



# Green Infrastructure Barriers and Opportunities in the Macatawa Watershed, Michigan

## An Evaluation of Local Codes and Ordinances

## About the Green Infrastructure Technical Assistance Program

Stormwater runoff is a major cause of water pollution in urban areas. When rain falls in undeveloped areas, the water is absorbed and filtered by soil and plants. When rain falls on our roofs, streets, and parking lots, however, the water cannot soak into the ground. In most urban areas, stormwater is drained through engineered collection systems and discharged into nearby waterbodies. The stormwater carries trash, bacteria, heavy metals, and other pollutants from the urban landscape, polluting the receiving waters. Higher flows also can cause erosion and flooding in urban streams, damaging habitat, property, and infrastructure.

Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water. These neighborhood or site-scale green infrastructure approaches are often referred to as *low impact development*.

EPA encourages the use of green infrastructure to help manage stormwater runoff. In April 2011, EPA renewed its commitment to green infrastructure with the release of the *Strategic Agenda to Protect Waters and Build More Livable Communities through Green Infrastructure*. The agenda identifies technical assistance as a key activity that EPA will pursue to accelerate the implementation of green infrastructure.

In February 2012, EPA announced the availability of \$950,000 in technical assistance to communities working to overcome common barriers to green infrastructure. EPA received letters of interest from over 150 communities across the country, and selected 17 of these communities to receive technical assistance. Selected communities received assistance with a range of projects aimed at addressing common barriers to green infrastructure, including code review, green infrastructure design, and cost-benefit assessments. The Macatawa Area Coordinating Committee was selected to receive assistance to identify green infrastructure barriers and opportunities in local codes and ordinance.

For more information, visit [http://water.epa.gov/infrastructure/greeninfrastructure/gi\\_support.cfm](http://water.epa.gov/infrastructure/greeninfrastructure/gi_support.cfm).

## Acknowledgements

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## 1 Project Summary

Lake Macatawa is considered to be one of the most hypereutrophic lakes in the State of Michigan. The lake has a direct connection to Lake Michigan, and the lake's watershed has an extensive urbanized area with a significant minority population. The Michigan Department of Environmental Quality (MDEQ) has included the lake and its tributaries on the state's 303(d) list for impaired waters (i.e., those not attaining water quality standards) and the watershed operates under a phosphorus total maximum daily load, which was approved by U.S. Environmental Protection Agency (EPA) Region V in 2000. Approximately 91 percent of the total phosphorus load comes from nonpoint source pollution, primarily during storm events. There is a significant community need for strategies to reduce the huge amount of nonpoint source pollution that is driven by wet weather events.

The Macatawa Area Coordinating Council (MACC) requested technical assistance from EPA to complete a green infrastructure assessment of five partner agencies within four localities using EPA's *Water Quality Scorecard*. The five partner agencies all operate in the Macatawa Watershed, and include the City of Holland, City of Zeeland, Ottawa County Drain Commissioner, Ottawa County Road Commission, and Allegan County Drain Commissioner. The project supports MACC outreach and implementation efforts of the watershed management plan by facilitating communication with local municipal staff and educating local decision makers about green infrastructure. Further, the assessment will help identify obstacles to MACC green implementation goals by evaluating local codes, policies and procedures.

This report describes the assessment process and presents key findings from the reviews of the five partner agencies' plans, policies and codes with a summary of the action items that the partners could implement.

## 2 Document Review

To review relevant sections of the partners' standards and specifications, policies, and procedures, EPA used an infrastructure code and policy evaluation tool: *The EPA Water Quality Scorecard* (hereafter referred to as the "Scorecard," available at [http://www.epa.gov/smartgrowth/water\\_scorecard.htm](http://www.epa.gov/smartgrowth/water_scorecard.htm)). The original Scorecard developed by EPA assigned points to various green infrastructure elements with the goal of creating an overall score that local governments could use as a baseline and to track progress over time. At the request of MACC, EPA amended the original Scorecard by removing the point allocations and creating, instead, a checklist to document the reviews.

Based on EPA's research and partner input, a set of codes, ordinances, standards, guidelines, and plans were determined to have a bearing on green infrastructure implementation and were selected for review. The review identified existing partner's standards and specifications, policies, and procedures that support green infrastructure implementation. The review also identified provisions that actively limit or prevent the use of green infrastructure, create ambiguity that could discourage or prevent its use, or have omissions that, if remedied, could better promote the use of green infrastructure.

EPA completed the modified Scorecard for each partner, noting the implementation tools/policies that (1) are already covered by existing standards and specifications, codes, plans and policies, (2) are not addressed, or (3) fall outside the partner's authority or jurisdiction.

To develop recommended priority action items, EPA reviewed the findings generated by the Scorecard's 220+ potential implementation tools/policies and identified 97 actions that are (1) most critical for implementing the Macatawa Watershed Management Plan (i.e., those that mirror or support Plan recommendations) and (2) basic, effective green infrastructure practices that are relatively easy to implement. Some of these priority actions are appropriate for a single partner while some require a partnership with other partners, i.e., drain commissioner. For each element of the modified Scorecard, recommended follow up activities were characterized as follows:

NO RECOMMENDATION: Adequately addressed in existing plans, policies, and codes.

OPPORTUNITY FOR IMPROVEMENT: Element of Water Quality Scorecard that is not addressed, but that is not a for priority action.

