

Sustainable Watershed Action Team (SWAT)
Aurora's Countryside Vision Plan
August 2004

Submitted to:
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I Sustainable Watershed Action Team (SWAT) Introduction

The principle goal of the SWAT effort is to protect and enhance biodiversity in the Chicago Wilderness region. SWAT involves the development of a team of experts that will, upon request, provide assistance to local government officials and the development community in the design and implementation of major development projects to facilitate the incorporation of innovative, environmentally sensitive practices into new developments. The specific assistance and composition of the resource professional team will be tailored to the needs of the project or issue submitted.

There are four principle criteria that must be met for a project to be selected for the SWAT effort:

1. Presence of sensitive environmental resources, such as, endangered & threatened species, wetlands (ADID wetlands in particular), Illinois Natural Area Inventory sites, Illinois Nature Preserve (in proximity), remnant woodlands & prairies, critical recharge areas, or publicly owned lands. If sufficient natural resources are present and warrant protection, the following then must also apply.
2. The municipality's planning department, mayor/village president, and city council/village board in which the project exists must be willing to participate in the SWAT effort.
3. If the SWAT effort involves a specific development, the developer proposing the project must be willing to participate.

In addition to the above, there are other considerations:

1. The project must be in the early phases of the design process in order to allow conservation design techniques to be incorporated
2. No legal agreement, such as an annexation agreement should exist that would inhibit design changes being incorporated.
3. The municipality must have ordinances that allow for conservation design techniques, or be willing to consider variances to allow such practices to be approved.

If a project has sufficient natural resources that warrant protection, the SWAT coordinator, Dr. Deanna Glosser, will collaborate with SWAT partners and select four projects in 2004-05 that are deemed most likely to be successful. The City of Aurora has been selected as one of these four model projects.

