This plan was funded in part by Boeing and facilitated by the Chicago Wilderness Sustainable Watershed Action Team. The plan is a result of engaging the local community in a planning effort focused on incorporating green infrastructure into industrial development.
Acknowledgements

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Abstract

The Kishwaukee River Corridor Green Infrastructure Plan is based on an area in Winnebago County that has significant natural and recreation resources and has been identified for a new industrial development corridor. The assets and opportunities presented at this location made it an ideal site to incorporate green infrastructure into development plans. Chicago Wilderness recognized this opportunity, and Boeing funded a project to provide green infrastructure consulting and technical assistance to municipalities with jurisdiction over the development corridor. The result was a series of meetings and presentations over the past year and a half with municipalities, landowners, environmental organizations, press, and interested local citizens. During these meetings, consultants and environmental organizations explained green infrastructure and its benefits, presented examples, inventoried and mapped local resources, identified opportunities and challenges of local ordinances, listened to concerns and needs, and provided recommendations for protecting valuable assets and incorporating green infrastructure. This plan documents this process and provides a compilation of inventories, reviews, and recommendations.

Introduction

The corridor of land south of the Kishwaukee River in Winnebago and Ogle counties that lies along Interstate 39, and south of Chicago – Rockford International Airport has been identified in local economic development plans for new industrial development. These plans take advantage of the airport’s location near major transportation systems and the I-39/Baxter Road Interchange.

The Kishwaukee River system is recognized as one of the few remaining high quality resource rich areas in northern Illinois. It is recognized statewide for its diversity of fish and mussel species, migratory bird habitats, river otters, and high quality natural woodlands and wetlands. It’s one of the highest quality river systems in the State of Illinois.

The Kishwaukee River and its tributaries are also an important recreational resource, providing quality fishing, hiking, canoeing, tubing, camping, picnicking, bird watching and other healthy outdoor activities. The park district runs a residential outdoor education program in Atwood Park. The high quality habitat and local participation in the river for recreational activities is a “brand” that many communities may wish they could use as they compete for economic development, long-term jobs, and economic sustainability.

The development corridor includes portions of the Villages of Cherry Valley and New Milford, the City of Rockford, and unincorporated Winnebago County. Rock River Environmental Services owns several hundred acres of land in the corridor and operates the Winnebago County Landfill and Recycling Center.

Most of the proposed Kishwaukee River development corridor drains into the Kishwaukee River and its tributary, Kilbuck Creek. The western-most part of the corridor drains via a drainage ditch directly into the Rock River just south of its confluence with the Kishwaukee River. The land lying south of Baxter Road and west of I-39 drains into Kilbuck Creek. The soils in this area are composed mostly of drained wetlands. The land lying north of Baxter Road drains directly
into the river through steep ravines that formed in the bedrock on the edge of the Kishwaukee River Gorge, a narrow, highly scenic and heavily wooded segment of the river between Cherry Valley and New Milford. Most of these ravines drain through public parks and forest preserves. The soils in this area are shallow glacial tills over bedrock and are highly erosive. The land lying south of Baxter Road and east of I-39 drains into the south branch of the Kishwaukee River, which flows through several forest preserves and joins the north branch within Blackhawk Springs Forest Preserve just west of Perryville Road.

The Winnebago County Forest Preserve District has made a major public investment protecting open space along the Kishwaukee River and Kilbuck Creek. The Rockford Park District also owns Atwood Park, a major regional park that straddles the Kishwaukee River east of New Milford.

The Kishwaukee River Ecosystem Partnership (KREP) has worked for many years to guide preservation and restoration efforts in the watershed, and when possible offer advice on strategies and initiatives that help preserve and sustain the river for our future generations. KREP will continue to work with the Villages of Cherry Valley and New Milford, City of Rockford, Winnebago County and Rock River Environmental Services to develop strategies and guidelines to help insure the continued protection of the habitat values, recreational amenities, and water quality of the Kishwaukee River and Kilbuck Creek.

The I-39/Baxter Road Redevelopment Project, because of its size and proximity to the Kishwaukee, is a project that should be sensitively designed, especially in terms of the quantity (discharge rates) and quality (non-point pollution sources) of stormwater runoff. Mitigating stormwater impacts within the site boundaries of the I-39/Baxter Road Redevelopment Project (1,348 acres), Eco-Rock Landfill Expansion (862 acres) and Global Trade Park (1,637 acres) will go a long way in protecting the public investment already made along the river.

There are many stormwater engineering strategies in common practice today that show proven effectiveness in mitigating stormwater impacts on rivers and streams and can be incorporated into the design of the proposed industrial developments in a manner that insures the protection of the Kishwaukee River. This Green Infrastructure Plan for the Kishwaukee River recommends land development policies, best management practices for stormwater, and ordinances needed to implement these strategies.

*JP, December 2011*
Project Deliverables

The project resulted in the three written products listed below. In addition to these documents, the process itself was an accomplishment of engaging the local community in a planning process alternative that has previously received little attention. Deliverables include:

1. Final green infrastructure maps with elements addressing natural resources, sensitive areas, greenways and open space.
2. Specific green infrastructure policy and implementation recommendations based on the relevant policies and recommendations in the Kishwaukee River Watershed Strategic Plan for Habitat Protection and Restoration and the recommendations of the natural resource and local government stakeholders in the planning area. These recommendations address alternative, concept-level green infrastructure design approaches for the major industrial and commercial land uses in the planning area. Recommendations also include land development policy and ordinance alterations that can be adopted by local governments.
3. This *Kishwaukee River Corridor Green Infrastructure Plan* that describes map elements, the map development process, and the process of engaging the local community as well as policy and implementation recommendations.

Defining Green Infrastructure

Both nationally and regionally, the term “green infrastructure” has a range of meanings, which are simplified here into three categories.

*Landscape-based green infrastructure*

Perhaps the meaning most commonly applied to green infrastructure, landscape-based green infrastructure is based in the idea that certain lands have an inherent value that can be made even greater when a part of a network. The Conservation Fund defines it this way:

"Strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations."

Under this definition, the foundation of green infrastructure networks are the natural elements – river corridors, woodlands, wetlands, grasslands – that work together as a whole to sustain ecological values and functions. But green infrastructure also can include working lands, trails and other recreational features, and cultural and historic sites.

*Biodiversity-based green infrastructure*

In its *Green Infrastructure Vision*, Chicago Wilderness adopts a related meaning for green infrastructure—one that focuses on the goal of supporting biodiversity. Chicago Wilderness defines green infrastructure as:

“The interconnected network of land and water that supports biodiversity and provides habitat for diverse communities of native flora and fauna at the
This definition reflects both existing green infrastructure – forest preserve and park district holdings, state parks, and designated natural areas – as well as opportunities for expansion, restoration, and connection.

**Nature-based alternatives to gray infrastructure**
This definition of green infrastructure focuses on nature-based alternatives to conventional “gray infrastructure” technology and engineering. In this context, green infrastructure can be used to describe products, technologies, and practices that use natural systems – or engineered systems that mimic natural processes – to enhance overall environmental quality and provide utility services. The U.S. Environmental Protection Agency identifies green infrastructure techniques, such as green roofs, porous pavement, rain gardens, and vegetated swales, which use soils and vegetation to infiltrate, evapotranspirate, and/or recycle stormwater run-off. In addition to effectively retaining and infiltrating rainfall, these technologies also can filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon.

This plan integrates each of these meanings into a single comprehensive view of green infrastructure. It encourages not only sustainable land use and open space protection but also innovative, green technology to better protect water and other natural resources.

**Green Infrastructure Examples**

This plan emphasizes mapping and protection of green infrastructure in the Kishwaukee River Corridor. It recognizes that implementation of green infrastructure plans and policies should be undertaken at multiple spatial scales, from small sites to large regions. The figure below highlights the range of scales.
It also recognizes that effective green infrastructure implementation requires coordination and involvement by local governments, other government agencies, private organizations, developers, and private landowners in order to maximize the benefits.

The following are some examples of green infrastructure planning and implementation at various geographic scales.

**At the Regional Scale**
The Chicago Wilderness *Green Infrastructure Vision* provides a regional framework for green infrastructure mapping and planning (see figure below). The Boone and Winnebago Greenways Plan maps an integrated network of green infrastructure elements, such as stream corridors, wetlands, and open space (see figure below). The extensive land acquisitions of the Winnebago County Forest Preserve District are another example of regional GI implementation that spans numerous municipalities and townships across the county.

**At the Community Scale**
At the community level, efforts can be made to incorporate GI maps and recommendations into municipal, county, and park district land use plans and maps. GI principles can be used to shape land use and zoning maps and provide a framework for more sustainable zoning, subdivision, stormwater, and landscaping codes as well as conservation design ordinances. GI principles also can influence land acquisition and trail priorities of local park and open space agencies. As noted later in this Plan, Rockford, Cherry Valley, and Winnebago County have all incorporated green infrastructure principles into their land use plans.

**At the Neighborhood Scale**
Neighborhoods, both existing and new, can be transformed to incorporate conservation design principles. This means the subdivision review process includes open space protection, natural landscaping, and stormwater best management practices that preserve biodiversity and natural resource functions in the design of the neighborhood. Not only does this preserve and enhance the natural environment, it also brings nature closer to families and children.

A number of local governments in northeastern Illinois, including McHenry County, Woodstock, Crystal Lake, and Algonquin, have developed comprehensive conservation design ordinances for new development on sensitive sites. The 400-acre Deer Hills/Deer Woods II development by LandMark Development in nearby Belvidere serves as a local example of a conservation development. It was recognized by the Environmental Protection Agency and Chicago Wilderness with a 2009 Conservation and Native Landscaping Award for its 90-acre “eco-spine” of naturalized areas following Beaver Creek.
**At the Site Scale**

Small sites, including residential yards, businesses, school grounds, and parks can incorporate practices that treat stormwater as a resource and provide habitat for native species. This is accomplished through practices like bioswales, rain gardens, permeable paving, and natural landscaping. There are many examples in Rockford, including the Leadership in Energy and Environmental Design (LEED) certified facility and green roof at Rockford Park District’s Nicholas Conservatory & Gardens; bioswales and green roof at the Riverfront Museum Park; LEED certified Karl J. Jacobs Center for Science and Math at Rock Valley College; and LEED Certified facility, bioswales, stormwater treatment train, and naturalized stormwater drainage system at the Rock River Water Reclamation District.
(Rockford Metropolitan Agency for Planning, 2011)
The Importance of Green Infrastructure

Green infrastructure helps protect existing ecological and water resource systems and their associated social and economic functions. More specifically, preserving green infrastructure and managing it properly can provide numerous benefits. Some of the key green infrastructure purposes and benefits identified in the planning area include the following.

