



Project Summary

The Anoka Conservation District (ACD) completed a Rice Lake stormwater retrofit assessment for the Rice Creek Watershed District (RCWD) that identified cost-effective stormwater BMPs. As a result, eleven curb-cut rain gardens were installed in a residential neighborhood within the RL-13 catchment, and two were installed within the RL 5 catchment. The rain gardens will reduce the degradation of Rice Lake by infiltrating stormwater runoff that would have otherwise drained untreated to Rice Lake.

Project promotion and construction oversight was conducted by ACD staff with funding from RCWD. Project designs were completed by Metro Landscape Restoration Program staff with project dollars provided by ACD and the Clean Water Fund (CWF) from the Clean Water, Land and Legacy Amendment. Long term maintenance will be conducted by the landowners under an agreement with the RCWD.



Project Specs

Rain Gardens Installed 13
 Date Installed August 2011
 Live Storage Area.....3,088 ft²
 Watershed Treated..... 19.87 acres

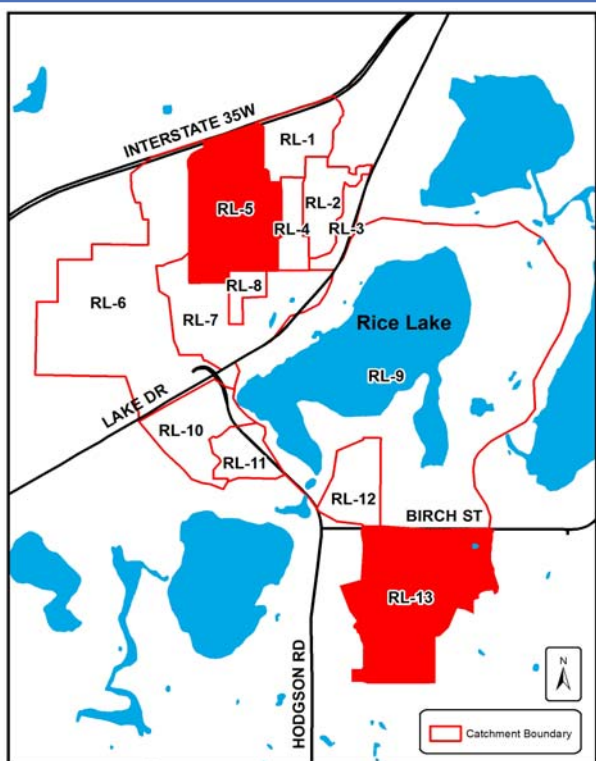
Installation Funding

RCWD \$22,364.18
 State of MN CWF \$25,784.73
 MN State Cost Share **\$8,516.80**
 Total Project Cost..... \$56,665.71

Other Expenses

Design \$7,140
 Construction Oversight\$7,809
 Promotion/Administration \$8,476
 Ongoing Maintenance\$1,050/yr

RL-5 and RL-13 Catchments



Within the subwatershed assessment, catchments RL-5 and RL-13 were identified for retrofit projects intended to;

- Decrease stormwater volume,
- Decrease pollutant loads, and
- Increase infiltration to recharge groundwater.

The catchments consist primarily of medium density residential housing. The table below highlights important characteristics of the catchments as well as WinSLAMM model outputs of total phosphorus (TP), total suspended solids (TSS), and volume contributions prior to rain garden installations.

| | RL-5 | RL-13 |
|------------------------------|----------------------------|----------------------------------|
| Acres | 177 | 249 |
| Land Cover | Residential, 1/4 acre lots | Residential, 1/4 - 1/2 acre lots |
| Parcels | 290 | 455 |
| TP (lbs/yr) | 74.88 | 136.76* |
| TSS (lbs/yr) | 34,165 | 42,417* |
| Volume (acre-feet/yr) | 57.35 | 103.71* |

*Does not include treatment by existing stormwater ponds. However, existing treatment is likely minimal due to current pond conditions.

Installation

Detailed analysis of the RL-5 and RL-13 catchments resulted in the identification of high priority properties for rain garden placement. These locations were identified to maximize the effectiveness of the installed rain gardens by ensuring close proximity to existing catch basins and large drainage areas. Property owners at high priority locations were then contacted for potential rain garden installation. A total of 13 curb-cut rain gardens were installed in 2011.



1. Site preparation and soil excavation to achieve desired side slopes and 1 ft. maximum ponding depth.

2. Retaining wall construction, as well as soil amendment with rain garden soils to promote treatment and infiltration.



3. Placement and installation of pretreatment chamber and plant positioning.

4. Curb-cut construction to accept offsite runoff from curb and gutter system.



Fully functioning curb-cut rain gardens within RL-13. Note the pretreatment chambers that filter incoming runoff and also prevent debris and sediment from entering or exiting the rain gardens when filled to capacity.

Site Monitoring/Post-Project

Post-project monitoring verified acceptable rain garden infiltration rates and proper pretreatment chamber function following storm events. Monitoring will continue during the 2012 growing season to ensure proper garden function and successful plant establishment.