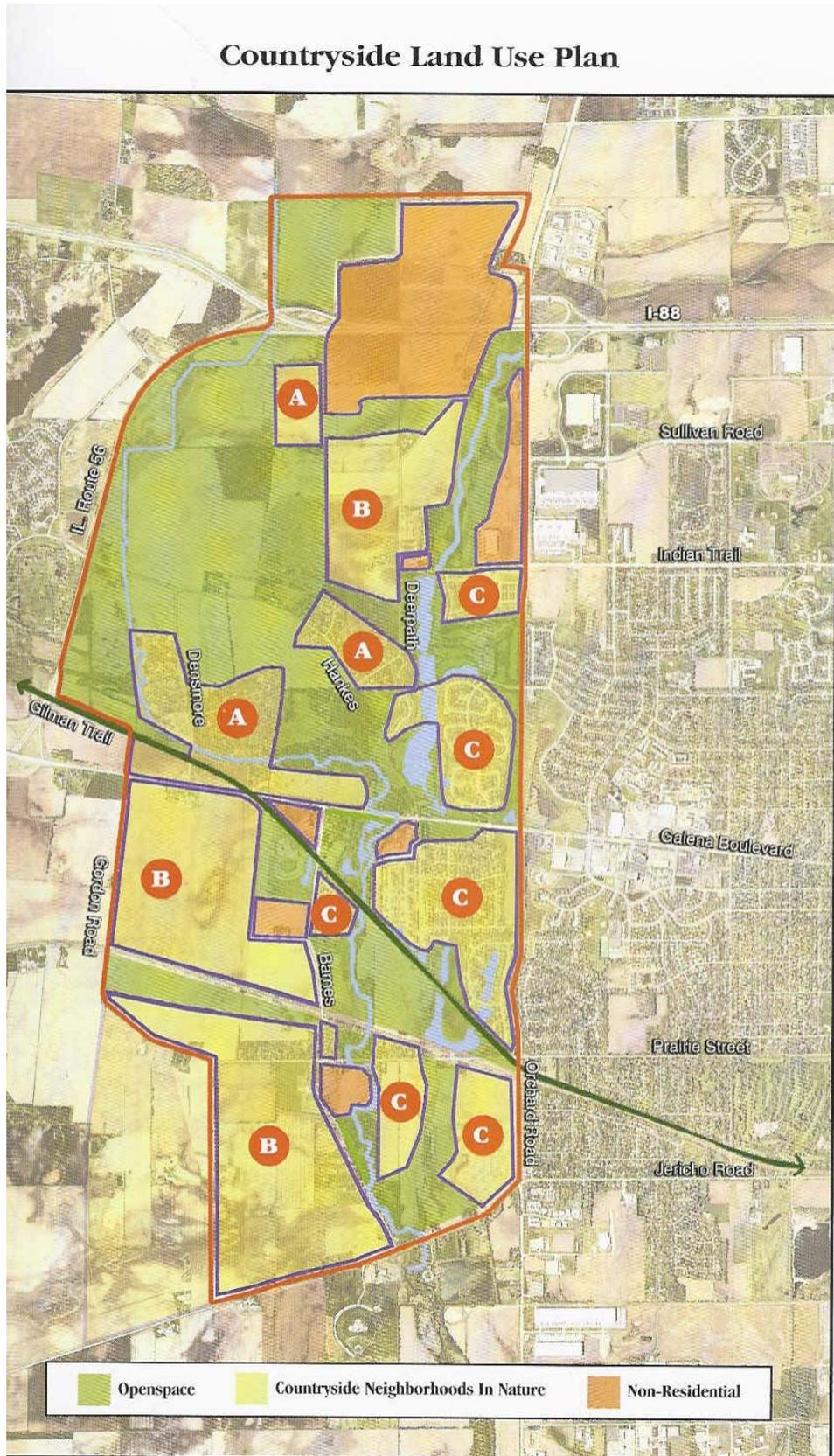
II Aurora SWAT Project

Background

In August 2001, Aurora initiated an effort to develop a Vision Plan for the approximately 4,000 acres in the western part of the city. One of the objectives of this planning process was to ensure that public open space and natural resource protection become components of future development plans.

The area encompassed in this plan include areas west of Orchard Road; east of Illinois Route 56 and Gordan Road; north of Jericho Road and south of an area just north of I-88 (see Figure 1).

Figure 1: Countryside Vision Land Use Plan (page 13)



Note: Areas designated at “A” are both undeveloped parcels plus existing residential development in Sugar Grove Township. Areas identified as “B” represent the largest tracts of land available for development. Areas targeted for development will allow flexible design standards for large lot residential areas, but preserving natural resources and minimizing stormwater runoff. Areas labeled “C” are existing developments.

The guiding principles are identified on page 20 of the Countryside Vision Plan:

1. Protect against flooding
2. Create a quality living environment
3. Enhance water quality
4. Provide adequate buffers for streams
5. Look at the land first – identify resources to be protected before designing the development
6. Minimize site development costs to maximize open space.

Techniques to achieve these goals are identified on page 21 of the Plan. They include use of on-site natural stormwater management to eliminate curb and gutter and piped stormwater systems, preserving and restoring native vegetation, use of bioretention and filter strips, and creation of an integrated trail system throughout the entire area.

SWAT Goals

While this award-winning plan established the vision for Aurora’s future, additional work was needed to identify the details to ensure its success as developments are approved and implemented. This takes time and resources. Four developments within the Countryside Vision planning are now being considered, totally 700 acres.

A meeting was held on July 22 with Aurora’s Community Development Director, Bill Wiet, Senior Planner, Stephanie Phifer, SWAT coordinator, Dr. Deanna Glosser, and SWAT experts Mark O’Leary, Applied Ecological Services, Tom Price, Conservation Design Forum, and Mark Willobee, Kane County Soil & Water Conservation District. The purpose of the meeting was to determine if SWAT could be of assistance.

After much discussion, it was decided that SWAT would provide the following:

1. Native vegetation performance standards and/or specific species lists and recommendations for planting and maintenance.
2. Performance standards and/or specific design recommendations for natural stormwater management, which includes no pipes or detention ponds and use of native vegetation.
3. Other recommendations to ensure the successful implementation of the Countryside Vision Plan.

All recommendations are to be submitted to Bill Wiet by August 18, 2004.