**Environmental Benefits**
- Biodiversity and habitat protection
- Improved water quality
- Enhanced groundwater recharge
- Reduced flood damage
- Reduced erosion
- Carbon sequestration

**Economic Benefits**
- Reduced life-cycle costs of infrastructure
- Expedited permitting
- Green industry jobs
- Green marketing potential
- Green architecture
- “Ecotourism” opportunities
- Enhanced property values

**Social Benefits**
- Greenway, trail, and open space connections
- Enhanced recreational opportunities
- Community health and mobility
- Contribution to the area’s identity and sense of place

**Planning Benefits**
- Expediting the development planning process by identifying resource areas and corridors before development is proposed.
- Creating a vision of the future to guide the Village’s long-term planning goals and objectives.
- Providing a better means of evaluating economic and environmental factors when making land use decisions.
- Ensuring that development and open space activity are encouraged and established in appropriate and compatible locations.

Green Infrastructure Policies in Local Plans and Ordinances

**Community engagement process**
Engagement of the community involved meetings with each municipality with jurisdiction over the project area and major stakeholders, reviews by local technical advisors, and presentations to a variety of environmental organizations and public interest groups. From February 2012 through June 2013, meetings were coordinated to allow various stakeholders to be involved in the planning process, including natural resource and open space agencies, local governments and park districts, and primary landowners.
Initially, the municipalities with jurisdiction over the project area were contacted to become involved in the planning process. In February and March of 2012, the first meetings were held with City of Rockford, Village of Cherry Valley, Village of New Milford, and Winnebago County. During these meetings, each municipality became aware of the project and shared their level of interest in becoming involved with the planning process and desired technical support. Attempts were made to engage major landowners, of which two out of four elected to participate: William Charles and Rock River Environmental Services.

After the initial meetings, the project team gathered existing natural resource and policy information. Nathan Hill inventoried the natural resources of the area and identified opportunities and threats for maintaining their integrity and ecological function. The project team then prioritized a core band of resources recommended to be protected from development and a supporting layer of resources to receive secondary consideration. This information was portrayed on a series of maps inventorying the natural resources and recommending “Core Green Infrastructure,” and “Supporting Green Infrastructure.” These maps were reviewed by technical advisors from various local environmental groups and their input was incorporated. Contributors included WinGIS, Rockford Metropolitan Agency for Planning, Rockford Park District, Winnebago County Forest Preserve District, Winnebago Soil and Water Conservation District, and Natural Resource Conservation Services. To accompany the recommendations portrayed on the maps, Dennis Dreher reviewed local ordinances and drafted a series of recommended policy changes for each municipality.

During a second series of meetings that took place in February and March of 2013, the maps and recommendations were shared with all municipalities and participating major landowners. Green infrastructure was defined and examples were shared, specifically a project within the City of Joliet that mirrors the Kishwaukee River Corridor industrial development plans. The municipalities indicated that specific recommendations would be helpful to them, which were later provided by Dennis Dreher. This report will also be available to them as a resource.

In addition to engaging municipalities and landowners, the project team provided presentations to various organizations and public interest groups between March and June of 2013. These groups included the Rockford Park District Board of Directors, Winnebago County Forest Preserve Board of Directors, Rockford Area Economic Development Commission, Natural Land Institute Corporate Council, Lt. Governor’s Mississippi River Coordinating Council (MRCC), Friends of Kishwaukee River, Friends of Madigan Creek, Paddle and Trail, Smeja Foundation, and University of Illinois Extension. The public was able to attend a presentation at A River Gathering hosted by the Four Rivers Environmental Coalition.

The press was invited to attend presentations and interview the project team. A participating reporter from the Rockford Register Star wrote the following article in the local newspaper:
How green grows our industrial park to keep waterways clean

Coalition wants Winnebago County leaders to think Kish, Kilbuck protection while building


ROCKFORD — A coalition of environmentalists is pushing local governments to adopt more ecological-friendly development practices.
The group will urge leaders in Rockford, Cherry Valley, New Milford and Winnebago County to update their ordinances to protect natural land around the Kishwaukee River from stormwater and potential pollutants that industrial development could bring.
More than 1,000 acres near Interstate 39 and Baxter Road are slated for industrial development. The corridor is home to two of northern Illinois most pristine waterways, the Kish and Kilbuck Creek.
The industrial park will be built with green infrastructure techniques — natural landscaping, living roofs, permeable pavements, bioswales, natural stormwater-detention basins — if the coalition’s voice is heard.
“One of the things people think is that environmentalists don’t want development. That’s not it at all,” said Kerry Leigh, executive director of the Natural Land Institute.
“We need to pay attention to how development is done so we can protect these areas and not cause more problems.”
About 20 people met Monday at the Cherry Valley Library to review a presentation of the Kishwaukee River Corridor Green Infrastructure Plan.
The coalition — NLI, the Forest Preserve District, Rockford Park District, Kishwaukee River Ecosystem Partnership, the Illinois Department of Natural Resources, Olson Ecological Solutions and Geosyntec Consultants — hopes to have its final plan ready for local government leaders in June.
Winnebago County already plans to incorporate some of the recommendations into an updated version of its zoning regulations.
The county is drafting a new Unified Development Ordinance that would greatly restrict development in a 100-year flood plain, require buffers between development and critically sensitive areas, and set aside large areas to remain undeveloped. It also would encourage native species to be planted as buffers and have more landscaping requirements that incorporate green concepts.
“It’s not costing the development process more dollars,” Winnebago County Board Chairman Scott Christiansen said. “We’re just doing it smart.”
Christiansen hopes a draft of the new ordinance can be presented to County Board members this year for a vote.
Dennis Dreher, lead consultant with Geosyntec, said green infrastructure principles can reduce long-term costs for companies and make it easier to obtain permits from agencies like the U.S. Army Corps of Engineers. It can also be recruitment tool.
“By encouraging more creative development approaches, particularly things like green infrastructure, you actually create a climate to attract green jobs and green industries that might not otherwise be attracted to the area,” he said.
Kevin Haas: khaas@rrstar.com; 815-987-1410; @KevinMHaas

Plans
Winnebago County, Rockford, and Cherry Valley each have an adopted land use or comprehensive plan that establishes their policies for development, community character, public facilities, and open space. Each of their plans was reviewed to identify elements that were relevant to green infrastructure. A summary of the findings follows.

Winnebago County: Winnebago 2030 Land Resource Management Plan (LRMP)

The County plan has broad policy recommendations, as well as specific recommendations for individual townships. For future land use in Cherry Valley and Rockford Townships it recommends:
- Additional forest preserve land along the Kishwaukee River;
- Designation of the River Corridor Protection Overlay; and
- Industrial land uses around airport and along Rte. 20, Baxter, and Perryville Roads.

Natural Resources: The Plan has a strong emphasis on Natural Resource protection and enhancement. Key goals and policies follow.

The goal is to preserve green infrastructure through protection, conservation and restoration.

Policy 1: Inventory natural areas, critical habitats and contiguous ecosystems.

Policy 2: Implement protection and preservation measures.
  - Establish Environmentally Sensitive Areas Overlay District
  - Establish a review process for developers, staff, and natural resource experts
  - Implement a resource protection plan before development begins on a site

Policy 3: Natural resources -- e.g., parks, large tree stands, and streams -- should be a central feature of new development.

Policy 4: The County should restore and expand wildlife habitats.

Policy 5: Protecting groundwater, rivers, streams, wetlands, and watersheds is critical. It emphasizes restricting development in environmentally sensitive areas. It also identifies areas where drift is thin over the bedrock as “least favorable for general construction.”

Policy 6: Erosion control is necessary to preserve valuable soils.
  - Minimize impervious surfaces.
  - A stormwater ordinance is needed to prevent increases in runoff volume to up to the 2-year storm.
  - Use bio-swales and filter strips to minimize runoff and prevent erosion.

Policy 9: The County should establish public/private partnerships to improve public support for natural resource preservation and restoration. Some key organizations include:
  - Winnebago County Forest Preserve District
  - Winnebago County Soil and Water Conservation District
• IDNR
• USDA Natural Resources Conservation Service
• Natural Land Institute
• Rockford Park District

Public Facilities/Utilities: This section of the Plan includes recommendations for improved stormwater management.

Policy 4: Establish countywide stormwater management through policies and ordinances.
• Require stormwater plan for all new development
• Require buffer zones along stream banks and wetlands
• Address water quality through BMPs
• Encourage naturalized detention basins
• Encourage green roofs, bioswales, and filter strips
• Limit impervious surfaces and encourage permeable paving
• Provide incentives for green building design

Economic Development: This section of the Plan addresses some relevant development standards.

Policy: A clear set of high quality physical design and site development standards is needed for commercial and industrial development
• Encourage a predictable development process
• Encourages generous landscaping, buffering and setback requirements

City of Rockford: Rockford’s 2020 Plan (As Amended)

The Rockford Plan has a relatively strong emphasis on sustainability and smart growth.

Element I: Issues and Opportunities: Natural Resources Policy: Safeguard and improve environmental features as a means of promoting sustainable urban development, revitalization, and good quality of life.

Element II: Land Use
Policy: Get maximum impact from the visibility achieved from heavily travelled roadways: i.e., for commercial, industrial, technology parks

Policy: Incorporate Smart Growth Principles into development and redevelopment.
• Promote mixed-use development and compact building design
• Create a walkable community
• Foster distinctive, attractive community with strong sense of place
• Preserve open space, natural beauty, critical environmental areas
• Create a network of trails and greenways
• Encourage community and stakeholder collaboration in development process
  – Bring developers into the visioning process
  – Prepare sub-area plans
• Policy: Require *full urban services* for any new development. City water, sanitary sewer, urban streets with curb and gutter, storm sewers, and sidewalks. (*There is a concern with this policy because it could discourage green infrastructure approaches such as filter strips, bio-swales, rain gardens, and permeable paving.*)

*Element IX: Natural Resources*

Policy: Broaden the approach to the natural environment to ensure that it receives true protection
- Develop a comprehensive inventory and analysis of natural resources
- Determine how best to provide long-term protection
- Develop a regional framework for protection
- Adopt regulations and policies to be adopted regionally

Policy: Groundwater and stormwater management.
- Emphasize wellhead protection
- Prohibit development in the floodway
- Plan for acquisition with other appropriate jurisdictions
- Broaden the scope of the tree preservation requirements of the Zoning Ordinance
- The Rockford flood detention ordinance is “largely inadequate when dealing with macro stormwater management and quality.”

*Village of Cherry Valley: Cherry Valley Comprehensive Plan (Amended 2009)*

This Plan has considerable emphasis on natural resource and open space protection.