RECOMMENDED FOR ACTION [In conjunction with...]: Priority for action based on implementing the Macatawa Watershed Management Plan and core green infrastructure measures.

NOT APPLICABLE: Not applicable to the jurisdiction's powers, duties, and authority.

The five goals that comprise the Scorecard were used to organize and report findings. The goals and rationale for addressing each within the context of green infrastructure implementation are as follows:

### *Goal #1 Protect Natural Resources and Open Space*

Protection of significant tracts of critical lands and wildlife habitat aids in protecting and improving water quality by increasing infiltration and groundwater recharge, preventing erosion and contamination of ground water and surface water resources, and protecting sources of drinking water. No-development buffer zones and other protective tools in place around wetlands, riparian areas, and floodplains that improve/protect water quality will reduce pollutant loads and hydrologic alterations to water bodies. Protecting source water protection areas through land use controls and stewardship activities will help safeguard community health, reduce the risk of water supply contamination, and potentially reduce water treatment costs. An open space network can provide large areas that contribute little to stormwater loads and can provide large areas for the infiltration and purification of stormwater. Mature trees, including street trees, provide multiple environmental, economic, and community benefits, including improved water and air quality, reduced heat island effects, lowered energy costs, and improved community aesthetics.

### *Goal #2 Promote Efficient, Compact Development Patterns and Infill*

Municipalities can realize a significant reduction in regional runoff if they take advantage of underused properties, such as infill, brownfield, or greyfield sites. Redeveloping already degraded sites such as abandoned shopping centers or underutilized parking lots rather than paving greenfield sites for new development can dramatically reduce total impervious area while allowing communities to experience the benefits and opportunities associated with growth. Sewer and water authorities can play a major role in directing a region's growth by determining when and where new infrastructure investment will occur. Well-drafted facility planning areas can direct growth by providing sewer service in areas least likely to impact water resources. Mixed-use developments allow for the co-locating of land uses, which decreases impervious surfaces associated with parking and decreases vehicle miles traveled—resulting in a reduction of hydrocarbons left on roadways and reduced air deposition. Transit-oriented development (TOD) produces water quality benefits by reducing: (1) land consumption due to smaller site footprints; (2) parking spaces and the impervious

cover associated with them; and (3) average vehicle miles traveled, which, in turn, reduces deposition of air pollution into water bodies.

### *Goal #3 Design Complete, Smart Streets That Reduce Overall Imperviousness*

The width of travel lanes, parking lanes and sidewalks should be tailored to the urban setting. Where appropriate, narrowing travel lane width to 10–11 feet, rather than the standard 12–13 feet, can significantly reduce the total amount of impervious surfaces. Such streets can also substantially improve conditions for walking, biking, and using transit, which reduces automobile use and overall demand for parking spaces. Off-street parking and driveways contribute significantly to the impervious areas on a residential lot. Reducing such dimensions can minimize the amount of stormwater runoff from a site. Consistent projects to improve or repair streets provide opportunities to include green infrastructure retrofits as part of larger project budget, design, and construction. Streets, sidewalks, and other hard surfaces contribute a large portion to a municipality's total imperviousness. Making these impervious surfaces more permeable protects water quality, reduces flooding, and can recharge groundwater.

### *Goal #4 Encourage Efficient Parking*

Inflexible parking requirements that do not allow for alternative approaches, as well as standards that require too much parking for specific uses, increase the amount of impervious surface in a development. Over-parking a development also encourages greater vehicle use and detracts from the overall pedestrian environment. Incentives such as transit passes, vanpool arrangements, flexible work schedules, market-priced facilities, and separate leasing for spaces in apartments and condominiums have quantifiable impacts on parking demand. Incorporating them into parking requirements creates the opportunity to meet demand with less impervious cover. Parking lots generate a large amount of impervious cover. Requiring landscaping reduces the environmental impact of parking and can provide additional community benefits by providing shade and, if appropriately placed, creating natural barriers between pedestrians and cars.

### *Goal #5 Adopt Green Infrastructure Stormwater Management Provisions*

Green infrastructure approaches are more effective and cost efficient than conventional stormwater management practices in many instances, and they provide other substantial community benefits. Pre-site plan review is an effective tool for discussing with developers alternative approaches for meeting stormwater requirements. This will incorporate green infrastructure techniques into new projects at early design stages, well before construction begins. Stormwater reuse is important for dense, urban areas with limited spaces for vegetated green infrastructure practices. In some cases, it is impracticable or infeasible to treat all or even some of the stormwater runoff on site. In such instances, alternative means should be provided through contribution to off-site mitigation projects or off-site stormwater management facilities (preferably green infrastructure facilities). Monitoring, tracking, and maintenance measures will help ensure that the successful tracking and monitoring of green infrastructure practices remain in proper working condition to provide the performance required by the stormwater ordinance.

## 3 Evaluation Findings

### 3.1 Allegan County Drain Commissioner

EPA conducted a review of the Allegan County Drain Commissioner's relevant standards and specifications, policies, and procedures, including the following:

- Allegan County Soil and Erosion Control Ordinance 1013.1 (October 2008)
- Development Standards for Stormwater Systems
- Allegan County Maintenance Proposal

On the basis of that review, EPA developed recommended action items for each Scorecard goal, as applicable. Those action items are summarized below.

