Natural Resources Objectives and Policies

Green Bay Smart Growth 2022

Natural Resources Plan

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Natural Resources Plan

Relationship to the Issues and the Concept Plan

Summary of Issues

The major natural resources issues may be summarized as:

Water Quality: What priority do the citizens of Green Bay place on improving water quality in the Fox River and the bay?

Importance of Natural Resource Protection: To what extent is natural resource preservation important to the citizens of Green Bay? What should be done, if anything, to restore, preserve or enhance the natural resources in Green Bay? How much is the community willing to pay for such protection?

Urban Development and Resource Protection: What should be the balance between urban development and protection of high quality natural resources? What additional requirements, if any, should be placed on land developments that may affect high quality natural resource areas?

Multi-Jurisdictional Solutions: Can or should a multi-jurisdictional approach be taken to ecological protection? In what subjects or locations might this be most feasible, if any?

Fox River Water Quality: What actions should the City of Green Bay take to improve the quality of water entering the Fox River?

East River Restoration: Should the City work to restore a more natural environment along the East River, including land redevelopment near Main Street and diversifying the plant community?

Baird Creek and East River Greenway Connection: Should there be a greenway connection between the East and Fox Rivers and between the East River and Baird Creek?

Greenway Design: Should the previously-established pattern of public open space along Baird Creek be continued to the east? Should that open space include pedestrian and bicyclists paths? Should there also be a road for automobiles?

Plan Review and Inspections: Are plan review and inspections adequate to ensure that erosion control and stormwater management practices are followed?

Landfill Sites: Can the brownfields that were created by filling bayfront wetlands with Fox River dredge materials be remediated? Is the community willing to pay for that cleanup? Can a permanent moratorium of filling wetlands and a buffer of potential park or open space be implemented along the bay? Should restoring the

freshwater marsh that once dominated the bayfront be a high priority of the City?

Other Wetlands: Many other wetlands across the city have been identified for restoration by the US Fish and Wildlife Service. To what extent, if at all, should those sites be acquired by the City and restored? What actions should the City take to maintain the quality of water leaving the remaining wetlands across the city?

Bayfront Floodplain: Should the Federal Emergency Management Agency be encouraged to reduce the size of the area mapped as 100-year floodplain along the bay?

Guidance from the Concept Plan

The Natural Resources Plan is directed by the Concept Plan to safeguard and improve environmental features as a means of promoting sustainable urban development, revitalization and quality of life. High priority should be placed on improving water quality, restoring wetlands, protecting the remaining natural stream edges and restoring some lost or degraded natural features. New development should be carefully sited to protect natural character and use low-impact means of handling runoff.

Plan Overview

The *Smart Growth 2022* Natural Resources Plan provides guidance to the City in the management of wetlands, floodplains, woods and natural areas. Some of these locations will be protected through regulations such as zoning and other may be acquired by the public and managed. Water is the focus of the plan since the city is at the foot of a major bay and the mouth of several rivers or creeks.

Please refer to the *Smart Growth 2022* Land Use Plan for policies on the subject of brownfields or contaminated properties.

Goal: Improve wetlands, streams and wildlife habitat in Green Bay for the sake of sustainable development, ecological responsibility, quality of life and economic development.

Summary of Objectives

The objectives of the Natural Resources Plan are:

Objective 1 – Water Resources: Improve the quality of water in the streams and rivers that flow through Green Bay and, in turn, the waters of the bay.

Objective 2 – Groundwater: Protect the quality of groundwater from pollution from surface sources.

Objective 3 – Wildlife Habitat: Protect the key remaining small tracts of wildlife habitat and restore or improve the quality of other locations. Create or restore natural connections between natural areas where feasible.

Objective 4 – Soil Resources: Reduce soil erosion, especially near streams and wetlands.

Objectives and Policies

This major section of the Natural Resources Plan describes what the City would like to accomplish and how it would like to do so.

Objective 1 – Surface Water Resources

Improve the quality of water in the streams and rivers that flow through Green Bay and, in turn, the waters of the bay.

Objective 2 – Groundwater

Protect the quality of groundwater from surface pollution.

Recommended Policies:

1. **Regional Surfacewater Management Plan:** Green Bay should collaborate with adjacent cities and towns, Brown County and the Department of Natural Resources to prepare and adopt a stormwater management plan for the entire Lower Fox River basin. That plan should address means of improving the quality of runoff, regulating peak flows into rivers and streams, restoring or improving wetlands, and increasing infiltration of surface water into the aquifer.

