

Hugo City Hall Rain Gardens and Infiltration Islands

Maintenance and Monitoring Plan

The overall objective for this Maintenance and Monitoring (M&M) Plan is to ensure the longevity and integrity of the rain gardens and infiltration islands designed as part of the stormwater management plan for the Hugo City Hall.

Introduction

The rain gardens and infiltration islands are designed to retain and infiltrate storm water runoff for the entire site. The success of an infiltration practice is dependent upon a number of things: naturally permeable soils, sufficient depth to the water table, proper construction, proper maintenance and minimization of sediment build up which reduces infiltration potential by clogging soils. In this case soil borings have shown that the soils, subsurface material and depth to groundwater on the Hugo City Hall site are suitable for infiltration. Silty sands were found to a depth of about 12' with fine grained sand beneath. Groundwater table was found at about 10'. Proper management of these storm water management facilities will ensure their long-term viability and preserve them as attractive amenities in the site's landscape.

The purpose of this M&M Plan is to help City staff manage their rain gardens and infiltration islands. It has been divided into two sections; Maintenance and Monitoring. The Maintenance portion of the plan provides recommendations specific to time of year and phase of project construction. For ease of use, this plan has been arranged chronologically under the following headings:

- Spring/Summer 2002- Project Construction
- Summer/Fall 2002- First-year Establishment Period
- Annual Maintenance Schedule
- Periodic Major Maintenance

The Monitoring portion of the plan identifies methods for recording performance of the infiltration practices. Information such as rainfall and water levels within the rain gardens and infiltration islands will be recorded. Infiltration rates can be calculated from this data as well as determining when maintenance is necessary.

Maintenance

Spring/Summer 2002- Project Construction

Proper construction and control of site sediment is extremely important in ensuring the successful operation of an infiltration practice. The following recommendations should be followed throughout the construction process to ensure long term success:

Excavation of Rain Gardens and Infiltration Islands

- Excavation and grading of the rain gardens should follow completion of other site grading and vegetative protection activities.
- Rain garden grading should be accomplished with small rubber-tire equipment not prone to compacting soils.

Erosion and Sediment Control

- Silt fence and other erosion and sediment control best management practices need to be in-place and properly maintained throughout the entire construction process and until the entire site becomes permanently stabilized.
- Sediment washed into rain gardens and infiltration islands needs to be removed immediately.
- The site needs to be completely stabilized with permanent vegetative cover as soon as possible. Temporary cover crops should be used if any delay is expected in final turf establishment.

Do not Use Infiltration Areas for Sediment Accumulation during Construction

- Using the infiltration basins/ponds as temporary sediment removal ponds during construction has the potential to reduce the infiltration capacity of the practices. Because fines will migrate into the more permeable soil profile and reduce infiltration potential.

Landscaping of Rain Garden Areas

- The native vegetation planted in the rain gardens can withstand wet/dry cycling and fluctuations in water levels and their deep root systems promote infiltration with the underlying soils.
- Planting of the rain gardens should be coordinated with other site landscaping activities so plantings are not susceptible to damage from construction activities and sediment inundation.
- Minimize sustained fluctuations of water level within the rain gardens during planting and vegetative establishment periods. Periodic pumping may be required.

Summer/Fall 2002- First-year Establishment Period

Some specific maintenance may be required within the first growing season following construction.

Vegetation Establishment

- Although the native plants have a good potential to colonize sites, partial re-vegetation in areas where the native vegetation does not survive may be necessary. This may be accomplished by replanting plugs into these areas or seeding.
- Some periodic watering may be necessary if extended dry periods are encountered.

Sedimentation

- Sediment accumulations should be removed with light earth-moving equipment to prevent soil compaction and clogging.
- Sources of the sediment should be identified and controlled. This may require turf establishment on the remainder of the site or erosion protection along the slopes of the rain gardens.
- Care should be taken not to damage existing plant materials and landscaping when sediment is removed.
- Adjacent streets and parking lots should be kept clean from sediment to prevent flushing into rain gardens and infiltration islands.

Pumping

- During the first year or two some pumping may be necessary if prolonged periods of rain cause the rain gardens to be inundated for a week or more. Once native plants become fully established, pumping should not be necessary.
- The suction hose of the pump should be placed in the rocked portions of the rain gardens so as not to damage plant material.