*Natural Features and Open Spaces Policies*: The goal is the preservation and protection of natural features including surface waters, woods, wetlands, and floodplains.
- Restrict or prohibit development in flood-prone area or where unstable soil conditions exist.
- Encourage preservation of open space along stream corridors through coordination of public and private development.
- Prohibit physical alterations or construction of any sort upon wetlands or flood plain areas within the Planning Area through the enactment of Village wetland preservation and flood plain ordinances.
- Protect areas where topographic variations create potential for erosion
- Enhance water quality in stormwater runoff
- Conserve tree cover and natural scenic areas
- Encourage the utilization of open space for multiple purposes, including recreation and enhancing environmental quality
- Pursue Winnebago County plans to purchase recreational and open space along the Kishwaukee River
- Encourage the use of landscaping for existing developed sites without natural features and the landscaping of future sites to carry out the beautification goals
- Encourage preservation of natural features while promoting quality development
• Pursue converting existing landscaping areas into native and low maintenance landscaping in parks

**Parks Policies:** a goal is to improve and preserve the standard of living for area residents by the development of functional, attractive and sufficient recreational parks.
• Developers may be required to provide cash in place of land for development of parks or open space.
• Open space may be designated for lands inappropriate for other uses, and may serve other functions such as natural flooding areas or untouched areas for wildlife.
• The Village, the Rockford Park District, and other governmental bodies shall work to develop a potential park / open space.

**Transportation Policies:** This section of the Plan addresses bicycle and pedestrian routes.
• Provision of an interconnected system of designated routes for use by cyclists and pedestrians
• Routes would link neighborhoods, major activity centers, and serve also for recreational purposes
• Work with other county governmental bodies to design and create a metropolitan wide bike/pedestrian path

**Industrial Development Policies:**
• Require use of significant landscaping in a manner which will complement surrounding sites and land uses
• Industrial activities that develop will be required to construct their business in such a way as to minimize impact on surrounding activities, including the use of landscaping

**Development Policies:**
• All subdivisions shall be served with municipal water, sanitary sewer, curb, gutters, sidewalks, storm sewers and paved roads. *(There is a concern with this policy because it could discourage green infrastructure approaches such as filter strips, bio-swales, rain gardens, and permeable paving.)*

**Rockford Metropolitan Agency for Planning (RMAP):** RMAP has led the development of Rockford Region Vital Signs: A Regional Plan for Sustainable Development. This initiative focuses on the pillars of sustainability:
• Creating a higher quality of life;
• Establish 21st century economic strategies; and
• Maintain world-class sustainable environmental systems

**Vital Signs:** Vital Signs has identified a number of sustainability topics, many of which have a tie to green infrastructure.
• Safety
• Civic vitality
• Cultural life
• Health
• Food
• Housing
• Education
• Economic development
• Technology
• Transportation
• Built environment
• Water
• Land
• Biodiversity
• Energy
• Waste management
Kishwaukee River Watershed Strategic Plan for Habitat Protection and Restoration: Below are the Kishwaukee River Ecosystem Partnership’s recommendations to protect the Lower Kishwaukee River Subwatershed. These recommendations are intended to provide the local stakeholders with ideas and strategies that they can implement to preserve, protect and enhance the natural resources.

**Primary Actions to Needed Protect the Watershed:**

- Work with municipal and county development departments to revise development guidelines to mandate innovative land planning and stormwater management techniques which minimize runoff from development and maximize pollutant removal before runoff reaches the stream corridor or existing wetlands. In order to preserve the watershed’s high-quality resources, Conservation Development must be the rule, rather than the exception in all future development.
- Due to rapid urbanization, it is essential to coordinate the protection of remaining undeveloped parcels that contain unique habitats such as wetlands; floodplain; tributary streams; high quality upland habitat and/or are candidates for acquisition, conservation easements, or other conservation practices.
- Coordinate with Rockford, New Milford and Winnebago/Boone County governments to incorporate conservation design into zoning and planned developments yet to be designed/permitted.
- Coordinate with developers to educate and encourage conservation design in future developments. Emphasize economic and aesthetic benefits.
- Coordinate with Winnebago Forest Preserve and Greater Rockford Airport Authority to protect additional open space near the airport and confluence with Rock River, including Bell Bowl Prairie.

**Other Recommended Actions:**

- Assist and educate local residents and governments with streambank stabilization projects along the urban stream tributaries to mitigate impacts of urbanization/neglect.
- Create continuity of protection measures amongst multiple landowners (such as bank/bed erosion; invasive species removal, etc.)
- Assist Rockford Park District, Forest Preserve and local landowners with obtaining funds to stabilize main channel erosion at Atwood Park site, and other sites in the subwatershed.
- Work with Illinois Department of Transportation, County and Township Highway Departments to encourage increased use of native vegetation along right-of-ways and implement non-structural Best Management Practices (BMP’s) to improve runoff water quality entering streams that cross highway rights-of-way.
- Coordinate with Rockford Park District, Winnebago Forest Preserve and Other groups to restore and enhance existing protected open space.

**Site Specific Areas of Concern to Protect/Enhance the Subwatershed:** Coordinate with Winnebago Forest Preserve to protect additional open space near the airport and confluence with Rock River, including Bell Bowl Prairie.
**Ordinances**

The relevant ordinances of Rockford, Cherry Valley, and Winnebago County were reviewed, and findings are highlighted below.

**Rockford:** Chapter 109: Flood Hazard Reduction (appears to be the same as Chapter 11 ½: Surface Water Management

*Stormwater detention* provisions call for a maximum release rate of 0.2 cfs/acre. This compares to maximum release rates of 0.1 to 0.15 cfs/acre in most northeastern Illinois ordinances. There are no significant provisions for water quality-based detention designs, such as naturalized or wetland-type basins. No detention control is required for direct discharges to significant rivers, including the Kishwaukee and Rock.

*Stormwater quality* is referenced (e.g., LID is mentioned), but there are no specific requirements for BMPs.

*Erosion and sediment control* requirements are not specifically included but are adopted by reference to an ordinance developed by the City and the Winnebago County Association for Clean Water Action (2005). There also is a reference to SESC plans being consistent with the Illinois Urban Manual.

*Floodplain management* requirements incorporate the basic IDNR and FEMA provisions. There are no additional provisions for stream protection, buffers, or floodway appropriate uses as are found in many NE Illinois ordinances.

**Cherry Valley:** [http://library.municode.com/index.aspx?clientId=12455](http://library.municode.com/index.aspx?clientId=12455)

Chapter 62: subdivisions, Article III: Required Improvements – Sec. 62-129 Drainage

Chapter 30: Flood Damage Prevention

Chapter 28: Environment -- Soil Erosion and Sediment Control

*Stormwater detention* provisions call for a maximum release rate of 0.2 cfs/acre. While this ordinance is more detailed than the Rockford ordinance, there are no significant provisions for water quality-based detention designs, such as naturalized or wetland-type basins. There is a brief reference to silting basins.

*Erosion and sediment control* provisions are relatively comprehensive. The ordinance contains principles and design and operating standards similar to the recommendation of the NIPC Model SESC Ordinance. It also contains relatively strong provisions for site inspection, maintenance, and enforcement.
Floodplain management requirements incorporate the basic IDNR and FEMA provisions. The ordinance encourages preservation of natural streams and channels and preserving floodplains within parks or other public grounds. There are no additional provisions for stream protection, buffers, or floodway appropriate uses as are found in many NE Illinois ordinances.

Winnebago County: Article IV: Surface Water Management and Surface Water Management Technical Regulations

Stormwater detention provisions call for a maximum release rate of 0.2 cfs/acre. While this ordinance is more detailed than the Rockford ordinance, there are no significant provisions for water quality-based detention designs, such as naturalized or wetland-type basins. There is a brief reference to silting basins. No detention control is required for direct discharges to significant rivers, including the Kishwaukee and Rock.

Erosion and sediment control provisions are relatively comprehensive. The ordinance contains principles and design and operating standards similar to the recommendation of the NIPC Model SESC Ordinance. It also contains relatively strong provisions for site inspection, maintenance, and enforcement.

Floodplain management requirements incorporate the basic IDNR and FEMA provisions. The ordinance encourages preservation of natural streams and channels and preserving floodplains within parks or other public grounds. There are no additional provisions for stream protection, buffers, or floodway appropriate uses as are found in many NE Illinois ordinances.

Conclusions: These ordinances are generally less protective of aquatic systems and natural resources than typical ordinances adopted in the CMAP counties. Beyond the focus on stormwater detention, soil erosion, and floodplains, the ordinances do not appear to address some of the key concerns and opportunities of the Kishwaukee River corridor. These include:

- Stream and riparian area protection
- Wetland protection
- Stormwater drainage BMPs
- Protection/avoidance of steep slopes
- Natural resource protection (e.g., woodlands, prairies, critical recharge areas)
- Natural landscaping provisions
- Long-term maintenance/stewardship of natural areas
- Conservation development opportunities

For reference, the Appendix contains a checklist of “watershed friendly” ordinance provisions that has been used in several recent NE Illinois watershed plans.
Mapping of Green Infrastructure

Mapping process
GIS experts at the Rockford Park district began to develop a green infrastructure base map for the planning area. This map identified sensitive resources, natural areas, and open space.

The project planning area was defined generally as the Lower Kishwaukee River watershed. The area includes from the confluence with Rock River then heading South on South Bend road then straight south past the Winnebago / Ogle county line. East along the County line to Mulford Road and the North boundary is the Kishwaukee River just south of the Airport.

Spatial data was collected for the entire region including all available natural resource data and some created data. The following maps were then created using that spatial data to identify the Core Green Infrastructure of the Kishwaukee Corridor:

Map Review
The Kishwaukee River Ecosystem Partnership invited local natural resources staff to review the draft maps September 19, 2012. In attendance: Josh Franks - Natural Resources Conservation Service, Dennis Anthony - Soil and Water Conservation District, Tim Bragg- Rockford Park District, Mike Groves- Winnebago County Forest Preserve District, Gary McIntyre- Rockford Metropolitan Agency for Planning (RMAP), Colin Belle- RMAP, Colleen Hoesly- RMAP, Burnie Turner- WinGIS, Dennis Dreher- Geosyntec, Jerry Paulson- Natural Land Institute, Nathan Hill- Rockford Park District, and Rebecca Olson- Olson Ecological Solutions. Their knowledge and expertise of the natural resources of the Winnebago County and the Kishwaukee River watershed was invaluable in reviewing the draft map and recommending additional green infrastructure resources and priorities. The final maps were developed after their review.

Map Results
Individual maps generated for meetings, presentations, and this report included a base map, natural resources, core green infrastructure, and core and supporting green infrastructure. These maps, presented on the next few pages, included the following attributes:
Kishwaukee Corridor Base Map

✓ Roads, county line, streams, water bodies, county line.
✓ Kishwaukee River Corridor Project Planning area
✓ Protected Open Space – Rockford Park District, Winnebago County Forest Preserve, Natural Land Institute, and Natural Area Inventory Sites.
Kishwaukee Corridor Natural Resources Map

- Base Map layers +
- National Wetland Inventory Wetlands
- 100 year Floodplain
- Remnant Woodlands (created using Public land survey notes, 1939 and current aerial photography).