2. **River and Stream Shoreline Protection:** Natural conditions should be preserved or restored to the extent practical, especially the rivers and streams of the city, in order to filter runoff, reduce erosion and provide habitat for stream species. Natural means of stream edge erosion control should be used, natural vegetation should be allowed to grow and buildings should be set back from the stream a distance sufficient to allow such natural process to flourish. Although this policy can be achieved largely through regulation, education and local funds, the City will seek supplementary funds for these purposes from the US Fish and Wildlife Service and the Wisconsin Department of Natural Resources.

   Natural means of protecting the edge of the Fox River and other shorelines should be used in locations where wake action and ship loading needs do not dictate otherwise. The aims for restoring stream banks should be to introduce new plantings or protect existing native plants that will provide an integrated series of benefits:

   - Stabilize the mechanics of slopes
   - Reduce soil erosion
   - Improve water quality
   - Create and connect wildlife habitat
   - Enhance riverbank aesthetics
   - River and stream shoreline protection:

   A natural, vegetated stream corridor and lowland conservancy area should be maintained along the edges of streams or wetlands to minimize erosion, stabilize the bank, protect water quality, maintain water temperature at natural levels and preserve fish and wildlife habitat. The natural vegetation should extend a minimum of 25 feet from the ordinary high water mark of a perennial or intermittent stream or wetland.

   Soil bio-engineering techniques, as described in Appendix C, will be used to protect stream banks whenever practical. The use of stone rip-rap and concrete walls will be minimized because they are unattractive and do not provide any natural habitat or runoff filtration.

3. **Construction Sites:** The City will adopt and enforce "best management practices" on construction projects to reduce erosion and improve water quality. Examples of "best management practices" for water quality protection are presented in Appendix A. Examples of low impact

development techniques are also presented in Appendix B.

4. **Fox River Remediation:** The City of Green Bay will continue to cooperate with the Wisconsin Department of Natural Resources on the Remedial Action Plan for the cleanup of the Fox River.

5. **East River:** The City will protect the banks and floodplain of the East River by enforcing its current floodplain regulations, using natural stream edge protection techniques as described above and by acquiring additional land for public greenway. (See also the Parks, Greenways and Trails Plan and the Land Use Plan.)

   Aggressive non-native plants along the East River will be removed or managed before they create a monoculture with little habitat value and low quality.

6. **Greenway Design:** Greenway design and development will consider environmental issues. The basis of the greenway width should be determined by specific environmental standards such as slope percentage, erodible slopes, soil conditions, wetlands, floodplain locations and areas of quality woodlands with their size, area and species identified. If an asphalt bicycle path is included in a greenway, it should be near a road or on a former railroad corridor. In other locations, bicycle paths should be carefully aligned so as to minimize disruption of the ecology of the site.

7. **Baird Creek:** Baird Creek Greenway, a 3.5 mile forested riparian corridor that extends from the East River to the Town of Humboldt, is an irreplaceable community asset having special public value because of its ecological features.

   The unique natural features of the Greenway east of I-43 should be carefully considered as urban development proceeds in the watershed. Because the Baird Creek corridor is largely undisturbed and retains many of its original characteristics, special management techniques will be used there with particular attention to the ecological integrity of the corridor east of I-43. The City's proposed surface water surface water management plan should address this subwatershed in detail. The City should take care to apply along Baird Creek the Best Management Practices recommended by the Wisconsin Department of Natural Resources for it, which address infiltration, redirection of stormwater, sediment control and construction site erosion control.

   Public open space should be acquired to extend the Baird Creek Greenway to the eastern City limits along both the northern and southern branches of the creek, and westerly to the East River. (Refer to the Parks, Greenways and Trails Plan and the Land Use Plan.)

   A natural resources management plan should be prepared for the entire Baird Creek valley, and a grant from the Wisconsin Department of Natural Resources should be sought for this work. The greenway will be managed for both natural resource protection and recreation.

   The City will work closely with citizens groups such as the Baird Creek Preservation Foundation to plan and mange the greenway. The natural resources management plan would be one example of such cooperation.

8. **Renard Isle and Cat Island:** Brown County should consult with the Wisconsin Department of Natural Resources to make a final decision on the end-use plan for Renard Isle. (Restoration of Renard Isle is currently underway, but there is as yet no final agreement on the detailed end-use of the island.) Funding for the Cat Island restoration will continue.