#### *Goal #1: Protect Natural Resources and Open Space*

##### *Natural Area Preservation (including Water Resources)*

Amend existing post-construction design standards as follows:

- Remove language that discourages dispersed stormwater management practices – developers should be encouraged to use green infrastructure.
- Should improve upon permanent sedimentation basin design (allow Faircloth skimmers, etc. to improve sediment reduction).
- Promote use of other SCMs for temperature mitigation in sensitive areas – many green infrastructure practices have been shown effective at temperature buffering or overall thermal load reduction, whereas surface basins consistently export thermal load.

**Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)

Define “protected wetland or water source” ideally in conjunction with other watershed partners.

Identify and map currently critical natural resource areas to assist developers in properly identifying these areas on site plans.

Develop and codify standards requiring developers to protect these areas to include, at a minimum, no development zones, buffers, complying with applicable state, federal laws as they apply to inland riparian areas and wetlands. Provide more specific language on other types of sensitive natural lands that might also need protection.

**Resource:**

BMP Fact Sheet: Protect Sensitive Areas. Michigan Low Impact Development Manual.

<http://www.swmpc.org/downloads/lidmanual.pdf> (p. 97)

Develop and implement performance standards for post-construction discharges to wetlands. Provide more specificity on the pre-treatment standard for sediment removal.

**Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)



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Develop and implement regulations which require restoration of degraded riparian/wetland areas on a development site.

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*Open Space Preservation*

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Provide financial support to or collaborate with land trusts to acquire critical natural areas.

Allow and encourage retrofits of abandoned or underutilized public lands to serve as permanent or temporary open space and green infrastructure sites.

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*Tree Preservation*

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Adopt and/or implement construction protection rules for all public trees. Expand protection rules for all public trees beyond those in the floodplain buffer zone area.

**Resources:**

Bloomfield Township (Michigan) Tree Protection Ordinance

<http://www.bloomfieldtp.org/Services/PlanningBuildingOrdinance/PlanningDivision/PDF/TreeOrdinance.pdf>

Michigan LID Manual

<http://library.semco.org/InmagicGenie/DocumentFolder/LIDManualWeb.pdf> (p. 104)

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Require site plans or stormwater plans to include tree preservation.

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Include tree preservation and replacement goals in applicable plans.

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Conduct and/or advertise educational sessions for builders and developers regarding appropriate tree protection techniques and/or publish a technical tree protection manual.

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Support and/or promote local non-profits that plant trees and provide educational services.

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Provide and/or promote financial incentives for tree purchases and planting.

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## *Goal #2: Promote Efficient, Compact Development Patterns and Infill*

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*Development in Areas with Existing Infrastructure*

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Include a mechanism for off-site, regional water retention/detention and criteria by which they can be used in the ACDC Standards and Specifications to avoid costly on-site retention in densely developed infill areas and to provide benefit to priority retrofit sites, such as schools.

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## *Goal #3: Design Complete, Smart Streets that Reduce Overall Imperviousness*

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*Green Infrastructure and Street Design*

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Adopt technical specifications and design templates for green infrastructure in private and public rights-of-way.

**Resources:**

SEMCOG Washtenaw Avenue Corridor Plan. <http://www.semco.org/Stormwater.aspx>

SEMCOG. Great Lakes Green Streets Guidebook. [Under development] For more information:

<http://www.semco.org/SEMCOGBlog.aspx?id=90270&blogid=87637>

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Allow streets with green infrastructure to count towards stormwater requirements.

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Sponsor/approve pilot programs to determine appropriate pervious materials for different paving areas (e.g., permeable concrete for sidewalks, permeable pavers for driveways), as well as process for installation and maintenance.

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Incorporate pilot project results into standard practice for all new paved areas and retrofits of existing paved surfaces.

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Adopt policy to replace impervious materials with pervious materials where practical.

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**Resource:**

ForwardDallas! Comprehensive Plan. [http://dallascityhall.com/forwardDallas/comprehensive\\_plan.html](http://dallascityhall.com/forwardDallas/comprehensive_plan.html)

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#### *Goal #4: Encourage Efficient Parking*

No recommended action items for ACDC under this goal.

#### *Goal #5: Adopt Green Infrastructure Stormwater Management Provisions*

##### *Green Infrastructure Practices*

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Inform the public, through education and outreach programs, that green infrastructure practices can manage stormwater runoff on their property.

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Create and provide a green infrastructure workshop or training program, with collaboration from other watershed partners, for internal and external reviewers to ensure that the stakeholders who use this tool will have the ability to understand and use it effectively.

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Encourage and allow property owners to adopt home-based green infrastructure practices, such as rain gardens, rain barrels, and other rainwater harvesting practices by providing these as options in the ACDC Development Standards for Stormwater Systems.

- Promotion of dispersed stormwater control measures for volume reduction could improve water quality, mitigate flooding, and enhance overall watershed ecosystem services.
  - Specifically allow other green infrastructure practices and generate design guidance for implementation.
  - Credit green infrastructure practices toward volume storage requirements of retention/detention design.
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Review and change, where necessary and in conjunction with other watershed partners, other local regulations (e.g., other county departments, townships) to ensure that all local government departments/agencies have coordinated with one another to ensure that green infrastructure implementation is legal and encouraged.