- Streams – Perennial and Intermittent
- Illinois Natural Area Inventory Sites
- Steep Slope Soils: C or greater
Kishwaukee Corridor Core Green Infrastructure Map

- Base Map layers
- Core Green Infrastructure consolidated the following:
  - Wetlands, protected open space, remnant forests & streams all buffered 100ft
  - 100 year floodplain.
  - Winnebago Boone Greenways Plan - Critical and Sensitive Lands
  - Steep Slopes – C or greater
Kishwaukee Corridor Core & Supporting Green Infrastructure Map

- Base Map+
- Core Green Infrastructure Map components
- Supporting Green Infrastructure: Hydric Soils
Additional Supporting Green Infrastructure Map
✓ Aquifer Sensitivity
Additional Supporting Green Infrastructure Map
✓ Potential Shallow Water Contamination from NO3 and Pesticides
Green Infrastructure Policy and Implementation Recommendations

Moving from Policy to Action
This Plan recognizes the strong policy basis for various aspects of green infrastructure protection and design in the land use plans of Winnebago County, Rockford, and Cherry Valley. It also recognizes that these plans, for the most part, do not have the ability by themselves to effect most land use and development decisions. It notes that the development ordinances of the local governments generally do not reflect the progressive policies of their adopted plans.

Based on these observations, the core recommendation of this Plan is to encourage movement from broad policies to more specific actions. It recommends incorporating more specific green infrastructure (GI) maps and principles into land use and policy plans by taking action in the following areas:

- Adopt ordinance language that protects critical GI resources and allows, encourages, and/or require GI designs for all new development.
- Establish stronger collaboration between local governments, developers, and natural resource organizations to incorporate GI protection into development proposals.
- Continue to strengthen intergovernmental cooperation between the county, municipalities, and other relevant units of local government.

GI Principles for Policies and Plans

Objectives

- Preserve green infrastructure in the Kishwaukee River Corridor through protection, conservation, and restoration actions.
- Recognize that desirable economic growth and high quality of life in the Kishwaukee Corridor depends on an adequate quality and quantity of water, a pleasing natural environment, and ample recreational opportunities.

Recommendations

- Use the Kishwaukee Corridor Core Green Infrastructure Map as the “official” inventory of natural areas, critical habitats and contiguous ecosystems in land use plans and ordinances.
- Use this inventory to establish an Environmentally Sensitive Areas Overlay District.
- Establish public/private partnerships to identify and preserve additional public and private open space along the Kishwaukee River and Killbuck Creek. Suggested partners include:
  - Winnebago County Forest Preserve District
  - Rockford Park District
  - IDNR
  - Natural Land Institute
  - Winnebago County Soil and Water Conservation District
  - USDA Natural Resources Conservation Service
  - Private land owners and developers
• Work with these partners to ecologically restore and expand wildlife habitats.
• Work with these partners and neighboring local governments to connect existing and proposed greenway and trail systems to the existing regional network identified in the Boone and Winnebago Regional Greenways Plan.

**Development Ordinance Principles**

**Objectives:** Establish comprehensive ordinance requirements that:
• Minimize development in environmentally sensitive areas; and
• Minimize erosion and sedimentation, treat precipitation and runoff as resources (vs. waste products), encourage creative, cost-effective development approaches, and enhance quality of life and aesthetics.

**Recommendations – Resource Protection and Stewardship**
• Require creative planning of development on sites that contain or are adjacent to environmentally sensitive areas. More specifically, adopt ordinance criteria for avoidance and/or minimization of impacts in the following areas.
  - Rivers, streams, and intermittent streams and associated buffers
  - National Wetland Inventory (NWI) and locally delineated wetlands and associated buffers
  - 100-year floodplains
  - Remnant woodlands, prairies, and associated buffers
  - Buffers adjacent to protected open space
  - Illinois Natural Area Inventory sites and associated buffers
  - Steep slopes (C or greater)
• Avoid areas that are least favorable for general construction, such as where drift is thin over the bedrock.
• Incorporate existing and restored natural resources as central features of new development, including remnant woodlands and tree stands, streams, and wetlands.
• Establish long-term management provisions for protected natural areas, open space, and BMPs addressing:
  - Long-term funding
  - Ownership
  - Conservation easements
  - Maintenance, management, and performance criteria
  - Long-term monitoring

In discussions with staff and officials from Winnebago County, there was agreement to incorporate provisions for the preceding resource protection concerns into the County’s draft Unified Development Ordinance (UDO). While the UDO is still in draft as of the completion of this Plan, it is recommended that Rockford, Cherry Valley, and other communities look to the UDO for model ordinance language for protection of critical natural resources that comprise the core green infrastructure of the Kishwaukee Corridor.
In addition, Geosyntec has developed a checklist for development ordinances that identifies provisions that promote green infrastructure and watershed-friendly development. This checklist is presented as an Appendix. It identifies, for example, provisions that are recommended to be included in subdivision, landscaping, and zoning codes as well as specific recommendations for conservation design.

**Recommendations – Stormwater Best Management Practices (BMPs):** Establish consistent, countywide stormwater management through improved ordinances. These ordinances should address the following considerations:

- Ensure that the ordinance meets the evolving NPDES standards of the U.S. Environmental Protection Agency (EPA) and Illinois EPA to incorporate green infrastructure into development and to infiltrate the runoff from small to moderate storm events.
- Adopt ordinance provisions that will prevent increases in runoff volume for precipitation events up to the 2-year storm.
- Adopt standards to minimize adverse impacts for any development located on hydric soils or sensitive recharge areas.
- Require stormwater plans for all new development.
- Require the use of bio-infiltration practices -- particularly bio-swales, rain gardens, and filter strips -- wherever feasible, to minimize runoff volume and pollutant loads and prevent erosion.
- Require naturalized detention basins that incorporate wetland plants in basin bottoms and/or shorelines and prairie plants on basin side slopes.
- Require natural landscaping (in lieu of turf grass) for stormwater BMPs, buffer areas, common open space, and perimeters.
- Encourage green roofs.
- Minimize impervious surfaces and encourage permeable paving.
- Provide detention credits for runoff that is temporarily stored under permeable paving and bio-infiltration practices.
- Provide incentives for green building design.
- Encourage and/or require a clear set of high quality physical design standards, including generous landscaping, buffering and setback requirements.
- Evaluate and revise relevant provisions of county and municipal subdivision, zoning, and landscaping ordinances so that the stormwater and site design recommendations above are supported and incentivized.

The project team has engaged in conversations with Winnebago County officials to encourage the convening of a process to evaluate the prevailing stormwater ordinance standards and develop recommendations for improvements. It is recommended that this process be modeled after a similar intergovernmental process that had been undertaken in the mid-2000s and which led to many of the current stormwater ordinance provisions of the County, Rockford, Cherry Valley, and other communities. This intergovernmental process ideally would develop consistent regulatory standards that provide a “level playing field” among communities and would be
beneficial to the development community by providing a high degree of predictability and consistency.

More detailed ordinance recommendations, including a comprehensive checklist of provisions that require green infrastructure and watershed-friendly approaches to development, are contained in the Appendix. These recommendations address provisions for comprehensive stormwater management, including stormwater drainage and detention, soil erosion and sediment control, floodplain management, and stream and wetland protection. The checklist also contains provisions for natural area protection, natural landscaping, impervious area reduction (through more efficient road and parking lot design), and conservation design. These latter provisions are commonly addressed in subdivision, zoning, and landscaping codes.

The Appendix includes references for green infrastructure ordinance approaches. It also includes references to some municipal and county ordinances that could serve as models for the communities in the planning area. In addition, the countywide stormwater ordinances of DuPage, Kane, Lake, and McHenry Counties address many of the stormwater provisions recommended above. It is recommended that local jurisdictions in the Kishwaukee Corridor consider these provisions and existing ordinances as a starting point in updating local ordinances.

**Principles for a More Collaborative and Holistic Development Process**

**Objectives**

- Establish a proactive (vs. reactive) process for development planning and review that places a high priority on the early identification and protection of core and supporting green infrastructure.
- Consider related principles of cost-effectiveness, regulatory predictability, aesthetics, and sustainable economic development in the development review process.

**Recommendations**

- Establish a site plan review and platting process that effectively engages developers, staff, planners, and natural resource experts (including the agencies and organizations identified above), and the public.
- Require the development and implementation of a resource protection plan before development begins on a site.
  - Develop a site planning approach that avoids and/or minimizes impacts to any resources in the Environmentally Sensitive Areas Overlay District (i.e., the Core Green Infrastructure Map).
  - Develop a site design approach that minimizes adverse water resource, ecological, and aesthetic impacts through measures such as stormwater BMPs, minimizing impervious surfaces and mass grading, natural landscaping, and buffers.
  - Develop a long-term management plan for the sustainable ownership, stewardship, monitoring, and funding of protected natural resources and green infrastructure.
Intergovernmental Cooperation Principles

Objectives

- Strengthen intergovernmental cooperation between the county, municipalities, open space organizations, and other relevant units of local government.
- Present a consistent approach to development opportunities and infrastructure needs that emphasizes green infrastructure opportunities, sustainable economic development, and cost-effectiveness.

Recommendations

- Develop an improved countywide stormwater ordinance and/or adopt consistent ordinances among the county and municipalities in the planning area to provide a level playing field for future development proposals.
- Establish a framework for intergovernmental cooperation on land use decisions in Kishwaukee Corridor Planning Area.
- Strive for continued cooperation among local governments in the planning and provision of water, sewer, and transportation infrastructure to the planning area.

Cost Effectiveness of Green Infrastructure

While green infrastructure is becoming a widely accepted alternative development approach on the merits of its environmental benefits, questions of its cost effectiveness – in comparison to conventional grey infrastructure approaches – continue to be raised. Fortunately, there is growing documentation, regionally and nationally, supporting the conclusion that the long-term costs of green infrastructure are generally less than or equal to the costs of grey infrastructure. A few specific references and websites are provided at the end of this section.

While a true comparison of green vs. grey infrastructure costs often will require a site specific analysis, there are several basic principles that should be considered for all projects.

*Reduced up-front costs*

Some green infrastructure approaches reduce or eliminate the need for expensive grey infrastructure. A common example is the use of inexpensive naturalized swales or bioswales in lieu of traditional storm sewer drainage systems. Similarly, conservation developments that reduce mass grading and road and utility lengths can substantially reduce their infrastructure costs.

*Reduced life-cycle costs*

Some green infrastructure practices last substantially longer than grey infrastructure alternatives, thereby reducing life cycle costs. A good example is a permeable paving parking lot that often costs more to initially install than conventional concrete or asphalt but has a much longer life span. When considering total cost outlays over a time span of 20 to 30 years, for example, permeable paving may be much less expensive. When the stormwater storage under permeable
paving is factored in (thereby reducing detention needs), the cost advantages for permeable paving are even stronger.

**Reduced maintenance costs**

Depending on the particular practice, green infrastructure may be more or less expensive to maintain than conventional infrastructure. But maintenance costs of some green infrastructure practices are much less expensive than their grey counterparts. A good example is natural landscaping in comparison to turf grass. While most turf installations require regular mowing and irrigation, well-established natural landscapes require relatively little long-term maintenance. Natural landscapes do require long-term spot control of invasive weeds and a regular schedule of controlled burning, but these costs are substantially less than maintenance costs for most turf installations.