9. **Bayfront Wetlands:** The City will work with landowners and the Wisconsin Department of Natural Resources to protect the remaining wetlands along the bay. The City will continue to apply its shoreland and wetland ordinances and Environmentally Sensitive Area requirements there.

   Some degraded wetlands will be restored with native vegetation, using local funds and funding assistance from the US Fish and Wildlife Service and other sources as available. Additional parkland will be acquired along the shoreline as an extension of the Ken Euers Nature Area. Certain wetlands have been filled with hazardous materials or mixed municipal waste and will be managed as such.

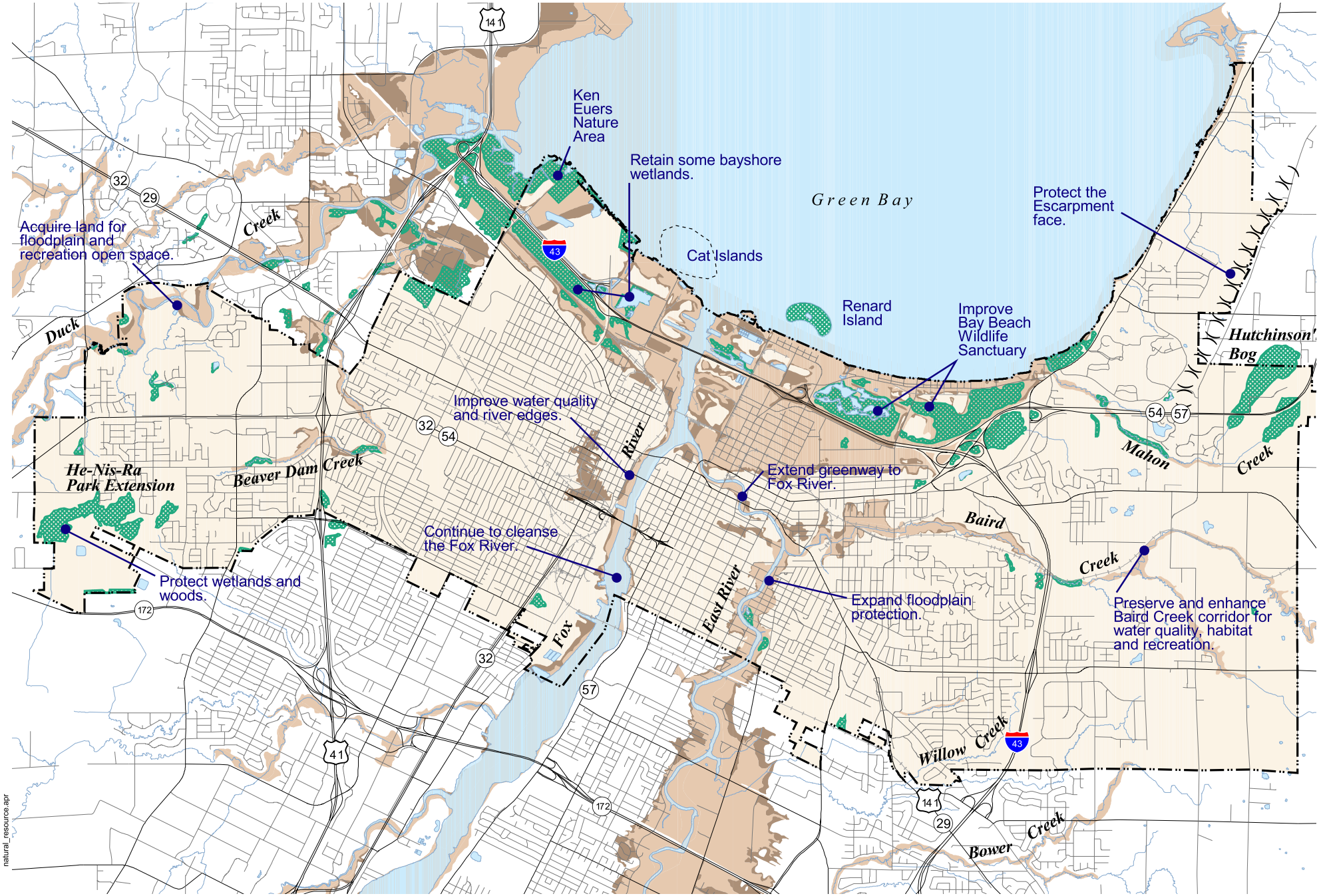
10. **Wetland Restoration:** The *Wetlands Restoration and Compensation Determination Plan* prepared by the US Fish and Wildlife Service will be reviewed and used as a guide by the City. (Refer to *Wetland Habitat Restoration Opportunities in the Green Bay Area*, Hey and Associates, Inc., August, 2000. The Analysis of Conditions element of *Smart Growth 2022* included a summary.) That plan identified and ranked in priority opportunities for restoring lost or degraded wetlands. Priority for such acquisition should be in favor of coastal areas regardless of habitat type.