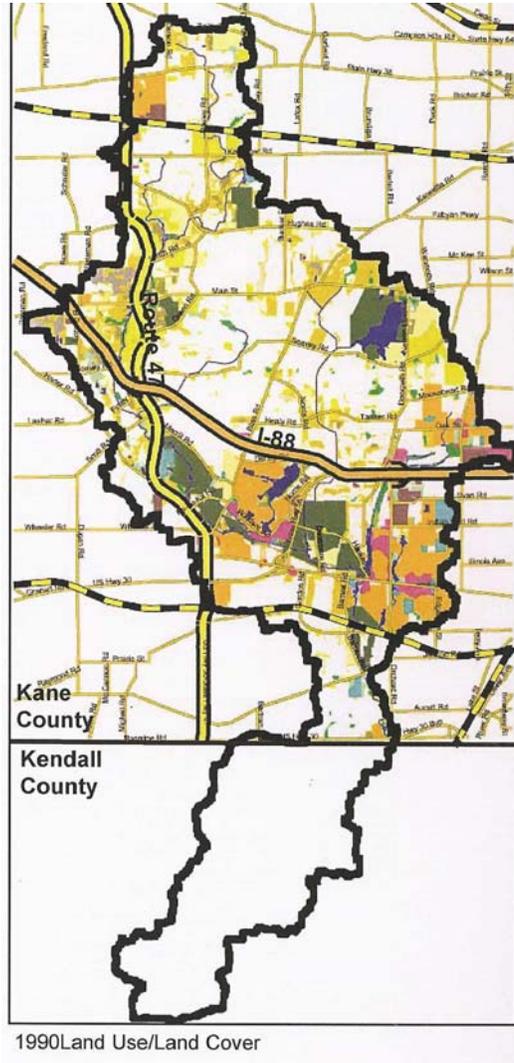
III Natural Resources

A. Blackberry Creek Watershed

The area encompassed within the Countryside Vision Plan is located in the Blackberry Creek Watershed (see Figure 2). Specifically, it is located south of I-88,

the dark green polygons approximately in the center of the map. The Blackberry Creek Watershed is located within the Fox River Basin and is 73 square miles in size.

Figure 2: Blackberry Creek Watershed (Blackberry Creek Watershed Alternatives Future Analysis, page 12)



Blackberry Creek flows mostly north to south and has three branches. According to the Illinois Protection Agency's 2002 Illinois Water Quality Report, the designated uses for Blackberry Creek are aquatic life and fish consumption.

Wetlands occurring in the watershed are riparian, associated with Blackberry Creek corridor or depressional wetlands distributed throughout the watershed. Blackberry Creek and its associated wetlands provide valuable wildlife habitat and provide water quality and flood control benefits. The Countryside Vision Plan makes every effort to protect Blackberry Creek and its tributaries, wetlands, remnant native vegetation, and other open space.

B. Kane County Forest Preserve District Properties

Kane County Forest Preserve District owns extensive property within the area of the Countryside Vision Plan (see Figure 1). The Countryside Vision Plan proposes a trail system to connect the County's open space throughout the planning area. Protecting the County's land from the indirect impacts of development is also important.

IV SWAT Recommendations & Outcomes

A. General

1. Preliminary Plats

In order to comprehensively evaluate a proposed development and ensure the tenets of the Countryside Vision Plan are adhered to, it is important that the development proposal contain the following information:

- a. All natural features located within the area of the proposed development or on adjacent properties, including streams, wetlands (including depressional wetlands), Illinois Natural Area Inventory sites and Illinois Nature Preserves, endangered and threatened species habitat, hydric soils, floodplains, and native vegetation.
- b. The results of the tree survey required by the City of Aurora should be presented as part of the approval process, even if not displayed on the plat map itself.
- c. Land uses surrounding the proposed development.
- d. The location of property owned by the Kane County Forest District property in relationship to the proposed development.

2. Trail network

On page 21 of the Countryside Vision Plan, the use of an integrated trail system throughout the planning area is identified. This trail system should be articulated on every development proposal, with connections to existing local or regional trail systems being required.