**Multiple benefits**

While most grey infrastructure practices have a single purpose, most green infrastructure practices provide multiple benefits. For example, while storm sewers are meant to merely convey runoff, bio-swales convey, store, treat, and infiltrate runoff. Green roofs not only reduce runoff volumes, they also reduce urban heat-island impacts and reduce heating and cooling costs for buildings. Native landscaping and use of trees in urban design can enhance property values, reduce air pollution, mitigate climate change impacts, and reduce energy costs.

**Reduced need for public infrastructure investment and remediation**

Regardless of the potential cost savings to developers, green infrastructure provides considerable public benefits and reduces public remediation costs for problems like flooding and stream channel erosion. The use or native landscaping instead of turf can substantially reduce demand for irrigation, thereby reducing the need to size water supply infrastructure to meet extreme summer-time demands. Another example is the creation of open space, greenways, and trails in private developments that provide connections to public recreation systems or, in some cases, are donated directly to public open space agencies.

**Next Steps**

We recommend that municipalities and stakeholders continue to work with technical advisors to achieve the following:

1. Adopt the Green Infrastructure Plan through an Intergovernmental Agreement approved by Winnebago County, Ogle County, City of Rockford, Village of Cherry Valley, Village of New Milford, Rockford Park District and Winnebago County Forest Preserve District.

2. Develop and adopt a UDO and county-wide stormwater ordinance that incorporates the recommendations of the Green Infrastructure Plan.

3. Work with the City of Rockford and Ogle County to develop a GI-based master plan for the industrial property in the Global Trade Park south of Kilbuck Creek.
4. Work with RMAP and Rockford Area Economic Development Council to incorporate GI concepts into the regional plan for Sustainable Development.

5. Engage larger landowners and developers in the planning area to discuss GI concepts and innovative approaches to development.

**Selected References**

Banking on Green: A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-Wide, ASLA  

Forging the Link, Chapter 3: Economics and LID Practices  
[http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/FTL_Chapter3%20LR.pdf](http://www.unh.edu/unhsc/sites/unh.edu.unhsc/files/docs/FTL_Chapter3%20LR.pdf)  
This was developed by Rob Roseen, a colleague at Geosyntec.

Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices, USEPA  
[http://water.epa.gov/polwaste/green/upload/2008_01_02_NPS_lid_costs07uments_reducingstor mwatercosts-2.pdf](http://water.epa.gov/polwaste/green/upload/2008_01_02_NPS_lid_costs07uments_reducingstormwatercosts-2.pdf)  
This EPA doc reports on a number of case studies.

Link to EPA's website that addresses costs-benefits of GI.  
[http://water.epa.gov/infrastructure/greeninfrastructure/gi_costbenefits.cfm](http://water.epa.gov/infrastructure/greeninfrastructure/gi_costbenefits.cfm)

Changing Cost Perceptions: An Analysis of Conservation Development, Chicago Wilderness  
Appendix 1

Suggested Ordinance Checklist

Background and Purpose

The purpose of this checklist is to provide a template for the review of municipal and county stormwater, subdivision, zoning, and related development ordinances. The goal is to encourage ordinance provisions that promote sustainable development and redevelopment that protects water resources, natural resources, and quality of life. A related goal is to meet the intent of evolving state and federal Environmental Protection Agency standards that call for increased reliance on green infrastructure solutions.

This checklist is based on a combination of local, regional, and national ordinances and resources, including:

- NIPC Facility Planning Area Nonpoint Source Management checklist
- Progressive provisions of local municipal ordinances, countywide stormwater ordinances, and other municipal or county conservation design ordinances
- NIPC/CMAP Ecological Planning and Design Directory
- Blackberry Creek Watershed: Zoning Code Analysis and Ordinance Language Recommendation report (Kane County, 2004)
- U.S. EPA Water Quality Scorecard
- Center for Watershed Protection, Better Site Design (Code and Ordinance Worksheet and related publications)

The ordinance review addresses five major topical areas. These include:

1) Comprehensive Stormwater Standards
   a. Stormwater drainage and detention
   b. Soil erosion and sediment control
   c. Floodplain management
   d. Stream and wetland protection
2) Natural Area Standards
3) Landscaping Standards
4) Impervious Area Reduction: Street and Parking Requirements
5) Conservation Design: Zoning/Subdivision Standards

1. Comprehensive Stormwater Standards

A comprehensive stormwater ordinance should address stormwater and erosion impacts of development on runoff quantity and water quality. The ordinance also should regulate impacts to streams and wetlands in an attempt to minimize adverse impacts to aquatic habitat.
**General Recommendations**: Adopt progressive, comprehensive standards for the protection of water resources and related aquatic resources. In particular, ordinances should go beyond a core emphasis on stormwater rate and quantity to also emphasize holistic protection of water quality, natural hydrology, and aquatic habitat. These items can be addressed through an integrated approach to stormwater drainage and detention, soil erosion and sediment control, floodplain management, and stream and wetland protection.

2. **Natural Area Standards**
This section focuses on protection, restoration, and management of natural areas. These recommendations address *remnant* landscapes as well as *restored/created* natural areas. Comprehensive stormwater ordinances should address, to a large degree, protection of streams and wetlands. However, most stormwater ordinances do not specifically address associated upland natural areas—such as prairies, savannas, and woodlands—that buffer aquatic systems and provide critical landscape linkages for wildlife.

**General Recommendations**: Identify, map, and plan for the protection of a green infrastructure network that recognizes aquatic and upland resources to be protected, along with appropriate buffers. This could be accomplished via a series of community-wide “natural areas overlay districts.” Identified natural areas could be protected via strict development prohibitions or through flexible zoning that allows for clustering around sensitive areas. Specific standards should address natural area identification, allowable uses and vegetative cover within the natural area, buffer transitions, and other design elements.

In addition, preparation of management plans should be required for designated natural areas and buffers. Further, performance criteria, qualified management entities, and revenue sources for management activities should be institutionalized.

3. **Landscaping Standards**
Natural landscaping can greatly benefit the preservation of water quality and natural hydrology. Natural landscaping can be encouraged and/or required, where appropriate, in common areas in lieu of conventional turf grass landscapes. It also can be specifically targeted to BMP applications, such as bio-infiltration swales, rain gardens, filter strips, and naturalized detention basins.

Unfortunately, some landscaping ordinances may (unintentionally) discourage the use of natural landscaping via “weed” prohibition language. Some ordinances also require the physical separation of pervious and impervious surfaces on site, thereby effectively preventing runoff from impervious surfaces flowing onto pervious areas. A common example is the requirement to install raised landscape islands (vs. recessed islands) in parking lots.
General Recommendations: Landscaping ordinances should encourage and/or require the integration of pervious, landscaped areas with the impervious areas of the site. Runoff, where feasible, should be routed across and through landscaped areas. Wherever feasible and appropriate, deep-rooted natural landscaping should be used in lieu of conventional, shallow-rooted turf grass landscaping. This should be accompanied by ordinance performance criteria for the establishment of attractive and ecologically sustainable natural landscapes and legal and financial provisions (such as a back-up Special Service Area) for their long-term management. Language to specifically allow/require integration of bio-infiltration into parking lot islands and street side landscape strips also is recommended.

Tree protection language is recommended to provide protection of desirable (e.g., native) trees and shrubs. Flexibility should be provided to allow removal of trees where appropriate for proper forest/natural area management, along with the inclusion of replacement criteria for the unavoidable removal of desirable species.

4. Impervious Area Reduction: Street and Parking Requirements
A significant proportion of the impervious surfaces, which are the primary sources of stormwater impacts, is related to streets and highways. Limiting the amount of impervious cover to that which is necessary and to the most appropriate areas is a key to ecologically sensitive design.

Similarly, parking facilities often create large impervious surfaces that result in an increase in stormwater runoff and related water quality issues. Reduced parking area and alternative porous paving materials can help to reduce impervious surfaces and facilitate infiltration and groundwater recharge.

General Recommendations:
Revised design standards for narrower street widths, along with allowances for street designs that utilize naturalized stormwater infiltration and conveyance systems, should be incorporated into current codes. Also, since stream crossings can cause significant stream impacts, recommended standards related to the number of crossings and the design of crossings should be considered.

Parking standards can be updated to allow for shared parking, parking credit programs (i.e., purchasing credits for public parking in lieu of creating private spaces), and preferred parking for compact cars and non-motorized vehicles. Specific language to allow permeable parking surfaces such as interlocking concrete pavers, porous asphalt, and porous concrete is recommended. In addition (as noted above) parking lot design standards should encourage or require practices that enhance runoff infiltration and cleansing, such as bio-swales, rain gardens, and filter strips.
5. Conservation Design: Zoning/Subdivision Standards
Some of the approaches and standards discussed above may be inconsistent with existing zoning and subdivision codes. Therefore, greater flexibility is needed in existing codes to allow, encourage, and/or require creative, conservation-based site designs. One obvious way to enable creative designs is to incorporate standards for “clustering” of residential developments. This can provide a number of benefits, including allowing additional room for the incorporation BMPs; reducing mass grading; allowing shorter street networks; and protecting natural areas and open space without reducing the number of lots.

General Recommendations: Conservation design should be encouraged or required in zoning and/or subdivision codes. Options are to allow conservation design by right, require it for all sites containing sensitive natural resources, or require it for all developments. Conservation design would ideally incorporate a four-step site design process for residential developments.

- Identify and preserve natural resources, natural drainage features, and sensitive areas.
- Locate buildable areas to minimize impacts on natural areas and to take advantage of open space and scenic views.
- Design the street network to minimize encroachment in sensitive natural areas.
- Establish lot lines and lot sizes following a cluster development approach.