    Some remaining wetlands are of a high quality, and therefore should be preserved. Prime examples of two such wetland complexes are Hutchinson's Bog and He-Nis-Ra Park. He-Nis-Ra Park specifically needs protection from encroaching development.

11. **Bay Floodplain:** The City will work with the Federal Emergency Management Agency and the Wisconsin Department of Natural Resources to conduct a study of the bay floodplain to determine whether the area mapped as floodplain can legally be reduced and what physical improvements, if any, need to be made to accomplish that change. (The presence of the mapped floodplain reduces the ability of property owners to improve their property or obtain mortgage loans.)

12. **River Floodplains:** The City will continue to strictly enforce its river and stream floodplain regulations, which are part of the zoning code. Land use plans and site development plans will be drawn to make use of floodplain lands so as to protect the streams and accomplish appropriate waterfront development.

13. **Lawn Fertilizers:** Phosphorus in lawn fertilizer is a widespread and significant source of water pollution in Green Bay as in other communities. Thus, the City will encourage local retailers to carry one or more brands of phosphorus-free lawn fertilizer. The City will encourage the University of Wisconsin Extension Service to promote this practice.



100 year Floodplain
500 year Floodplain
Wetland
Niagara Escarpment

Figure 17-1

Major Elements of the Natural Resources Plan

0 2000 4000 8000 feet NORTH

Objective 3 – Wildlife Habitat

Protect the key remaining small tracts of wildlife habitat and restore or improve the quality of other locations.

Recommended Policies:

1. **Native Species of Vegetation:** The Department of Parks, Recreation and Forestry will seek opportunities for restoring native vegetation in parks. The Baird Creek Greenway would be a good location for this approach. In certain areas of private development, such as near wetlands, native vegetation could be used in an attractive and economical manner. City planners will suggest and encourage private site designers to adopt this practice and advise them on species.

2. **Greenways:** The existing and planned public open space along Baird Creek, East River, Duck Creek and other streams in Green Bay can act as corridors for the protection and movement of some species of animals. Thus, the City will try to manage them to retain uninterrupted vegetative cover and a high percentage of native vegetation. To the extent feasible, additional lands will be acquired along those greenways beyond what may be needed for recreation and trails in order to enhance their function as wildlife corridors.

3. **Bay Beach Wildlife Sanctuary:** The Wildlife Sanctuary is the largest tract of natural open space in Green Bay. The Department of Parks, Recreation and Forestry will continue to manage it for species protection, species diversity and ecological education.

4. **Urban Forest:** The Department of Parks, Recreation and Forestry City will continue to replace trees that have been lost or removed along its streets and in its parks. An inventory and map will be prepared for the trees in those locations.

   The City will adopt an ordinance that requires land developers to assess the quality of trees on certain identified sites during the plan review process. Based on that review, clearcutting may be prohibited or selected trees may be protected based on their size, species or other outstanding characteristics. In addition, the ordinance may require replacement of a certain percentage of trees removed based on the total caliper inches of trees removed.

   The City will return to the practice of requiring land developers to install trees in the street right-of-way behind the curb along all residential streets. Private utilities (electricity, cable television, gas and telephone services) will be located near the outside of the right-of-way or in an easement just outside the right-of-way to leave the boulevard open for trees.

   The City will also install or require developers to install trees along arterial roads, including in commercial or industrial districts according to a comprehensive tree planting plan.

5. **Tree Replacement:** The City will improve its zoning requirements for landscaping in new developments to address the loss of significant trees.

Objective 4 – Soil Resources

Reduce soil erosion, especially near streams and wetlands.

Recommended Policies:

1. **Erodible Slopes:** The City will manage public and private development near the high banks and steep slopes along Baird Creek to avoid erosion.