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Credit green infrastructure practices towards required controls for stormwater runoff.

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Modify ACDC Development Standards for Stormwater Systems to specifically allow green infrastructure facilities, including but not limited to:

- Green roofs;
- Infiltration approaches—rain gardens, curb extensions, planters, permeable and porous pavements, and other designs where the intent is to capture and manage stormwater using soils and plants;
- Water harvesting devices, such as rain barrels and cisterns; and
- Downspout disconnection.

**Resources:**

Town of Huntersville LID Ordinance: <http://www.docstoc.com/docs/115239270/Town-of-Huntersville-Post-Construction-Storm-Water-Ordinance>

San Antonio Unified Development Code. Sec. 35-504(f). - Stormwater Detention and Other Stormwater Management Facilities. <http://library.municode.com/index.aspx?clientId=14228>

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Encourage/require a pre-site plan meeting with developers to discuss stormwater management and green infrastructure approaches.

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Develop off-site green stormwater management plans for infill and redevelopment areas in cooperation between local government and landowners/developers. Designate sewersheds within the watershed to ensure that true mitigation is possible and realize the equal stormwater management and water quality benefits through off-site management.

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Identify and prioritize retrofit projects within the sewersheds that will utilize green infrastructure stormwater management techniques.

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Amend ACDC Development Standards for Stormwater Systems to allow off-site stormwater management for infill and redevelopment areas as part of the case-by-case review cited in the Standards and Specifications.

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix H: Model LID Stormwater Ordinances (pg 477)

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Establish system that allows/requires payment-in-lieu fees for off-site stormwater management facilities. Fees should be set sufficiently high as to cover the true cost of off-site management. Consider limitations on amount of off-site management allowed (more for infill areas, less for greenfield sites).

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Develop a plan approval and post-construction verification process to ensure compliance with stormwater standards, including enforceable procedures for bringing noncompliant projects into compliance.

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### *Maintenance and Enforcement*

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Ensure that proper local agencies have authority to enforce maintenance requirements.

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Require long-term maintenance agreements that allow for public inspections of the management practices and account for transfer of responsibility in leases and/or deed transfers.

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix G: Stormwater Management Practices Maintenance Agreement (pg 455)

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Conduct inspections every 3 to 5 years, prioritizing properties that pose the highest risk to water quality, inspecting at least 20% of approved facilities annually.

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix F: Maintenance Inspection Checklists (pg 445)

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### 3.2 Ottawa County Drain Commissioner

EPA conducted a review of the Ottawa County Drain Commissioner's relevant standards and specifications, policies, and procedures, including the following:

- Ottawa County Standards and Specifications for Drain Commissioner's Approval (September 9, 2005)
- Soil Erosion and Sedimentation Control Act, Part 91 of P.A. 451, 1994 as amended.
- Ordinance No 02-1 to establish rules and regulations to control soil erosion and sedimentation

On the basis of that review, EPA developed recommended action items for each Scorecard goal, as applicable. Those action items are summarized below.

#### *Goal #1: Protect Natural Resources and Open Space*

##### *Natural Area Preservation (including Water Resources)*

Amend existing post-construction design standards as follows:

- Reduce the required capacity of open conveyance channels to the 10-yr discharge could allow for use of wetland swales or bioswales.
- Mandate a volume reduction component or universal extended detention for water quality improvement.
- Specifically allow other green infrastructure practices and generate design guidance for implementation.
- Provide drainage duration requirements to prevent permanent pools of water in retention facilities.
- Credit green infrastructure practices toward volume storage requirements of retention/detention design.
- Remove catch basin spacing requirement to allow for use of green infrastructure.

**Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)

Define "protected wetland or water source" ideally in conjunction with other watershed partners.

Identify and map currently defined "environmentally sensitive sites" to assist developers in properly identifying these areas on site plans.

Develop and codify standards requiring developers to protect these areas to include, at a minimum, no development zones, buffers, complying with applicable state, federal laws as they apply to inland riparian areas and wetlands.

**Resource:**

BMP Fact Sheet: Protect Sensitive Areas. Michigan Low Impact Development Manual.

<http://www.swmpc.org/downloads/lidmanual.pdf> (p. 97)

Develop and implement performance standards for post-construction discharges to wetlands.

**Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)

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Develop and implement regulations which require restoration of degraded riparian/wetland areas on a development site.

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*Open Space Preservation*

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Allow and encourage retrofits of abandoned or underutilized public lands to serve as permanent or temporary open space and green infrastructure sites.

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Provide financial support to or collaborate with land trusts to acquire critical natural areas.

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*Tree Preservation*

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Adopt and/or implement construction protection rules for all public trees.

**Resources:**

Bloomfield Township (Michigan) Tree Protection Ordinance

<http://www.bloomfieldtwp.org/Services/PlanningBuildingOrdinance/PlanningDivision/PDF/TreeOrdinance.pdf>

Michigan LID Manual

<http://library.semcog.org/InmagicGenie/DocumentFolder/LIDManualWeb.pdf> (p. 104)

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Require site plans or stormwater plans to include tree preservation.

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Include tree preservation and replacement goals in applicable plans.

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Conduct and/or advertise educational sessions for builders and developers regarding appropriate tree protection techniques and/or publish a technical tree protection manual.

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Support and/or promote local non-profits that plant trees and provide educational services.