3. Buffers

Sufficient buffers should be provided to protect wetlands, streams, and property owned by the Kane County Forest Preserve District. The recommended buffers in the Blackberry Creek Watershed Zoning Code Analysis and Ordinance Language Recommendations should be adhered to:

- a. Streams – “Varies from 15 to 50 feet, depending on drainage area and stream quality (Kane County stormwater ordinance)” (pg. 9)
- b. Wetlands – “Varies from 15 to 50 feet, depending on wetland area and wetland quality (Kane County stormwater ordinance)” pg. 9.
- c. Kane County Forest Preserve District (FPD) property – work with the FPD and Aurora planning staff to determine the size of the buffer.

4. Professional Ecologist

In order to ensure the enhancement and/or protection of the areas natural resources and full implementation of the Countryside Vision Plan guidelines, it is recommended that the developers be required to hire the services of a professional ecologist to work as part of the interdisciplinary team of engineers, landscape architects, and land planners.

B. Native Vegetation

Naturalized Landscape Zones refer to areas within the development where native plant communities will be restored or created. These could include stormwater treatment systems, swales, common open space, or even residential yards. Successfully establishing naturalized landscape areas depends on the following factors:

- Design;
- Implementation;
- Maintenance and Management;
- Monitoring;
- Performance Standards;
- Funding;
- Accountability.

While it is beyond the scope of this project to cover each one of these factors in details, the following generalizations can be made:

Design

While there is a lot of information available about using native plant material and ecological restoration, it remains a rather specialized field. In general, good designs in a development setting should be **functional** in that they hold soils in place, provide water quality and wildlife habitat benefits, and are appropriate to given edaphic, hydrologic, and light conditions. They should be **beautiful**. Native landscapes do not look cultivated, but they can be designed to ease the transition for those who are more comfortable with traditional (European) landscapes. The designs should look **intentional** – like they belong where they have been placed. The designs should result in **low maintenance** landscapes that are relatively easy and inexpensive to maintain. An interdisciplinary team consisting of a professional ecologist, landscape architect, land planner, and engineer can work to achieve these objectives.

Good designs should also contain explicit direction, usually in the form of design and construction documents, as to implementation, maintenance and management, monitoring (short and long term), performance standards, funding and oversight.

Implementation

A good design will fail in the field if not properly installed. Implementation of the design should be spelled out in the specifications and design documents, but the documents should be flexible enough allow for changes in the field by the project ecologist. At a minimum, the specifications should address Soil Preparation, Seeding, Herbaceous Perennial Planting, Woody Plantings, and Management. The specifications and all

aspects of the installation should include a section that requires only qualified contractors and be overseen by the project ecologist.

Maintenance and Management

A short term (zero to five year) and long term (five years and out) maintenance and management plan must be designed, planned for and implemented if a naturalized landscape is to succeed. Native landscapes generally take three to five years to become established. Most of the maintenance and management work takes place during years one to three. If properly designed, installed and maintained, the landscape should be relatively low maintenance in perpetuity after years three to five.

If a prairie is dormant seeded during the fall, maintenance during the first growing season generally involves two to three mowings and spot herbiciding. During the second growing season, one to two mowings and spot herbiciding is recommended. If the seeding was successful, there's generally enough fuel to permit a burn during year three or four. Once the prairie is well established, maintenance is limited to spot herbiciding weeds as necessary, and burning every two to three years.

Monitoring

It is important to monitor native plantings so that maintenance and management can be targeted to accomplish specific goals, and so deficiencies can be remedied immediately. Monitoring is also important during installation. Like management, monitoring is most intense (one to four times per month) during the growing seasons of the first three years, but tapers off to only a couple of times during the growing season once plantings become well established. Ideally, management occurs as a result of direct observations during monitoring events rather than as a result of adhering to an inflexible management schedule.

Performance Standards

Performance standards are absolutely critical for quantifying progress toward restoration goals and objectives. Standards vary depending on planting zones and project objectives. The five year standards described below are reasonable guidelines for a created native planting as part of a development. They would not be appropriate for a wetland mitigation area or a natural area where biodiversity standards would be more stringent. Developers can adopt more stringent standards, but costs for materials and management increase with required performance.