   The City will adopt an ordinance that prevents erosion and protects the appearance of steep slopes city-wide (including areas such as the Baird Creek Valley and the Niagara Escarpment.)

2. **Other Erodible Sites:** Surface water runoff and wind erosion from construction sites will remain the largest source of soil loss and a problem for water quality at certain times. Thus, the City will continue to enforce requirements for erosion control at such locations.

3. **Wetland Buffers:** The City will amend its zoning ordinance to require a building and impervious surface setback around the defined boundaries of wetlands.

Implementation Program

This section describes the major actions involved in implementing the *Smart Growth 2022* Natural Resources Plan and indicates the relative priority of each, the responsible agency and any required coordination. Numerous specific actions are described in the body of this plan while the items listed below are only the major short- and long-term actions.

Table 17-1: Implementation Program for the Natural Resources Plan

Priority	Action	Lead and Coordinating Agencies
1	Prepare a surfacewater management plan for the Lower Fox River Watershed.	Brown County; Green Bay and other Cities and Towns
1	Acquire land to extend the Baird Creek Greenway	Parks Department; Baird Creek Preservation Foundation
1	Continue to remediate the soil and water contamination in and near the Fox River.	City of Green Bay; Wisconsin DNR, Brown County, US EPA, Property owners.
2	Amend zoning ordinance to require tree replacement, better landscaping, steep slope protection and wetlands buffers.	City Planning Department City Park, Recreation and Forestry Department
2	Acquire lands for East River and Fox River linear parks.	Parks Department
3	Restore and improve certain wetlands	City of Green Bay

Appendix A:
Examples of Best Management Practices for Water Quality Improvement

The following techniques, sometimes known as Best Management Practices (BMP), should be used in conjunction with one another to improve treatment of water quality. All techniques have benefits but cannot do the entire job. Although stormwater ponds and wetland treatment systems are most often the tools for treatment and storage of urban runoff, they are best used in conjunction with multiple management options ranging from street sweeping and structures to open space and litter control laws.

Priorities of appropriate BMPs should be addressed by:

1. Avoiding adverse impacts.
2. Minimizing unavoidable adverse impacts.
3. Mitigating unavoidable adverse impacts

Information and Education
- Catch basin stencils
- Erosion control information
- Fertilizer and pesticide application
- Illicit dumping and littering information
- Landscaping information to reduce runoff
- Maintenance of lots (parking and vacant)
- Proper storage of chemicals
- Information on hazardous waste and used motor oils
- Awards and public recognition for Best Management Practices.

Ordinances and Regulations
- Erosion-control ordinances
- Comprehensive management plans for developments
- Elimination of illegal connections
- Fertilizer and pesticide licensing
- Illicit dumping and littering enforcement
- Land use controls
- Landscaping requirements to reduce runoff
- Special commercial or industrial requirements
- Pet waste ordinances

Discharge Elimination
- Infiltration basins
- Pervious structures
- Diversion of off-line infiltration devices

Source Controls by the City
- Limiting infiltration to storm sewers
- Effective use of deicing chemicals
- Management of hazardous waste and used motor oils
- Management of commercial and residential yard wastes
- Monitoring programs
- Storm sewer outlet and streambank erosion prevention and maintenance
- Spill response and prevention
- Street cleaning
- Storm sewer maintenance

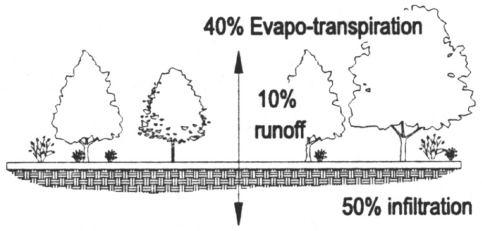
Minor Structural Controls
- In-line sediment traps
- Skimmers and separators

Treatment Measures
- Detention basins
- Stormwater-treatment facilities
- Swirl concentrators
- Alum treatment

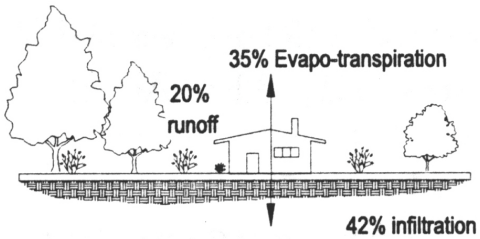
Appendix B:
Low Impact Development and Conservation Design Techniques

Certain methods can be used to mimic the predevelopment site hydrology and a watershed's natural hydrologic function. The following techniques may be used to reduce water runoff and boost groundwater recharge by creating a balance between runoff, infiltration, storage, groundwater recharge and evapotranspiration. With this approach, receiving waters may experience fewer negative impacts in the volume, frequency and quality of water runoff so as to maintain base flows and more closely approximate predevelopment runoff conditions. The following list is comprehensive but may not be complete.