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Provide and/or promote financial incentives for tree purchases and planting.

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## *Goal #2: Promote Efficient, Compact Development Patterns and Infill*

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*Development in Areas with Existing Infrastructure*

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Include a mechanism for off-site, regional water retention/detention and criteria by which they can be used in the OCDC Standards and Specifications to avoid costly on-site retention in densely developed infill areas and to provide benefit to priority retrofit sites, such as schools.

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## *Goal #3: Design Complete, Smart Streets that Reduce Overall Imperviousness*

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*Green Infrastructure and Street Design*

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Adopt technical specifications and design templates for green infrastructure in private and public rights-of-way.

**Resources:**

SEMCOG Washtenaw Avenue Corridor Plan. <http://www.semcog.org/Stormwater.aspx>

SEMCOG. Great Lakes Green Streets Guidebook. [Under development] For more information:

<http://www.semcog.org/SEMCOGBlog.aspx?id=90270&blogid=87637>

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Allow streets with green infrastructure to count towards stormwater requirements.

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Sponsor/approve pilot programs to determine appropriate pervious materials for different paving areas (e.g., permeable concrete for sidewalks, permeable pavers for driveways), as well as process for installation and maintenance.

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Incorporate pilot project results into standard practice for all new paved areas and retrofits of existing paved surfaces.

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Adopt policy to replace impervious materials with pervious materials where practical.

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**Resource:**

ForwardDallas! Comprehensive Plan. [http://dallascityhall.com/forwardDallas/comprehensive\\_plan.html](http://dallascityhall.com/forwardDallas/comprehensive_plan.html)

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#### *Goal #4: Encourage Efficient Parking*

There are no recommended action items for OCDC under this goal.

#### *Goal #5: Adopt Green Infrastructure Stormwater Management Provisions*

##### *Green Infrastructure Practices*

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Inform the public, through education and outreach programs, that green infrastructure practices can manage stormwater runoff on their property.

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Create and provide a green infrastructure workshop or training program, with collaboration from other watershed partners, for internal and external reviewers to ensure that the stakeholders who use this tool will have the ability to understand and use it effectively.

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Encourage and allow property owners to adopt home-based green infrastructure practices, such as rain gardens, rain barrels, and other rainwater harvesting practices by providing these as options in the OCDC Standards and Specifications for Drain Commissioner's Approval.

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Review and change, where necessary and in conjunction with other watershed partners, other local regulations (e.g., other county departments, townships) to ensure that all local government departments/agencies have coordinated with one another to ensure that green infrastructure implementation is legal and encouraged.

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Credit green infrastructure practices towards required controls for stormwater runoff.

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Modify OCDC Standards and Specifications to specifically allow green infrastructure facilities, including but not limited to:

- Green roofs;
- Infiltration approaches—rain gardens, curb extensions, planters, permeable and porous pavements, and other designs where the intent is to capture and manage stormwater using soils and plants;
- Water harvesting devices, such as rain barrels and cisterns; and
- Downspout disconnection.

**Resources:**

Town of Huntersville LID Ordinance:

<http://www.docstoc.com/docs/115239270/Town-of-Huntersville-Post-Construction-Storm-Water-Ordinance>  
San Antonio Unified Development Code. Sec. 35-504(f). - Stormwater Detention and Other Stormwater Management Facilities. <http://library.municode.com/index.aspx?clientId=14228>

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Encourage/require a pre-site plan meeting with developers to discuss stormwater management and green infrastructure approaches.

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Develop off-site green stormwater management plans for infill and redevelopment areas in cooperation between local government and landowners/developers. Designate sewersheds within the watershed to ensure that true mitigation is possible and realize the equal stormwater management and water quality benefits through off-site management.

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Identify and prioritize retrofit projects within the sewersheds that will utilize green infrastructure stormwater management techniques.

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Amend OCDC Standards and Specifications to allow off-site stormwater management for infill and redevelopment areas as part of the case-by-case review currently cited in the Standards and Specifications.

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**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix H: Model LID Stormwater Ordinances (pg 477)

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Establish system that allows/requires payment-in-lieu fees for off-site stormwater management facilities. Fees should be set sufficiently high as to cover the true cost of off-site management. Consider limitations on amount of off-site management allowed (more for infill areas, less for greenfield sites).

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*Maintenance and Enforcement*

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Ensure that proper local agencies have authority to enforce maintenance requirements.

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Require long-term maintenance agreements that allow for public inspections of the management practices and account for transfer of responsibility in leases and/or deed transfers.

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**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix G: Stormwater Management Practices Maintenance Agreement (pg 455)

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Conduct inspections every 3 to 5 years, prioritizing properties that pose the highest risk to water quality, inspecting at least 20% of approved facilities annually.

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**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix F: Maintenance Inspection Checklists (pg 445)

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In addition to digitizing “As-Builts,” develop a plan approval and post-construction verification process to ensure compliance with stormwater standards, including enforceable procedures for bringing noncompliant projects into compliance.

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### 3.3 Ottawa County Road Commission

EPA conducted a review of the Ottawa County Road Commission's relevant standards and specifications, policies, and procedures, including the following:

- Ottawa County Road Commission Soil Erosion and Sedimentation Control Procedure
- Ottawa County Road Commission Standards and Specifications for Plat Condominium and Public Road Development

On the basis of that review, EPA developed recommended action items for each Scorecard goal, as applicable. Those action items are summarized below.