It also may be desirable to offer density bonuses to incentivize conservation design elements that exceed the minimum ordinance requirements. As noted above, conservation developments should include clear institutional and financial arrangements for the long-term ownership and management of open spaces and natural areas.
ORDINANCE CHECKLIST

Comprehensive Stormwater Standards

Stormwater Drainage and Detention

Does the stormwater management ordinance:

▪ Include control of runoff rate, volume, and quality in the purpose statement?  
  Yes _____ No _____

▪ Encourage the use of permeable paving, green roofs, and similar practices that reduce the quantity of runoff that must be handled with innovative or conventional drainage practices?  
  Yes _____ No _____

▪ Encourage/require the use of natural drainage practices (e.g., swales, filter strips, bio-infiltration devices, and natural depressions over storm sewers) to minimize runoff volumes and enhance pollutant filtering?  
  Requires _____ Encourages______ Neither______

▪ Provide detention credit for practices, such as permeable paving or bio-infiltration, that provide temporary storage of runoff in the sub-surface void spaces of stone or gravel?  
  Yes _____ No _____

▪ Require that peak post-development discharge from events less than or equal to the two-year, 24-hour event be limited to 0.04 cfs per acre of watershed? Yes _____ No _____  
  Other__________

▪ Require detention design standards that maximize water quality mitigation benefits, with a requirement for “naturalized” wet bottom and/or wetland basins over dry basins?  
  Yes _____ No _____

▪ Require conformance to numerical water quality performance standards (such as percent removal of sediment or phosphorus)?  
  Yes _____ No _____ Comment__________

▪ Prohibit detention in the floodway?  
  Yes _____ No _____
▪ Prohibit on-stream detention, unless it provides a regional stormwater storage benefit (e.g., for upstream properties and/or multiple sites) and is accompanied by other upstream water quality BMPs, such as bio-infiltration?
Yes _____ No _____

▪ Prohibit the direct discharge of undetained stormwater into wetlands?
Yes _____ No _____

▪ Require formal maintenance plans and contracts for the long-term maintenance and vegetative management of all new detention facilities?
Yes _____ No _____

**Soil Erosion and Sediment Control**

Does the soil erosion and sediment control ordinance:

▪ Include a comprehensive purpose statement which limits sediment delivery, as close as practicable, to pre-disturbance levels and minimizes effects on water quality, flooding, and nuisances?
Yes _____ No _____

▪ Include a comprehensive set of principles that minimize sediment transport from the site for all storms up to the ten-year frequency event? (These principles should include provisions to minimize the area disturbed and the time of disturbance; follow natural contours; avoid sensitive areas; require that sediment control measures be in place as part of land development process before significant grading or disturbance is allowed; and require the early implementation of soil stabilization measures on disturbed areas.)
Yes _____ No _____

▪ Require ordinance applicability for any land disturbing activity in excess of 5,000 square feet?
Yes _____ No _____ Other (Describe) ________________________________

Require ordinance applicability for any land disturbing activity in excess of 500 square feet if adjacent to stream, lake, or wetland?
Yes _____ No _____ Other (Describe) ________________________________

▪ Include explicit site design requirements for sediment control measures, conveyance channels, soil stabilization, construction adjacent to water bodies, construction entrances, etc.?
Yes _____ No _____ Comment__________
• Adopt by reference the "Illinois Urban Manual" published by the Natural Resources Conservation Service and the Illinois Environmental Protection Agency (1995, updated 2010) and the "Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control" published in 1988 (the Greenbook)? (These references provide additional design standards and guidelines beyond the specific standards spelled out in the ordinance.)
  Yes _____ No _____

• Require routine maintenance of all erosion and sediment control practices?
  Yes _____ No _____

• Require inspection by appropriately trained personnel of construction sites at critical points in the development process to ensure that measures are being correctly installed and maintained?
  Yes _____ No _____

• Provide effective enforcement mechanisms including performance bonds, stop-work orders, and penalties, as appropriate?
  Yes _____ No _____ Comment_____________

**Floodplain Management**

Does the floodplain management ordinance:

• Include protection of hydrologic functions, water quality, aquatic habitat, recreation, and aesthetics in the purposes for the ordinance?
  Yes _____ No _____

• Restrict modifications in the floodway to the following appropriate uses: public flood control projects, public recreation and open space uses, water dependent activities, and crossing roadways and bridges? (The ordinance would thereby prohibit new treatment plants and pumping facilities; detached garages, sheds, and other non-habitable structures; parking lots and aircraft parking aprons; and roadways which run longitudinally along a watercourse.)
  Yes _____ No _____ Comment_____________

• Discourage stream channel modification and require mitigation of unavoidable adverse water quality and aquatic habitat impacts? (This would be done in cooperation with the Army Corps of Engineers for federally jurisdictional waterways.)
  Yes _____ No _____
▪ Require effective soil erosion and sediment control measures for ALL disturbances in the floodway?
Yes _____ No _____

Stream and Wetland Protection

Does the applicable stream and wetland protection ordinance:

▪ Include a comprehensive purpose statement which addresses the protection of hydrologic and hydraulic, water quality, habitat, aesthetic, and social and economic values and functions of wetlands?
Yes _____ No _____

▪ Protect the beneficial functions of streams, lakes, and wetlands from damaging modifications, including filling, draining, excavating, damming, impoundment, and vegetation removal? (This could be done through some combination of avoidance and mitigation requirements, similar to Army Corps of Engineer requirements for federally jurisdictional waters.)
Yes _____ No _____

▪ Prohibit the modification of high quality, irreplaceable wetlands, lakes, and stream corridors?
Yes _____ No _____

▪ Discourage the modification of wetlands for stormwater management purposes unless the wetland is severely degraded and nonpoint source BMPs are implemented on the adjacent development?
Yes _____ No _____

▪ Designate a minimum 100 foot setback zone from the edge of identified wetlands and water bodies in which development is limited to the following types of activities: minor improvements like walkways and signs, maintenance of highways and utilities, and park and recreational area development?
Yes _____ No _____ Other (if not 100 feet) _____

▪ Establish a minimum 25-foot wide protected native vegetation buffer strip along the edge of identified wetlands and water bodies?
Yes _____ No _____ Other (if not 25 feet) _____
• Prohibit watercourse relocation or modification except to remedy existing erosion problems, restore natural habitat conditions, or to accommodate necessary utility crossings; and require mitigation of unavoidable adverse water quality and aquatic habitat impacts?
  Yes _____ No _____

• Encourage the restoration of stream and wetland habitat, hydrology, and morphology on development sites that contain degraded aquatic systems? (This could be accomplished through a streamlined permitting process and/or other development incentives.)
  Yes _____ No _____

**Natural Area and Open Space Standards**

Does the applicable ordinance require:

Protection of remnant natural areas, including steep slopes, prairies, woodlands, and savannas (in addition to regulated wetlands and floodplains)?
Yes _____ No _____ Comment__________

Setting aside onsite open space for residential development, generally conforming to the following guidelines: estate residential: 60%; moderate residential: 45%; urban residential: 30%? (Common open space is preferable, but deed-restricted open space also is acceptable.)
Yes _____ No _____ Other_____

Restoration of protected natural areas to reduce invasive species and enhance biodiversity?
Yes _____ No _____

Identification of an open space ownership entity, with a preference for a qualified public or private land conservation organization?
Yes _____ No _____ Comment__________

Dedication of natural open space via a binding conservation easement or similar binding legal instrument that ensures protection in perpetuity?
Yes _____ No _____ Comment__________

Secure and permanent funding arrangements for the long-term management and maintenance of open space, natural areas, and stormwater facilities once responsibilities are turned over to a conservation entity or the homeowners/property owners association? (Said funding arrangements shall be noted and made part of the Covenants and Restrictions.)
Yes _____ No _____
Establishment of a back-up special service area (SSA) in order to provide funds necessary to support the maintenance of open space and stormwater management areas (in the event that the responsible land owner/manager does not meet the required maintenance standards)?
Yes _____ No _____ Other arrangement_________

Long-term management/stewardship plans for all common open space areas, natural areas, and stormwater facilities?
Yes _____ No _____

Meeting measurable performance criteria for managed natural areas, including ground coverage, species diversity, and control of invasive species?
Yes _____ No _____

**Landscaping Standards**

Does the applicable ordinance:

Include “noxious weed” provisions that might intentionally, or unintentionally, preclude natural landscaping because of vegetation height standards or similar restrictive provisions?
Yes _____ No _____

Encourage/require the use of native plant materials for the default landscaping of common areas, stormwater facilities, common open space areas, and the buffers of streams, lakes, wetlands and other natural areas?
Encourage _____ Require _____ Neither _____

Specify a minimum percentage of pervious landscaping for parking lots?
Yes _____ No _____ If yes, specify percent _____

Encourage/require the use of recessed landscape islands (vs. raised islands) to facilitate the infiltration and filtering of parking lot runoff?
Encourage _____ Require _____ Neither _____

Require provisions for long-term oversight, management, funding, and performance criteria for common areas and natural landscapes (as referenced above in greater detail)?
Yes _____ No _____ Comment__________

Require planting street trees? Yes _____ No _____
If yes, how many trees?
Residential: Per 100 feet of roadway _____ Per lot _____ Other__________
Commercial: Per 100 feet of roadway _____ Per lot _____ Other__________
Industrial: Per 100 feet of roadway _____ Per lot _____ Other__________

Require protection of native/desirable trees (i.e., a tree protection ordinance)?
Yes _____ No _____

Require replacement of any trees that are unavoidably impacted by construction activities?
Yes _____ No _____

Require payment into a tree replacement fund or “mitigation bank” when removed trees cannot be replaced/mitigated on site?
Yes _____ No _____

Impervious Area Reduction: Street and Parking Requirements

Does the applicable ordinance:

Encourage/require residential street widths that are narrower than suburban norms (i.e., encourage streets to be no wider than is necessary to move traffic effectively, to slow traffic and create safer conditions, and to safely accommodate pedestrians and bicyclists)? (As an example, the Better Site Design manual recommends 18’ – 22’ pavement width for streets with < 500 average daily trips.)
Encourage _____ Require _____ Neither _____

Encourage/require shared driveways, reduced driveway widths, and two-track driveways for single-family developments?
Encourage _____ Require _____ Neither _____

Require parking stalls to be less than or equal to 9 x 18 feet?
Yes _____ No _____ Comment/Other__________

Allow for reduction in parking stall size to account for vehicle overhang onto landscaped islands or perimeter landscaping? (E.g., such flexibility might allow for an 18-foot deep stall to be reduced to 16 or 16.5 feet deep.)
Yes _____ No _____ Comment__________

Promote use of pervious materials for paved areas, including alleys, streets, sidewalks,
crosswalks, driveways, and parking lots?
Yes _____ No _____ If yes, specify which:________

Provide flexibility regarding alternative, reduced parking requirements (e.g., shared parking, off-site parking) and discourage over-parking of developments?
Yes _____ No _____ Comment________

Require a parking ratio for a professional office building that is 3 spaces, or less, per 1,000 square feet?
Yes _____ No _____ Comment________

Require a parking ratio for retail that is 4.5 spaces, or less, per 1,000 square feet?
Yes _____ No _____ Comment________

Require a parking ratio for a single family home that is 2 spaces, or less?
Yes _____ No _____ Comment________

Establish parking requirements as a maximum or a minimum?
Maximum _____ Minimum ______

Provide flexibility in downtown areas to permit developers to make payments in lieu of providing parking on-site, with the revenues to be used for a structured parking facility?
Yes _____ No _____ Comment________

Vary parking requirements by zone to reflect places where more trips are on foot or by transit? (E.g., can the provision of bicycle parking substitute for some automobile parking?)
Yes _____ No _____ Comment________

Discourage cul-de-sacs?
Yes _____ No _____

Require subdivisions to achieve a certain score on an index for internal street connectivity?
Yes _____ No _____ Comment________

Conservation Design Standards (Flexible Zoning/Subdivision Codes)

Does the applicable ordinance:

Require a site analysis map that includes a natural resources inventory at the Concept Plan stage or prior to the Preliminary Plan stage?
Yes _____ No _____
Require that the proposed development be designed to preserve natural drainage patterns, use and preserve native vegetation, stabilize soils during construction, and protect, enhance, and maintain natural resources (such as remnant woodlands, prairies, and steep slopes)?
Yes _____ No _____