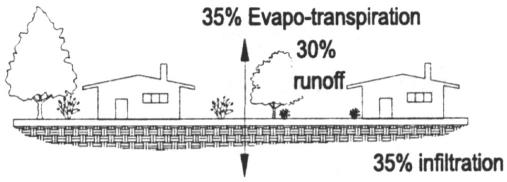
- Limit impervious surfaces created by driveways.
- Create natural resource areas.
- Minimize disturbance and compaction to site then loosen soils after construction is complete. Preserve infiltratable soils.
- Preserve natural depression areas and topography.
- Use vegetated swales, on-site bioretention, wider and flatter swales, maintain sheet flow, and clusters of trees and shrubs in flow path.
- Maximize tree preservation or forestation.
- Use native vegetation that have deeper roots, more water uptake, or better water evapotranspiration.
- Minimize storm drainpipes.
- Use filter and buffer strips, swales, grass, and infiltration trenches.



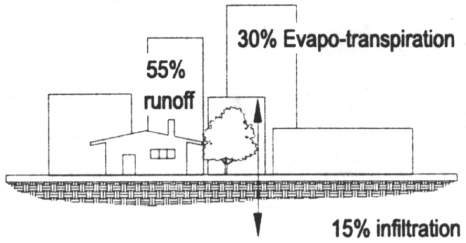
Natural Ground Cover



10-20% Impervious Surface



35-50% Impervious Surface



75-100% Impervious Surface

Appendix C: Soil Bio-Engineering for Riverbank Protection

Soil bio-engineering techniques should be used to restore or protect vegetation along the banks of streams. Soil bioengineering is a living technology consisting of plant structures that initially add stability to banks through live stem stakes, and overtime, through root systems. Roots consolidate soil particles as a mass, thus reducing the potential of the bank to slump or collapse. Growth of plant stems and leaves creates a shoreland buffer that reduces run-off velocities, cleanses the water by collecting sediment, redirects flow, and offers surface erosion control protection. Use of native species for bioengineering will enhance biological diversity and complement the landscape restoration and wildlife habitat recommendations.

Four bioengineering methods are recommended:

- Joint planting
- Live fascine
- Brushmattress
- Vegetated geogrid

Joint Planting is a system that installs live vegetative stakes between the joints of previously place rip-rap. As the plants grow, a mat of roots spread beneath the rocks, increasing the stability of the existing structure and placing the new filtration buffer on the surface. The technique is simple and low cost, but produces highly effective ecological and aesthetic results.

Live Fascine structures are bound bundles of live cut branches. They are tied together securely and place into trenches along stream banks, upland slopes, wetlands, or in gullies. The live fascine bundles are typically installed with live stakes and dead stout stakes, and often used in conjunction with erosion control fabrics. Plantings follow contour lines in dry areas, breaking up slopes into a series of shorter slopes separated by benches. Mini-dam structures are created capable of holding soil on slopes. The technique provides surface stability, which speeds the natural process of vegetation.

Brushmattress is a system that combines living structures to form an immediate protective surface cover on riverbanks. Live stakes, live fascine, and a branch mattress cover are installed, resulting in rapid growth of heavy vegetation.

Vegetated Geogrid is useful for the reconstruction of steep fill slopes. This technique involves the installation of live rooted plants, branch cuttings, and soil lifts wrapped with geogrid, in regular arrays in the face of reconstructed slopes. The branches are oriented perpendicular to the slope, and when combined with geogrid material, offer significant reinforcements to soils. This method is most useful for upland slopes and riverbank to solve complex, deeper instability and higher run-off velocity conditions.

Benefits

Application of these techniques to selected sites along streams in Green Bay will vastly improve the ecological function of the riverbank by vegetating denuded sites, creating a shoreland buffer for filtering run-off, stabilizing slopes, reducing erosion, and connecting habitat for wildlife in the river corridor. The aesthetic effect of implementation can be dramatic, with luxuriant growth along streams, softening and greening the stream landscape for park and trail users and recreational boaters.