#### *Goal #1: Protect Natural Resources and Open Space*

##### *Natural Area Preservation (including Water Resources)*

Adopt stormwater quality and quantity performance standards to protect receiving waters that promote green infrastructure in new SW Management Standards for Road Projects mentioned under the SWPPI. Work with the Ottawa County Drain Commissioner to ensure that stormwater runoff from new road projects and the performance standards included in SW Management Standards for Road Projects are also cross-referenced in OCDC's Standards and Specifications.

**Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)

Include language that provides more specificity as to what "be attentive to SESC protection in these areas throughout the planning and construction/maintenance process" means with regard to critical and/or sensitive areas in the OCRC SESC Procedure rather than leave it open to interpretation. For example, provide specific references to the types of BMPs that will be used to protect critical and sensitive areas.

Consider adopting a minimum 50 ft. vegetated buffer requirement along each side of stream and around wetland areas in conjunction with other watershed partners.

Adopt language that requires restoration of degraded riparian/wetland areas.

Include performance standards for stormwater discharges to wetlands that protect the hydrologic regimes and limit pollutant loads. (Note: OCDC Standards and Specifications also do not include performance standards for stormwater discharges to wetlands, so referencing OCDC will not be sufficient for this area.)

**Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)

##### *Tree Preservation*

Consider adding tree species to the list that are known for managing stormwater runoff, in addition to salt tolerance. Consider waiver of tree planting requirements to allow installation of approved green infrastructure BMPs.

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix C Recommended Plants Lists for Stormwater Management

---

Conduct education and outreach about tree protection, proper maintenance, and replanting opportunities through printed materials, workshops, events, and signage

---

Revise Section IV.G. of OCRC's Standards and Specifications for Plan Condominiums and Public Roads to include requirement to replace public trees damaged or removed during construction.

---

Adopt construction protection rules for all public trees.

---

**Resource:**

MN/DOT Guidelines For Protecting, Salvaging And Replacing Vegetation Along State Highways.

<http://www.dot.state.mn.us/design/landscape-treatments/pdf/guidelines.pdf>

---

Conduct and/or advertise educational sessions for builders and developers regarding appropriate tree protection techniques and/or publish a technical tree protection manual.

---

Provide credit for protection of trees over a specified minimum size (e.g., 3-inch caliper) toward stormwater requirements.

---

Require permits before removing trees on proposed development or redevelopment sites. Provide fines and/or stop-work authority for permit violations.

---

Set minimum tree preservation standards for new development sites. New street designs and redesigns of existing streets take into account space for tree development and require necessary surface area and volume of soil dependent on type of tree species selected (this includes lateral root growth as well as direct downward growth to accommodate mature tree canopy and roots without adversely affecting other utilities).

---

Require site plans or stormwater plans to include tree preservation.

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## *Goal #2: Promote Efficient, Compact Development Patterns and Infill*

No recommended action items for OCRC under this goal.

## *Goal #3: Design Complete, Smart Streets that Reduce Overall Imperviousness*

### *Street Design*

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Endorse context-sensitive street design with narrower streets in appropriate locations in conjunction with other watershed partners. Revamp local government technical street specifications to allow context-sensitive, innovative street design with narrower travel lanes, without curb and gutter, etc., in appropriate circumstances.

---

Promote street standards for fire safety that include attributes of narrow streets (20 feet widths) while identifying factors applicable to local government departments involved with streets such as public works, engineering, and utilities.

---

Work with emergency response professionals and other local government departments involved with streets (e.g. public works, engineering, utilities) to promote endorsement or adoption of design standards for narrower neighborhood streets.

---

Involve emergency response early on in the development review process to reach consensus on appropriate project street design and access.

---

### *Green Infrastructure and Street Design*

Comprehensive/transportation plans promote green infrastructure practices in street design.

Develop technical street specifications that allow/require integration of green infrastructure elements into street project construction.

Adopt technical specifications and design templates for green infrastructure in private and public rights-of-way.

**Resources:**

SEMCOG Washtenaw Avenue Corridor Plan. <http://www.semco.org/Stormwater.aspx>

SEMCOG. Great Lakes Green Streets Guidebook. [Under development] For more information: <http://www.semco.org/SEMCOGBlog.aspx?id=90270&blogid=87637>

Allow street-side swales to replace conventional curb and gutter for managing stormwater and for separating sidewalks from street traffic in appropriate circumstances.

Allow streets with green infrastructure to count towards stormwater requirements.

Sponsor/approve pilot programs to determine appropriate pervious materials for different paving areas (e.g., permeable concrete for sidewalks, permeable pavers for driveways), as well as process for installation and maintenance.

Incorporate pilot project results into standard practice for all new paved areas and retrofits of existing paved surfaces.

Adopt policy to replace the use of impervious materials with pervious materials where practical.

**Resources:**

Green Highways Partnership: <http://www.greenhighwayspartnership.org/index.php>

Low Impact Development Center: [http://www.lowimpactdevelopment.org/green\\_highways.htm](http://www.lowimpactdevelopment.org/green_highways.htm)

Develop technical street specifications that allow pervious paving materials in appropriate circumstances (e.g., not allowed over aquifer recharge areas).