Encourage/require clustering of residential lots around sensitive natural areas, thereby creating a protected common open space area?
Encourage _____ Require _____ Neither _____ Require a minimum area of protected naturalized open space in new residential developments?
Yes _____ No _____ If yes, specify minimum percentage _____

Provide density bonuses for conservation developments that exceed minimum standards (such as additional open space, providing for regional trails and greenways, or incorporating environmentally sensitive design features beyond what is required by the Ordinance)?
Yes _____ No _____

Require the street network to minimize encroachment in sensitive natural resources and take advantage of open space vistas, while providing an interconnection of internal streets and street connections to adjoining land parcels to create opportunities for future connectivity?
Yes _____ No _____

Allow conservation design as a “by-right” form of development?
Yes _____ No _____

Does the zoning map indicate areas where conservation development is required?
Yes _____ No _____ Comment_________

Reinvestment and Compact/Contiguous Development (Zoning Code)

Is there a downtown overlay district or another mechanism to encourage mixed-use development in neighborhood centers?
Yes _____ No _____ Comment_________

Are there reduced impact fees or other incentives to encourage infill development?
Yes _____ No _____ Comment______
Appendix 2

Overview of Sustainability, Green Infrastructure, and Low Impact Development Provisions of the City of Joliet

Related to the CenterPoint Intermodal Center

Development on property owned by CenterPoint Properties in Joliet was guided by comprehensive conservation design and stormwater best management practice (BMP) standards. This design approach was determined through negotiations and permitting for the CenterPoint Intermodal Project-Joliet. This site encompasses 3600 acres of distribution, warehouse, and intermodal facilities. Development began in 2009.

Sustainable development practices are based, in part, on requirements and recommendations of the City of Joliet and generally conform to the following:
- recommendations of the City of Joliet South Side Comprehensive Plan,
- requirements of the Joliet Creek Watershed Protection Ordinance, and
- guidelines and requirements of the July 29, 2008 annexation agreement between Joliet and CenterPoint.

JOLIET SOUTH SIDE COMPREHENSIVE PLAN:

This plan was developed to address land use and development approaches in an area of historical agricultural and residential land uses where rapid growth is anticipated. The new plan’s objectives include providing a large contiguous area for industrial growth within the city while protecting residential neighborhoods from incompatible development. Relevant environmental objectives include:
- To increase the amount of open undeveloped land (green space) in the City used for passive and active recreation, as well as protection of flood prone areas, natural wetlands, and wooded areas.
- To provide a guide for managing the future storm water needs for Joliet’s portion of the Des Plaines Watershed including Cedar Creek and portions of Sugar Creek and Jackson Creek.

The plan includes detailed assessments and recommendations for drainage, environmental concerns, open space, recreation, and natural resources. It also includes thorough natural resource, environmental and open space inventories.

Drainage and Environmental
Stormwater and floodplain management: The plan recommends aggressive stormwater detention policies for new development, requires protection and compensation for depressional storage, and discourages stormwater detention in the floodway.

Natural resources: The plan calls for:
- Preservation of natural resource features such as floodplains, streams, lakes, steep slopes, significant wildlife areas, wetlands, prairies, woodlands, sensitive aquifers and their recharge areas and native soils;
- Site development shall conform to the existing topography and soil so as to create the least potential for vegetation loss and site disturbance and;
- Site design shall maintain natural drainage patterns and watercourses.

Stream protection: The plan includes strong recommendations for protection of streams and riparian areas and includes a Creek Watershed Protection Ordinance that is described below.

This plan identifies varying levels of protection for certain stream segments that are based on existing stream quality and location. The classifications are discussed in more detail below.

Class I: Main Channel Protection: This designation applies to the main stream channels that are to be preserved. This most restrictive class of protection allows for virtually no alterations to be made to existing stream channels.

Class II: Branch Tributary: This class applies to small tributaries and allows for slight modifications to the channel. These types of alterations must be accompanied by channel substitution, open space supplements or enhanced plantings.

Class III: Tributary Areas: This class applies to the smallest headwaters and ditches. It allows for interruption of existing channels, upon completion of some form of mitigating action.
The Plan calls for a holistic best management practice (BMP) approach for development. Key components are:

**Protection of Wetland, Riparian, and Woodland Environments:** The City encourages the preservation of wetlands, woodlands, and riparian environments.

**Minimization of Impervious Surfaces:** Reduction of impervious surfaces should be addressed during project planning. Recent Ordinances adopted by Joliet require larger park donations and increased open space. Concrete channels will not be allowed in dry bottom detention basins. Where concrete channels have historically been used, pervious materials will be substituted.

**Naturalized Stormwater Management:** Naturalization of on-site stormwater management features should be implemented during development whenever possible. Stormwater storage basins and vegetated swales should be planted with native prairie and wetland vegetation. Ongoing management of these areas is essential to the success of the native plantings. Typically, a minimum of three years is required for native vegetation to become adequately established.
Management is significantly reduced as the native area matures. Assigning performance standards for the first three years to naturalized stormwater features ensures success of the native plant community.

**Soil Erosion Control and Stabilization:** Specifications for soil erosion and sediment control should be followed during and after site construction to minimize erosion impacts to the existing creeks and the Des Plaines River. In addition, where current watercourses show evidence of streambank erosion, a site specific plan shall be developed to stabilize critical locations.

**Site-Level BMP Requirements:** The Illinois Urban Manual prepared by the United States Department of Agriculture, Natural Resource Conservation Service, shall be used as a basis for site-specific BMP designs. At a minimum, the following practices should be considered:
- Vegetated strips / bioswales at storm detention outfalls to creeks or their tributaries
- Spreader boxes or level spreaders
- Depressed landscape islands in parking lots with parking lot runoff directed through curb openings to storm inlets in the center of the islands
- Infiltration trenches
- Grassed filter strips
- Stream bank stabilization.
- Pervious pavement

**Native Vegetation in Naturalized Areas:** The plan has detailed lists of recommended native grasses, forbs, trees, and shrubs to be planted within naturalized areas. Recommended natural areas include detention ponds, stormwater BMPs, landscaping berms, creek banks, riparian areas, floodplains, open spaces. An environmental consultant or landscape architect experienced in planting of native species shall determine which species and planting methods are most appropriate for specific site conditions and anticipated water regimes.

**Management Recommendations for BMPs and Natural Areas:** Native landscape management activities should be conducted for a minimum of three years following planting. A professional trained in evaluation of native plant communities should determine appropriate management measures for site specific conditions. Required management activities include: seasonal mowing (short-term), herbicide treatment, and controlled burning. The Plan goes on to identify required performance criteria for address plant cover, plant diversity and quality, and minimization of invasive species. Once the short-term performance criteria are met, the site should be maintained to achieve or improve on these criteria in the long-term.
Open Space, Recreation and Natural Resources

Open space, tree preservation and natural areas are important to the City of Joliet and the provision for neighborhood parks, regional parks and pedestrian/bike trails is desired. The focus of the open space in the south side planning area is on existing water features and parks.

**Open Space:** Planning should respect the natural features and characteristics of the existing landscape and provide for the open space and recreational needs of existing and future residents of the City. Floodplains, wetlands, areas of ecological or archaeological significance and mature forests should be protected and enhanced as open space. Conservation easements should be provided for protection of trail systems, open spaces, parks and environmental areas.

**Recreational Facilities:** New residential development should provide neighborhood parks in close proximity to all of the homes, with generous frontage, as well as pedestrian linkages to community parks and open space. Regional parks are larger and provide a broader range of recreational needs than neighborhood parks. Regional parks should be accessible via multi-use trail systems. Community parks may range from twenty to one hundred acres.

**Regional Trail Systems:** Regional multi-use trails are proposed along roadways and greenway corridors. They are intended to provide pedestrian orientated linkages to parks, natural areas, environmental corridors, as well as shopping activities and residential neighborhoods.

**Land Use and Design Guidelines**

Land use and design guidelines provide site planning direction and promote attractive quality development with consistent and compatible site planning and design elements. Preservation, protection, and enhancement of natural features, and provision for neighborhood parks, community parks, and trails are desired. Guidelines are provided for residential, commercial, and industrial development. Relevant industrial development provisions are summarized below.

**Industrial Development Guidelines**

- Natural corridors should be used whenever possible to buffer industrial uses from residential uses. Where no natural corridors exist, a 100’ green way will be implemented for buffering purposes.
- A landscape easement screening outdoor storage areas shall be provided along all adjacent public or private right-of-ways. The easement shall be a minimum of 50 feet wide, and shall be included on the site plan.
- Landscape buffers and perimeter landscaping should include berming (no greater than 3:1) and a mixture of deciduous and evergreen plant materials to provide for attractive and effective screening. (*Note that berming provisions were modified in the annexation agreement to allow greater flexibility, specifically encouraging native landscaping.*)
- Stormwater basins shall be landscaped with a mixture of deciduous and evergreen materials. Best management practices should be incorporated where appropriate.

**CREEK WATERSHED PROTECTION ORDINANCE** (Appendix A of the South side Comp Plan.)

This ordinance applies to creeks in Joliet’s south side planning area. Some of the relevant purposes are:

- prevent flood damage by preserving the storm and floodwater storage capacity of Cedar Creek, Sugar Creek, Jackson Creek, and Jackson Branch;
- maintain the normal hydrologic balance of the creek by storing and providing for infiltration of runoff in floodplains and wetlands, and releasing it slowly to the stream to maintain in-stream flow;
- manage stormwater runoff and maintain natural runoff conveyance systems, and minimize the need for major storm sewer construction and drainageway modification;
- improve water quality, both by filtering and storing sediments and attached pollutants, nutrients, and organic compounds before they drain into the creek and by maintaining natural pollutant-assimilating capabilities;
- protect shorelines and stream banks from soil erosion, using natural means and materials wherever possible;
- protect fish spawning, breeding, nursery and feeding grounds;
- protect wildlife habitat;
- preserve areas of special recreational, scenic, or scientific interest, including natural areas;
- maintain and enhance the aesthetic qualities of developing areas; and
- encourage the continued economic growth and high quality of life of the Joliet community which depends in part on an adequate quality of water, a pleasing natural environment, and recreational opportunities.

This ordinance codifies the stream protection provisions of the Comprehensive Plan. It calls for minimizing any alterations of water courses, such as channelization and straightening. It also calls for protection and restoration of stream buffers as described below.

**Natural Resource Inventory:** The applicant shall identify the land within the within the “watershed protection area” which is generally defined to be creek channel and 100 feet on either side. The inventory should identify land that is currently in a natural state and that portion of the site that has been altered or disturbed by development or agricultural land uses.