Emergent/Open Water
<ul style="list-style-type: none">• By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.• Total vegetation cover within emergent/open water zones shall be at least 60% by the end of year five.• Total reed canary grass cover shall not exceed 20%.• Total cattail cover shall not exceed 40%.
Wet Prairie

- By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.
- By the end of the third through the fifth year, total vegetation cover within the wet prairie shall be at least 90%.
- Total reed canary grass cover shall not exceed 10%.
- Total cattail cover shall not exceed 40%.

Mesic Prairie

- By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.
- Total vegetation cover within mesic prairie zones shall be at least 90% by the end of the third through the fifth year.
- Total reed canary grass cover shall not exceed 10%.

Savanna/Woodland

- During year one, reduce woody plant cover so at least 60% of the available light can reach ground layer vegetation.
- Non-native woody vegetation shall not exceed 10% total cover.
- By the end of the fifth year, 80% of the species installed shall be present, and at least 60% of the total cover shall be native species.

Funding

Many projects fall short by not anticipating short and long term maintenance and monitoring costs. We recommend preparing a short term (one to five years) management budget as well as a long term (five to 10 years) budget that gets turned over to the organization that ultimately will handle the maintenance of the open space. We also recommend that the City of Aurora create as part of the annexation agreement with the developer a special service area tax that would cover the entire short and long term maintenance budget, in perpetuity, should the developer or receiving land management agency fall short on their land management obligations.

Accountability

We have found that recommendations described above are not generally implemented unless the governing body (in this case, the City of Aurora) has not only the will, but the mechanisms in place to enforce them, and the expertise to know what to enforce. The annexation agreement in conjunction with a special service area tax is a good mechanism for enforcement. We also recommend that the City hire consultants with expertise in natural area restoration to make sure that specifications are followed, and performance standards met.

Review of Proposed Landscape Memo

The comments below address the referenced memorandum from Karl Krogstad to Paul Rose:

1. Canopy trees referenced in the memorandum to be located around the stormwater facility should consist of native species adapted to fire management, planted in

such a way that protects the plantings from prescribed burns. Even young burr oaks – our most fire-adapted native tree – are susceptible to fire damage during prescribed burns.

Protecting woody material from prescribed burns can be accomplished in a variety of ways: a) install woody material in copses that can be easily burned around; b) mulch under the tree canopy; c) install a turf grass or no mow fescue mix around the copses.

2. The Low Profile Prairie with Accent looks reasonable. However, not all of the species are “low profile.” These include *Sorghastrum nutans*, *Silphium laciniatum*, and *S. terebinthinaceum*. There is not necessarily a problem with these species, however, it is important to note that they are not “low profile.” This zone should be installed no lower than 1.0’ above NWL.
3. In the Wet Meadow Plant List, it is very difficult to establish *Spartina pectinata* from seed. This is a fine bank stabilization species, but should be plugged in addition to seeded. This zone should be installed between NWL and 1.0’ above NWL rather than between NWL and HWL per the memorandum.
4. There is no object to the Emergent Plant Mix. However, listed species are very difficult to establish from seed in a detention pond setting. Plugging these species is recommended in addition to seeding them. Plugged species should be installed 6” below NWL to NWL. Seeded species should be installed between NWL and 6” above NWL.
5. The memorandum states that the Landscape Plan (which was not available for review) strives to create a “naturalistic` look” under point 5, and states that the designer shall provide “a variety of canopy, ornamental and evergreen trees to provide interest and diversity” under point 6. “Naturalistic look” is not defined. Please note, it is not a native restoration if it includes ornamentals and evergreens.

An entirely native planting pallet is strongly recommended. If this is not realistic, the developer should distinguish between traditional landscape zones, and naturalized landscape zones. The latter is outlined above.

C. Stormwater Management

Ordinance Language: The following language or something similar could be included in an ordinance or annexation agreement.

It shall be demonstrated that the runoff volume from the site will not exceed the pre-development volume for all events up to the 2-year, 24-hour event. Further, all runoff from a 0.75 inch rainfall shall be retained on site. These standards may be met using practices such as rain gardens, bioretention swales, permeable paving, filter strips and other practices approved by the City Engineering Department.