Modeled Pollutant Reductions

WinSLAMM modeling was used to estimate reductions in water volume, total suspended solids (TSS), and total phosphorus (TP) following rain garden installation. The table to the right highlights these reductions for each of the 13 drainage areas within RL-5 and RL-13 in which a rain garden was installed. Water quality benefits to receiving water bodies associated with these reductions include:

- Groundwater recharge,
- Increased water clarity,
- Decreased pollutant and toxin loading, and
- Decreased nutrient loading that stimulates nuisance algae blooms.

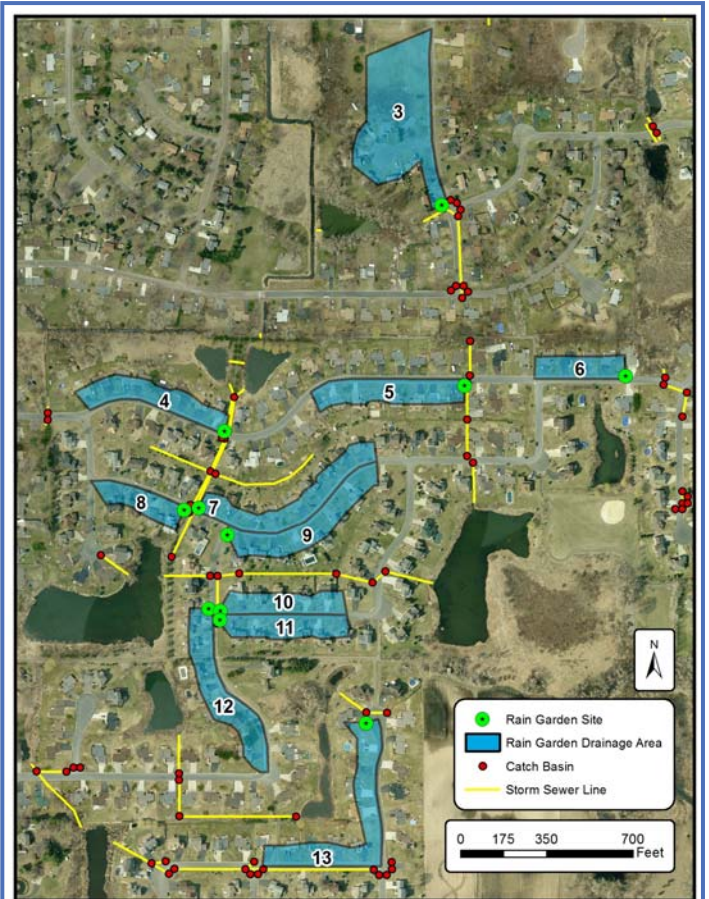
*Under drain installed due to slow infiltration rates, which decreases volume and pollutant reductions.

**The 30 year cost per unit of volume or pollutant removal includes installation, design, construction oversight, promotion, administration, and 30 year maintenance costs.

| ID | Drainage Area / Live Storage Area | Volume Reductions | | TSS Reductions | | TP Reductions | |
|--|-----------------------------------|---------------------------------|----|--------------------|----|--------------------|----|
| | | ft ³ /yr | % | lbs/yr | % | lbs/yr | % |
| 1 | 0.77 acres / 349 ft ² | 15,928 | 89 | 155.2 | 92 | 0.494 | 91 |
| 2 | 2.07 acres / 429 ft ² | 32,411 | 68 | 323.7 | 72 | 1.019 | 71 |
| 3 | 3.72 acres / 165 ft ² | 21,438 | 25 | 220.8 | 28 | 0.685 | 27 |
| 4* | 1.30 acres / 266 ft ² | 17,141 | 58 | 174.8 | 63 | 0.539 | 60 |
| 5 | 1.39 acres / 174 ft ² | 15,857 | 50 | 160.9 | 54 | 0.503 | 52 |
| 6 | 0.79 acres / 198 ft ² | 12,795 | 71 | 127.3 | 75 | 0.402 | 73 |
| 7 | 1.67 acres / 162 ft ² | 16,221 | 42 | 164.9 | 46 | 0.515 | 44 |
| 8 | 0.77 acres / 150 ft ² | 11,034 | 63 | 111.2 | 67 | 0.349 | 65 |
| 9 | 1.60 acres / 333 ft ² | 24,701 | 68 | 246.9 | 72 | 0.777 | 70 |
| 10 | 1.01 acres / 237 ft ² | 16,027 | 70 | 159.7 | 74 | 0.503 | 73 |
| 11 | 1.12 acres / 323 ft ² | 19,896 | 77 | 196.5 | 81 | 0.622 | 79 |
| 12 | 1.65 acres / 168 ft ² | 16,537 | 44 | 168.1 | 47 | 0.525 | 46 |
| 13 | 2.01 acres / 134 ft ² | 15,744 | 34 | 160.8 | 37 | 0.501 | 36 |
| Annual Project Total | | 235,730 ft³ | | 2,370.8 lbs | | 7.434 lbs | |
| 30 Yr Project Total | | 7,071,900 ft³ | | 71,124 lbs | | 223.020 lbs | |
| Benefit / \$100 Spent** (over 30 years) | | 6,337 ft³ | | 63.7 lbs | | 0.200 lbs | |
| 30 Yr Cost** / Unit | | \$687.35/acre-ft | | \$1.57/lb | | \$500.36/lb | |



Installed rain garden sites and drainage areas in RL-5.



Installed rain garden sites and drainage areas in RL-13.