AURORA ILLINOIS CITY OF LIGHTS

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Naturalized Planting Area Requirements

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A. 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.

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.

1. Emergent/Open Water
    a. 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.
    b. Total vegetation cover within emergent/open water zones shall be at least 60% by the end of year five.
    c. Total reed canary grass cover shall not exceed 20%.
    d. Total cattail cover shall not exceed 40%.

2. Wet Prairie
    a. 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.
    b. By the end of the third through the fifth year, total vegetation cover within the wet prairie shall be at least 90%.
    c. Total reed canary grass cover shall not exceed 10%.
    d. Total cattail cover shall not exceed 40%.

3. Mesic Prairie
    a. 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.
    b. Total vegetation cover within mesic prairie zones shall be at least 90% by the end of the third through the fifth year.
    c. Total reed canary grass cover shall not exceed 10%.

4. Savanna/Woodland
    a. During year one, reduce woody plant cover so at least 60% of the available light can reach ground layer vegetation.
    b. Non-native woody vegetation shall not exceed 10% total cover.
    c. 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. The Developer shall prepare 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.

Accountability

The annexation agreement in conjunction with a special service area tax is a good mechanism for enforcement. However the City may need to hire consultants with expertise in natural area restoration to make sure that specifications are followed, and performance standards met.

Additional Landscape Information

Canopy trees 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.

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.

B. Stormwater Management

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:

a. Filtration through stone chips used to fill the voids within permeable unit block pavers
b. Filtration through permeable concrete
c. Filtration through engineered soils such as those used in rain gardens, bioretention swales, or green roofs.
d. Filtration through sand filters.
e. 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:

a. Delaying excavation to finish grade until the upstream area is stabilized. A minimum of 6-inches should be retained above finish grade.
b. 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.
c. 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 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*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)