**Restoration of Natural Creek Features:** Riparian/floodplain land within the stream corridor (watershed protection area) that is not in a natural state shall be restored to a natural state. The creek bed and channel shall be modified where practicable to restore natural stream behavior, including, where practicable, the use of riffles and pools. The banks shall also be stabilized where necessary.
Plantings: Restoration and stabilization shall be accomplished by vegetative plantings using accepted bioengineering techniques and with approved native plants, brush, grasses, trees and other materials. All areas to be restored shall be seeded or planted with approved species in a timely manner and shall be maintained so as to avoid the growth of noxious weeds.

Creek Access: The preservation plan shall provide public access to the creek corridor along with linkage to other community transportation networks, including bicycle paths, hiking trails or public transportation. Trailheads shall be provided to link neighborhoods, parking areas and streets to the creek corridor, where practicable.
ANNEXATION AGREEMENT BETWEEN JOLIET AND CENTERPOINT PROPERTIES

The annexation agreement specifically references the need for the site concept plan to conform to the provisions of the South Side Comprehensive Plan and the Creek Watershed Protection Ordinance. It contains numerous other provisions related to sustainable site planning and design. Relevant provisions are highlighted below.

Tree Inventory and Replacement: Desirable trees larger than 6-inch diameter must be inventoried. Trees that cannot be avoided in the development process shall be replaced, or a fee-in-lieu shall be paid to the City.

Stormwater Detention: Wetland and prairie plantings shall be installed and maintained around the perimeter of all detention basins.

Roadway Improvements – Green Road Design: New roadways and improvements to existing roadways (with the exception of Laraway Road) shall be designed with natural landscaping and bio-swales. Two roadway designs are identified. Curbed (urban cross-section) roads shall convey runoff to adjacent bio-swales via stormwater drop-structures. Curbless (rural cross-section) roads shall be designed to sheet runoff into adjacent bio-swales. The site owner shall provide long-term maintenance to bio-swales and natural landscaping along roadways.

Property Owners Association Maintenance Responsibilities: Restrictive covenants shall be established to preserve, protect, maintain, repair, and replace private roads, common open space, common areas, and all roadside bio-swales.

Perimeter Berm/Buffer: Perimeter berms(buffer) (generally 100 feet) shall be provided along property lines and development sub-areas.

Natural Landscaping Principles: Native landscaping shall be used for berms, required green spaces, swales, landscape islands, and stormwater management areas. The annexation agreement includes extensive plant lists for native grasses, forbs, shrubs, and trees. It also includes extensive requirements for long-term maintenance of native landscapes, including mowing, herbicide applications, and prescribed burning. Landscape performance criteria also are specified.

On-Site Lighting Regulations: All illumination fixtures shall be designed to conceal the source of illumination when viewed from all points other than directly below, and to ensure that no light is emitted above the horizontal plane of the bottom of the fixture. The amount of illumination at any property line shall not exceed 0.5 foot-candles except where required for public safety.
DESIGN PRINCIPLES FOR CENTERPOINT INTERMODAL FACILITY

Based on the provisions of the South Side Comprehensive Plan, the Creek Watershed Protection Ordinance, and the Annexation Agreement, the CenterPoint Intermodal facility was designed following conservation design, BMP, and holistic natural resource protection principles. The conservation design approach summarized below also was developed to conform to the wetland permitting and mitigation provisions of the U.S. Army Corps of Engineers. This approach was applied to the Phase 1 development and also is intended for additional future development phases.

Conservation design is based on three broad purposes: 1) stream protection and restoration and 2) runoff attenuation, infiltration, and filtering, and 3) other sustainable development objectives. Standards, performance criteria, and descriptions for these objectives are provided below, as appropriate.

Stream protection and restoration: Stream protection and restoration principles will be followed, consistent with the Creek Watershed Protection Ordinance. In addition, stream channel enhancement and inclusion of recreational paths will be investigated and incorporated, where appropriate, into future development, following the recommendations of the Joliet South Side Comprehensive Plan. Specific stream protection and restoration standards follow:
- avoidance/minimize channel modification, except for purposes of habitat restoration
- protect 100-foot creekside buffers (on both sides of the channel)
- perform vegetative enhancement of buffer, including:
  - removal of invasive trees, shrubs, and herbaceous vegetation
  - seed native riparian vegetation appropriate to identified moisture regimes
- manage buffers in the long-term

Runoff attenuation, infiltration, and filtering: A series of BMPs will be routinely evaluated and implemented to achieve a "runoff treatment train". The design objectives for these comprehensive BMP designs are:
- Attenuation of runoff rates to less than existing conditions for the 2-year through 100-year design storms (consistent with the City of Joliet's stormwater ordinance)
- At least eighty (80) percent removal of runoff sediment (TSS and associated pollutants)
- Reduction of runoff volume via infiltration and evapotranspiration, consistent with a cumulative stay on goal of 74% for the entire 3,900-acre project assembled by CenterPoint.

In designing BMP plans for individual sites, BMPs should be evaluated and selected from the following menu:
- Impervious area reduction
- Green roofs
- Natural landscaping
- Permeable paving
- Filter strips
- Bio-infiltration: bioswales, naturalized swales and rain gardens
- Naturalized detention

Descriptions and design guidelines (where appropriate) for each BMP follow.

**Impervious Area Reduction:** Opportunities should be evaluated and implemented, where appropriate, to reduce the effective impervious area associated with buildings, parking lots, and roads. Such opportunities may be identified through a creative site planning and design process. Examples of impervious area reduction opportunities include shared parking arrangements and reduced road widths. Impervious area reduction was achieved in Phase 1 via the highly efficient site layout of the intermodal facility which resulted in the site footprint being reduced by approximately 43% over more traditional designs, such as the nearby CenterPoint Intermodal Center - Deer Run. More specifically, reductions were achieved largely by a very compact and efficient arrangement of parking, internal roads, container stacking, and rail facilities.

**Green Roofs:** Green roofs are vegetated roof systems designed to retain and slow roof runoff from the tops of buildings. Opportunities for green roofs should be evaluated for any projects that are pursuing LEED, or LEED equivalent, rating.

**Natural Landscaping:** Natural landscaping is the use of native, deep-rooted grasses, flowers, shrubs, and trees in lieu of conventional turf landscaping. Natural landscaping is a central recommendation of the Annexation Agreement. Natural landscaping should be implemented in common areas, perimeter berms, swales, roadsides, and detention facilities, wherever feasible. Preservation of existing natural landscapes, particularly remnant oak and hickory tree groves, also should be implemented, wherever feasible. To ensure effective implementation, all natural landscaping installations should follow the “Natural Landscape Seeding, Maintenance, and Monitoring Instructions” that were developed for this project.

**Permeable Paving:** Permeable paving incorporates spaces or pores that allow water to move through the pavement to the stone base below. Common permeable paving techniques include porous concrete or asphalt and interlocking permeable paving grids. Design elements of a permeable paving system include: a layer of sand at the base (to inhibit soil compaction); a supporting base of washed stone (typically 18 – 30 inches, depending on runoff storage needs); and an elevated underdrain to handle excess water during extended wet periods. Permeable paving should be evaluated and implemented, where feasible, for parking lots and other low-traffic paving applications, as an alternative to conventional asphalt or concrete. In permeable paving installations, consideration will be given to reducing the required detention storage based on the available void space below the pavement.

**Vegetated Filter Strips:** Vegetated filter strips are designed to convey sheet-flow runoff from impervious surfaces to enhance runoff filtration and infiltration. Filter strips are commonly used at the edge of the paving surface and to convey runoff into a swale or rain garden at the down-
slopes. Where curbs are necessary at the edge of the pavement, alternative designs such as ribbon curbs or frequent curb cuts should be utilized to convey runoff in a diffuse fashion onto the filter strip. Filter strips should be vegetated with low-profile prairie vegetation, where feasible. At the edge of trails, a strip of turf grass will provide a transition to the prairie vegetation.

**Bio-infiltration:** Bio-infiltration is intended to infiltrate and, in most cases, convey runoff particularly from routine storm events. Three bio-infiltration approaches are recommended and should be evaluated and implemented, based on their appropriateness to site conditions. These practices should be used to reduce, or eliminate, the need for conventional storm sewer drainage. Bioswales are low-gradient, flat bottom conveyance devices that are planted with native wetland and prairie vegetation. Bioswales should be used in lieu of storm sewers, wherever feasible, to drain parking lots, roadways, and other impervious surfaces. Their design utilizes a compost-sand soil mix at the surface that is vegetated with appropriate water tolerant native vegetation. Underlying the growing medium is a stone-filled trench that links to the parent soils below and, where relevant, to the gravel sub-base of adjacent pavement areas. Bioswales also should incorporate perforated underdrains. In addition, bioswales will incorporate raised storm sewer inlets to accommodate overflows from extreme storm events.

Naturalized swales are simplified versions of bio-swales (without the stone trench and underdrain). Naturalized swales may be more appropriate than bioswales in locations, such as roadsides, where sediment in runoff may be present and could lead to clogging of the bioswale. Naturalized swales are vegetated with low-profile wetland vegetation in the bottom, and prairie vegetation on the side slopes.

Rain gardens are very similar to bioswales in their design and purpose, except they are used primarily for temporary storage versus conveyance. Rain gardens will be used in various locations on the property including small “islands” of pervious area in parking lots.

**Naturalized Detention** All detention basins should be designed to meet the dual objectives of flow attenuation, consistent with the Joliet stormwater ordinance, and water quality enhancement. Basins should be designed as naturalized wetland and/or open water systems. Basin bottoms and sides should be vegetated with native wetland and prairie vegetation throughout to enhance pollutant filtering and nutrient transformation. There should be three planting zones and recommended planting lists for these zones are provided in the Appendix.

1. **Emergent (from normal water line (NWL) to 1 foot below NWL):** This zone should be very flat (i.e., no steeper than 10:1) and planted with emergent wetland vegetation.
2. **Shoreline (from NWL to 1 foot above NWL):** This zone also should be very flat (i.e., no steeper than 10:1) and planted with wet to wet-mesic vegetation that can tolerate saturated soils and frequent, short-duration inundation.
3. Upper slopes: These areas are subject to infrequent inundation and should be planted with low-profile dry-mesic prairie vegetation, possibly in conjunction with savanna trees and/or shrubs.

The following table provides some direction on the primary purposes and benefits of the respective BMPs. Wherever feasible, one or more BMPs should be selected from each column.

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<thead>
<tr>
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<th>Stormwater Reduction</th>
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<th>Stormwater Treatment</th>
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*Other sustainable development practices*: Additional sustainable development practices will be evaluated and implemented on a project-specific basis, as appropriate.

- "Dark sky" downward lighting will be utilized consistent with the Annexation Agreement.
- *LEED-type design* concepts will be evaluated for both new buildings and associated landscapes. LEED designs will be end user driven and implemented where feasible.
### Appendix 3

**Meeting Schedule**

**2012**

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<td>Winnebago County Chairman Scott Christiansen</td>
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<td>3/8/12</td>
<td>Villages of Cherry Valley and New Milford, Winnebago County, Winnebago County Forest Preserve District</td>
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**2013**

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<td>6/12/13</td>
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<td>6/22/13</td>
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