Where surface or subsurface infiltration facilities are used (surface infiltration basins, underground gravel storage, such as permeable paving, etc), the applicant shall show by permeability tests and by calculations that the volume will drain by infiltration in less than 24 hours. If the soils are unsuitable or the area allocated to infiltration is insufficient to achieve this standard, the retention volume may be assumed to be retained if the retention volume is released via surface discharge in no less than 120 hours. The maximum depth of the retention volume shall not exceed 6 inches when the drain time exceeds 24 hours.

Infiltration facilities shall include pre-treatment measures. Accepted pre-treatment measures include:

- Filtration through stone chips used to fill the voids within permeable unit block pavers
- Filtration through permeable concrete
- Filtration through engineered soils such as those used in rain gardens, bioretention swales, or green roofs.
- Filtration through sand filters.
- Sheet flow through vegetated filter strips with a minimum flow length of 20 feet.

The infiltrating layer of Infiltration facilities shall be protected from construction site runoff. Accepted measures of protecting the infiltrating layer include:

- Delaying excavation to finish grade until the upstream area is stabilized. A minimum of 6-inches should be retained above finish grade.
- Placing a sacrificial layer of soil, sand, or gravel over the infiltrating layer that may either be removed or replaced once the upstream area is stabilized.
- Diverting runoff around the infiltration facility until the upstream area is stabilized.

Design Guidance: There are a variety of tools that may be used to achieve the standards above. These tools include naturalized vegetated swales, bioswales and rain gardens, level spreaders, and permeable paving to name a few (see Figure 3). These are detailed below

- Naturalized swales: Vegetated swales may be used in lieu of storm sewer in many circumstances along roadway and in backyard areas. Unlike conventional swales that are vegetated with turf that is intolerant of wet conditions, naturalized swales need not be designed with a minimum 1% slope. Instead, the slope only needs to be sufficient to pass the design storm event (10-year or 100-year), assuming fully vegetated conditions. While naturalized swales will retain water for longer periods of time, due to their flatter slope, vegetation is selected to tolerate and thrive under the wetter conditions. Where wet conditions are not acceptable, a vegetated swale can be replaced with a bioswale that includes a drainage layer beneath (see below)
- Bioswales: Bioswales are similar to vegetated swales, except that they include a gravel retention/drainage layer below. The gravel layer is provided to minimize surface ponding and to provide retention of runoff for slow infiltration into the

subgrade. In many cases, a drainage pipe is not necessary in the gravel layer. However, where a drain is provided, it should be placed a minimum of 6-inches above the bottom of the gravel bed to enhance infiltration. The gravel retention layer should be designed to drain within 24 to 36-hours to prevent biological sealing of subgrade soils. The minimum 8" topsoil layer above the gravel bed should be amended with coarse sand to provide a high rate of infiltration from the surface down to the gravel layer. Depending on the permeability and organic content of the existing topsoil, the topsoil should be amended to with up to 70% sand and the organic content of the amended soil should be 8% to 10% to provide a good growing medium and improve water quality.

- Rain Gardens: Rain gardens have essentially the same cross section as bioswales. However, rain gardens are closed systems that do not provide the conveyance that bioswales do. The surface ponding depth below the surface outlet of the rain garden should generally be limited to approximately 6-inches to protect the vegetation within the rain garden. Like bioswales, rain gardens may include a drainage pipe at the top of the gravel layer. The hydrology of rain gardens is significantly different than detention basins. Because there is no surface outlet below the 6-inch depth, rain gardens will have ponded water in them during most rainfall events. However, the duration of ponding will generally be quite brief (several hours or less) due to the gravel drainage/retention layer below. Conversely, most detention basins experience ponding depths of 6-inches very infrequently (once or twice per year) but the duration of ponding can be quite long (typically a day or longer).
- Level Spreaders: Level spreaders are gravel trenches with a perforated pipe that receives runoff from a concentrated source. Level spreaders are used to deconcentrate runoff and distribute the flow over a large vegetated area. Level spreaders essentially act as underdrains in reverse. Runoff is sent to the level spreader from a storm sewer or detention basin and the perforated pipe within the level spreader acts as a manifold to carry the runoff water over the length of the gravel trench. Runoff then wells up over the length of the trench, where it seeps out across its length. The discharge to a level spreader should be limited and the length designed such that the depth of flow leaving the level spreader is less than one inch and the velocity is less than approximately 0.1 ft/s to avoid scour and rilling. The NRCS chart depicting Mannings "n" as a function of retardance and $V \cdot R$ should be used to determine Mannings "n" for the very shallow flows associated with level spreaders. The depth of flow leaving the level spreader will be a function of the vegetation and ground slope below the level spreader.
- Permeable paving is composed of a specially designed interlocking concrete paver paving surface with an open graded base. The pavers molded with openings formed into them to allow passage of runoff into the granular base. The base is an open graded material with no fines that provides both drainage and temporary storage. Permeable paving systems can provide retention since runoff can seep into the subgrade as well as detention as the base slowly drains laterally to the edge of the pavement. Paveloc Industries has an engineering manual that describes how to design permeable paving systems. (www.paveloc.com)

