the City of Alta to remove any sediment that may be trapped in the basins. Annual maintenance will keep the basins functioning at maximum capacity.

Seeding of the basins will include both cool season and native grasses. Until the AMU subdivision is fully developed, it is suggested that cool season grasses be planted in the bottom of the basin. Natives will be planted on the berms of the infiltration/detention basins. After lot development, the City of Alta is encouraged to plant natives in the bottom of the basin to maintain soil quality and high infiltration rates over time.

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4. Results:

Alta's plans to control the urban runoff are based on approved engineering practices and designs. The design work for the detention/infiltration basins is being completed by the engineering firm of Kuehl and Payer, LTD located in Storm Lake. This project will fully treat 60% of Alta's urban runoff from the north half of town. The amount of unfiltered urban water flowing from Alta will be cut by more than half. After implementation, urban runoff that currently flows unrestricted off of impervious urban surfaces will collect in one of two basins, infiltrate through an organic digestion system, then release slowly through a subsurface drain. Outflows will be cleaned up, cooled off, and released slowly to mimic groundwater discharge. The completion of this project will be a major accomplishment for the Storm Lake Watershed project.

In conjunction this project, the adjacent land owners will be working with the 319 project coordinator to improve and replace the existing waterways. They are eligible for State cost share through Public Owned Lakes.

PROJECT TIMELINE:

The City of Alta must approve the final project designs through city council meetings and get bids on the various components of the project. They will start layout and construction October 1, 2006. Once the berms are completed, they will be seeded with native grasses in late November 2006. In the spring after March 1, 2007, they will plant the cool season grasses in the infiltration/detention basins. All partners will continue to monitor progress in the following year to ensure function of the basins. Annual maintenance by the Alta Municipal Utilities will be performed annually on each basin to ensure the maximum infiltration and capacity.

5. Collaboration:

The Alta City Council is to be commended for stepping up and requesting help from the local Buena Vista Soil and Water Conservation District and NRCS. Possible solutions were presented to the City Council and they took the initiative to become part of the solution instead of avoiding the problem. The resulting plan is a product of collaboration with Alta City Council, SWCD, NRCS and Kuehl and Payer engineering firm as well as downstream agricultural landowners and operators.

Collaborative efforts for this application as well as many other watershed activities are the result of the following groups working together for a common goal in our watershed.

- Buena Vista Soil and Water Conservation District
- City of Alta
- Storm Lake Lake Preservation Association
- Storm Lake Lake Improvement Commission
- EPA Section 319 Watershed Coordinator
- City of Storm Lake
- Buena Vista County Supervisors
- USDA NRCS

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- Iowa Lakes Resource Conservation & Development
- Iowa DNR
- Water for Iowans
- Pheasants Forever
- Iowa State University
- Ag Partners LLC

6. Leveraging & Cost Effective

Urban runoff from the City of Alta has been an unaddressed concern and priority of the Storm Lake Water Quality project for several years. Until the creation of the Watershed Improvement Review Board grant program a project such as this was difficult to initiate and implement because partnering funding sources were unavailable. With a funding opportunity such as the WIRB grant it becomes possible to open lines of communication, and begin to collaborate with groups to develop a plan to solve the water quality problem described in this request.

Leveraging for this project is coming from several sources. The City of Alta, the Mortensen Family, and Ag Partners will share approximately sixty five percent of the cost of this overall project. Assistance from the water quality coordinator comes through the SWCD from EPA 319 funding. NRCS has provided technical assistance through the Urban Resource Conservationist and additional assistance is also being provided by the Iowa Lakes RC&D.

All parties involved with this project feel that this is the best, most cost-effective and community supported solution to the urban runoff problem and will provide major benefits to the quality of Storm Lake.

7. Project Monitoring:

Because of the leadership and collaboration of ongoing efforts several mechanisms already exist to review special projects within the Storm Lake Watershed. Existing review committees include the 319 advisory board, the Lake Improvement Commission, the Lake Preservation Association and the Iowater monitoring program.

Monitoring specific to this proposed project would include Iowater currently being implemented downstream in Powell Creek. The detention structure will be cleaned periodically. During these cleanouts the amount of trapped solids in the structure will provide another measure of how the structure is functioning. Finally, landowners downstream from these structures will be watching outlet flow very carefully to quantify reduction of sediment delivery, volume of surface runoff, and erosion problems on their lands from urban runoff.

8. Public Outreach:

Special outreach activities to be carried out include an Urban Field Day for city officials and others interested in the project. Information and education will be implemented through several approaches that already exist because of the ongoing water quality efforts. These include: Lake Preservation Association newsletters, 319 watershed newsletters, the City of Alta's website altaiowa.com and Storm Lake Water Quality

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website at www.slwaterquality.com. Storm Lake Storm Water outreach and two local newspapers also provide good coverage of watershed projects.

9. *Innovation:*

The decision by local officials to collaborate on this project and tailor it to their needs makes this project special. As more and more work is done addressing urban runoff, people and communities will embrace this sort of resource management approach. This will be the first “infiltration basin” installed in the State of Iowa, combining new infiltration strategies for water quality protection with traditional detention strategies for flood control. The Alta project will be a good example of how urban runoff can be planned for and managed.