Undertake consistent effort to secure state and federal funds (e.g., transportation enhancements) to pay for green infrastructure elements.

### *Goal #4: Encourage Efficient Parking*

No recommended action items for OCRC under this goal.

### *Goal #5: Adopt Green Infrastructure Stormwater Management Provisions*

#### *Green Infrastructure Practices*

Implement recommendations through this project to ensure that green infrastructure incentives are incorporated in existing standards and specification, particularly where the OCRC relies on the Ottawa County Drain Commission for drainage standards, as well as new OCRC SW Management Standards for Road Projects as mentioned in the SWPPI.

Create and provide a green infrastructure workshop or training program, with collaboration from other watershed partners, for internal and external reviewers to ensure that the stakeholders who use this tool will have the ability to understand and use it effectively.

---

Encourage and allow property owners to adopt home-based green infrastructure practices, such as rain gardens, rain barrels, and other rainwater harvesting practices by providing these as options in the OCDC Standards and Specifications for Drain Commissioner's Approval.

---

Review and change, where necessary and in conjunction with other watershed partners, other local regulations (e.g., other county departments, townships) to ensure that all local government departments/agencies have coordinated with one another to ensure that green infrastructure implementation is legal and encouraged.

---

Credit green infrastructure practices towards required controls for stormwater runoff.

---

Encourage/require a pre-site plan meeting with developers to discuss stormwater management and green infrastructure approaches.

---

Develop off-site green stormwater management plans for infill and redevelopment areas in cooperation between local government and landowners/developers. Designate sewersheds within the watershed to ensure that true mitigation is possible and realize the equal stormwater management and water quality benefits through off-site management.

---

Identify and prioritize retrofit projects within the sewersheds that will utilize green infrastructure stormwater management techniques.

---

Allow off-site stormwater management for infill and redevelopment areas.

---

Establish system that allows/requires payment-in-lieu fees for off-site stormwater management facilities. Fees should be set sufficiently high as to cover the true cost of off-site management. Consider limitations on amount of off-site management allowed (more for infill areas, less for greenfield sites).

---

#### *Maintenance and Enforcement*

---

Ensure that proper local agencies have authority to enforce maintenance requirements. This element will be particularly important when the OCRC develops its own stormwater management standards and specifications for road projects, as mentioned in the SWPPI.

---

Require long-term maintenance agreements that allow for public inspections of the management practices and account for transfer of responsibility in leases and/or deed transfers.

---

#### **Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix G: Stormwater Management Practices Maintenance Agreement (pg 455)

---

Conduct inspections every 3 to 5 years, prioritizing properties that pose the highest risk to water quality, inspecting at least 20% of approved facilities annually. Building the capacity to do inspections among OCRC staff is likely to be necessary if OCRC develops stormwater management standards and specifications for road projects, as discussed under the SWPPI.

---

#### **Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix F: Maintenance Inspection Checklists (pg 445)

---

Develop a plan approval and post-construction verification process to ensure compliance with stormwater standards, including enforceable procedures for bringing noncompliant projects into compliance. Building the capacity to do post-construction verification among OCRC staff is likely to be necessary if OCRC develops stormwater management standards and specifications for road projects, as discussed under the SWPPI.

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### 3.4 City of Holland

EPA conducted a review of the City of Holland’s relevant standards and specifications, policies, and procedures, including the following:

- Municipal Code
  - ✓ Chapter 6 – Buildings
  - ✓ Chapter 19 – Nuisances
  - ✓ Chapter 25 – Plumbing
  - ✓ Chapter 32 – Streets/Sidewalks
  - ✓ Chapter 33 – Subdivisions
  - ✓ Chapter 36 – Trees/Shrubs
  - ✓ Chapter 39 – Zoning
- 5-Yr. Master Plan (Recreation)
- City Master Plan (1992)
- Flood management ordinance (No. 1573)
- Separations between structures ordinance (No. 1558)
- Building set back ordinance (No. 1557)

On the basis of that review, EPA developed recommended action items for each Scorecard goal, as applicable. Those action items are summarized below.

#### *Goal #1: Protect Natural Resources and Open Space*

##### *Natural Area Preservation (including Water Resources)*

Update applicable stormwater management post-construction performance standards for receiving water and wetlands as follows:

- Reduce the required capacity of open conveyance channels to the 10-yr discharge could allow for use of wetland swales or bioswales.
- Mandate a volume reduction component or universal extended detention for water quality improvement.
- Specifically allow other green infrastructure practices and generate design guidance for implementation.
- Provide drainage duration requirements to prevent permanent pools of water in retention facilities.
- Credit green infrastructure practices toward volume storage requirements of retention/detention design.
- Remove catch basin spacing requirement to allow for use of green infrastructure.

**Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)

---

Identify and map critical natural resource areas (e.g., steep slopes, wildlife habitat, forests, drinking water source areas). Expand the objectives under the existing Master Plan's goal's objective (Incorporate environmentally-sensitive development techniques, such as tree, natural feature, and wetland preservation, into project site plans) to include riparian buffers and drinking water source areas.

---

The local comprehensive plan contains a natural resource protection element with goals calling for preservation of identified critical natural resource areas.

---

Identify key natural resource areas for protection in jurisdiction's parks and open space plan.