Figure 3: Bioswale/Rain Garden

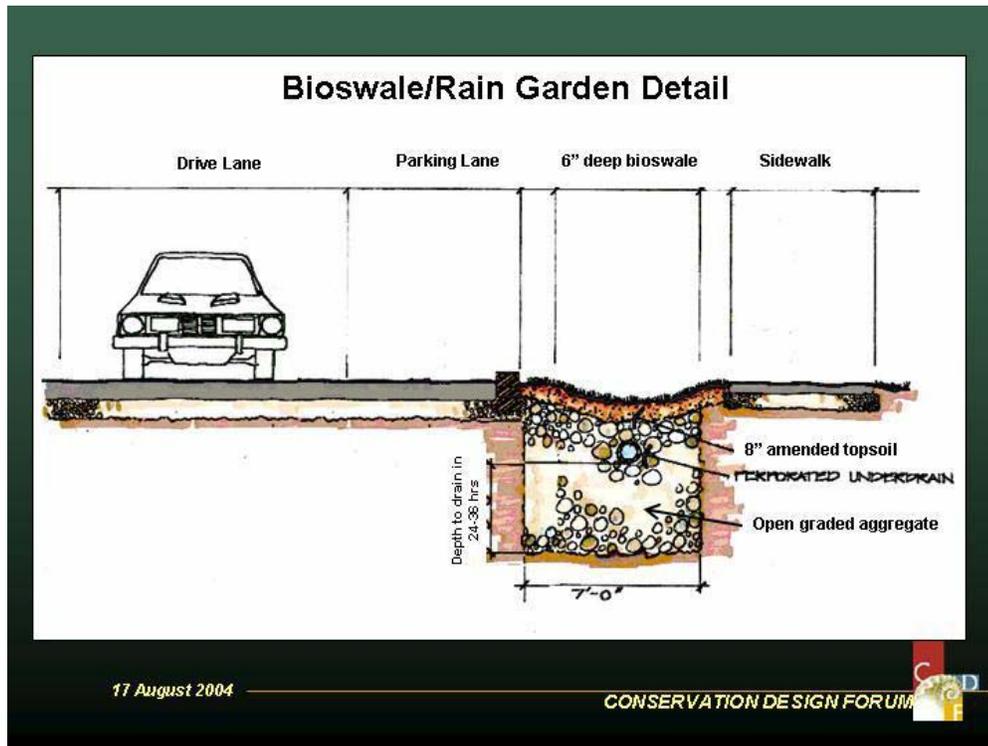
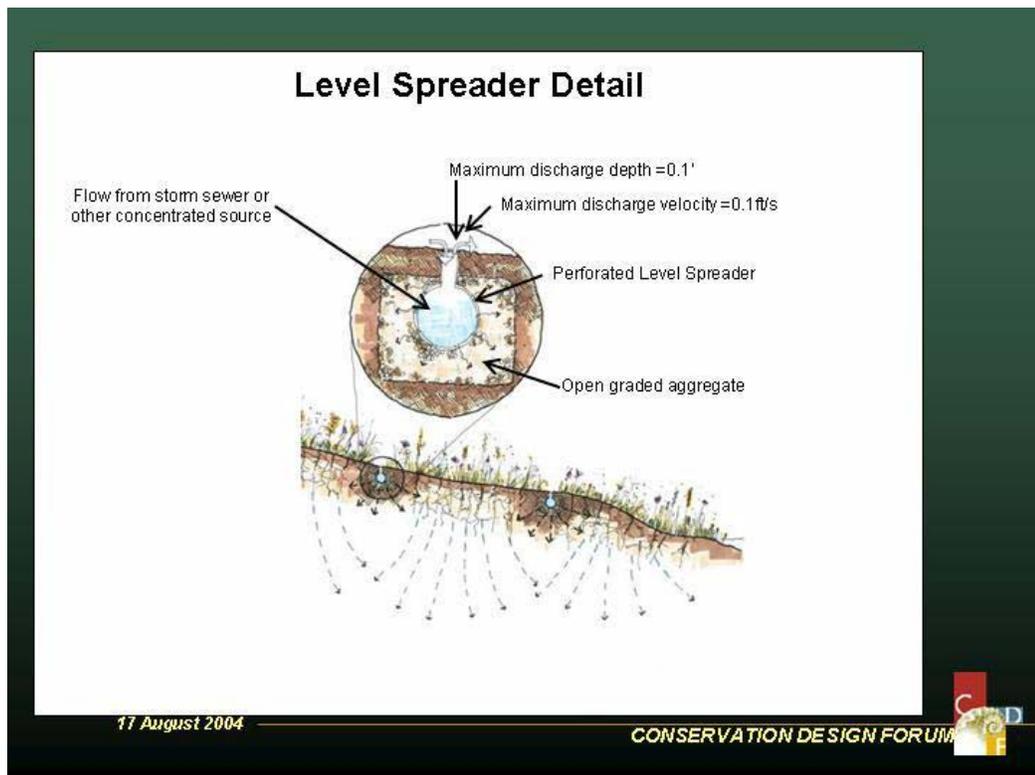