Weed Control

- Some weed control may be necessary during the rain garden establishment period.
- Targeted weeds should be hand-pulled by persons experienced with native plant materials.
- Flail mowing may be required if weeds become a significant problem.
- Herbicide should not be used in or adjacent to the rain gardens.
- Note that the contract with rain garden planting contractor covers most first-year weed control.

Annual Maintenance Schedule

Winter

- Minimize use of sand and salt on parking lot surface.
- Do not use rain gardens or infiltration islands for snow storage.
- Take photograph of each rain garden from fixed photo point.

Spring

- Sweep parking lot and other paved surfaces as soon as weather permits.
- Remove accumulated sediments in the sediment traps, along the curb cuts and within the rain gardens if necessary.
- Remove large accumulations of thatch within the rain gardens. This can be accomplished by mowing and bagging or weed whipping and hand-removing dead plant material. Special care should be taken to protect shrubs.
- Do not apply fertilizer or herbicide in or near the rain gardens.
- Hand-weed cool season invasive plants if necessary.
- Verify elevation of staff gauges.
- Take photograph of each rain garden from fixed photo point.

Summer

- Watering of rain gardens should only be necessary during abnormally low rainfall periods.
- Hand weed invasive weeds if necessary.
- Do not apply fertilizer or herbicide in or near the rain gardens.
- Take photograph of each rain garden from fixed photo point.

Fall

- Herbicide should not be used in or adjacent to the rain gardens.
- Hand weed invasive weeds if necessary
- Verify elevations of staff gauges.
- Take photograph of each rain garden from fixed photo point.

Periodic Major Maintenance

- If infiltration rates begin to significantly decrease, accumulations of sediment may be the cause. Maintenance will be required to remove built-up sediments and rejuvenate the rain gardens and/or infiltration islands.
- All work within the rain gardens and infiltration islands must not compact the native soils and be consistent with the “Project Construction” guidelines.

Monitoring Plan

Monitoring of infiltration practices is important in evaluating performance and identifying when maintenance is required. It is recommended that visual observations and data recording of the infiltration islands and rain gardens be performed by city staff on a routine basis.

Water Level Records

- Staff gauges within each rain garden should be read following runoff producing rain events until the rain garden drains completely.
- Depth of water in the infiltration islands should be recorded following runoff producing rain events until the infiltration island drains completely.
- Data should be recorded in the “Water Levels” worksheet in the “Hugo Rainfall and Infiltration.xls” spreadsheet. Gauge readings for the rain gardens and depth to water readings for the infiltration islands should be entered into their respective columns. The spreadsheet automatically calculates water elevations.
- Date of each recording should be entered in the first column of the “Water Levels” worksheet.
- The “Rain & Water Level Chart” automatically updates to graphically represent the data.

Seasonal Photographic Records

- Photographs of each rain garden should be taken at least 4 times per year. Recommended periods include Winter, Spring, Summer and Fall.
- The purpose of these photos is to document vegetative cover and correlate infiltration capacity to vegetation density.
- Photos will be taken from fixed points determined by RCWD.
- The District will be conducting an annual plant inventory for each rain garden. The inventories will be along a transect representing dry to wet regimes in each rain garden. The photo point will be at the specific transect location.

Rainfall Recordings

- An automatic raingauge is located at Hugo City Hall. Data for this gauge is collected periodically by RCWD staff. Data from the District's raingauge can be incorporated into the "Hugo Rainfall and Infiltration.xls" spreadsheet on the "Rainfall" worksheet. The chart will automatically update with additional data entered.
- A visual raingauge could also be used for monitoring this site. If this option is used, daily recordings will need to be entered into a spreadsheet containing amount of precipitation and date. Recording visual data will allow the City to update the graph more regularly if watershed district data is not available.

Infiltration Rates

- Infiltration rates can be determined by calculating the amount of water infiltrated over a given duration of time. (Δ Depth in inches / Δ Time in hours).
- Yearly infiltration rates can be compared to determine whether the basins are functioning to an acceptable level.
- If infiltration rates decline to 50% or less of the average rates of the first three years, then major maintenance is likely warranted.