Figure 4: Level Spreader



D. Additional Recommendations

Aurora Vision Plan Guiding Principles and Techniques: In addition to stormwater standards, it was discussed that we should develop language etc, to institutionalize or require the principles and techniques in their Vision Plan. Most of the natural resource related elements are addressed in the Blackberry Creek Watershed Zoning Code Analysis and Ordinance Language Recommendations prepared by Conservation Design Forum for Kane County. In particular, the following items in Table 1 should be included as requirements in all annexation agreements:

- Environmental Standards (4 – 16) address protection, naturalization, and management of open space, including stream corridors and wetlands (riparian and depressional).
- Landscape Standards (17 through 26) address use of parkways, landscape islands, etc as part of the stormwater management system.
- Zoning/Subdivision Standards (68 – 82) address clustering, site capacity analysis, open space requirements, etc.

Of particular importance is item 78, “Site Capacity/Yield –Calculation”. It is recommended that developers be required to “submit site yield calculations that document the number of dwelling units the site can support after excluding lands deemed “unsuitable” due to this or other laws and ordinances and due to losses associated with meeting applicable standards (i.e., detention, streets, required parking, setbacks and buffers, etc. that vary by zoning classification).”

V Summary

The SWAT experts have provided recommendations that will aide in the implementation of the Countryside Vision Plan, thus meeting its principle guidelines. Performance standards were included to allow flexibility in how these guidelines are met. Of particular importance are guidelines for the protection and enhancement of natural resources, innovative stormwater management, use of native vegetation, and establishing local and regional trail networks to connect public property and neighborhoods. These recommendations will allow the City of Aurora to implement their plan for the future as articulated in the Countryside Vision Plan.

VI References

- A. Countryside Vision Plan
- B. Blackberry Creek Alternatives Future Analysis, September 2003
- C. Blackberry Creek Watershed Zoning Code Analysis and Ordinance Language Recommendations prepared by Conservation Design Forum
- D. Preliminary Plat of Subdivision The Linden Estates PUD (Mackie Consultants, June 7, 2004)
- E. July 29, 2004 Memorandum from Karl Krogstad to Paul Rose