---

Assist landowners in identifying sensitive natural areas and laying out developments to avoid such areas.

---

Local plans establish and enforce areas which are available for development and which lands are a priority for preservation.

---

Protection of sensitive natural areas and wildlife habitat qualifies for credit towards local open space dedication and set-aside requirements.

---

Land use regulations provide for the creation of cluster and conservation subdivision on the periphery of urban growth areas to encourage preservation of intact blocks of sensitive natural areas.

---

Adopt regulations to protect steep slope, hillsides, and other sensitive natural lands (e.g., by limiting development on slopes > 30% or requiring larger lot sizes in sensitive areas).

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**Resource:**

BMP Fact Sheet: Protect Sensitive Areas. Michigan Low Impact Development Manual.

<http://www.swmpc.org/downloads/lidmanual.pdf> (p. 97)

---

Wetlands and other water bodies and buffer areas qualify for credit against local open space dedication/set-aside regulations

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Riparian and wetland buffer areas required by local land use regulations

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Local regulations require restoration of degraded riparian/wetland areas on a development site.

---

Provide financial support to or collaborate with land trusts to acquire critical natural areas.

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*Open Space Preservation*

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Master Plan should contain language which expressing describes the beneficial role of open space in stormwater management. Community Parks and Recreation Plan should include stormwater management as a beneficial use of "natural resource areas". Currently defined as: "Natural Resource Areas are lands set aside for preservation of significant natural resources, remnant landscapes, open space and visual/aesthetic buffering. These sites are typically unsuitable for development but offer natural resource potential and can support recreational activities at a level that preserves the integrity of the natural resource. The location and size of these parks are largely governed by availability." Propose including "stormwater management" as another potential benefit.

**Resources:**

Grants Management, Michigan Department of Natural Resources. Guidelines for the Development of Community Park, Recreation, Open Space, and Greenway Plans.

[http://www.michigan.gov/documents/dnr/IC1924-Guidelines for the Development of Community Park Recreation Open Space and Greenways Plans - 2012 373874 7.pdf](http://www.michigan.gov/documents/dnr/IC1924-Guidelines_for_the_Development_of_Community_Park_Recreation_Open_Space_and_Greenways_Plans_-_2012_373874_7.pdf)

Public Sector Consultants, Inc. Analysis of Initiatives and Best Practices for Regional Green Infrastructure Visioning and Policy Setting. Lansing, Michigan, 2003.

[http://pscinc.com/Portals/0/Publications/WMSA/2003/RPT0458\\_2003\\_WMSA\\_Green\\_Scan.pdf](http://pscinc.com/Portals/0/Publications/WMSA/2003/RPT0458_2003_WMSA_Green_Scan.pdf)

---

Green infrastructure practices count towards local open space set aside requirements up to 50% of total.

---

---

Allow and encourage retrofits of abandoned or underutilized public lands to serve as permanent or temporary open space and green infrastructure sites.

---

Additional open space credits are eligible for green stormwater management facilities improved/designed for public recreational purposes.

---

#### *Tree Preservation*

---

Select tree species based on known performance for managing stormwater runoff. Publish list and make widely available for homeowners/others that plant street trees.

---

Conduct education and outreach about tree protection, proper maintenance, and replanting opportunities through printed materials, workshops, events, and signage.

---

Code provides protection for trees along public highways during erection, alteration, repair or removal of any building or structure. Expand existing protections during construction/development to all trees on public property.

---

Require any public trees removed or damaged during construction associated with private development to be replaced on- or off-site with an equivalent amount of tree caliper (e.g., remove a 24-inch diameter tree/replace with 6 four-inch diameter trees).

---

Community plans specifically include tree preservation and replacement as community goals.

---

Conduct educational sessions for builders and developers regarding appropriate tree protection techniques and/or publish a technical tree protection manual.

---

Support local non-profits that plant trees and provide educational services.

---

Provide financial incentives for tree purchases and planting.

---

Trees over a specified minimum size (e.g., 3-inch caliper) protected during development are credited towards landscaping requirements.

---

Require permits before removing trees on proposed development or redevelopment sites. Provide fines and/or stop-work authority for permit violations.

---

Set minimum tree preservation standards for new development sites.

---

Require site plans or stormwater plans to include tree preservation.

---

Offer incentives, such as reduced setbacks or increased building densities, in exchange for additional tree preservation beyond ordinance requirements.

---

New street designs and redesigns of existing streets take into account space for tree development and require necessary surface area and volume of soil dependent on type of tree species selected (this includes lateral root growth as well as direct downward growth to accommodate mature tree canopy and roots without adversely affecting other utilities).

---

### *Goal #2: Promote Efficient, Compact Development Patterns and Infill*

#### *Infill and Redevelopment*

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Consider increasing the minimum allowable densities to encourage infill development in the PUD and PRD and allowing additional dwelling units for buildings converted to residential in the central district.

---

Local sewer/water authority capital improvement plans follow development policies established in local comprehensive plans and target areas with existing development/infrastructure.

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---

Allow off-site, regional water retention/detention to avoid costly on-site retention in densely developed infill areas and to provide benefit to priority retrofit sites, such as schools.

---

Allow a wide variety of housing types and sizes within infill areas and reduced minimum lot sizes.

---

Increase development densities and allowable height in infill areas.

---

#### *Development in Areas with Existing Infrastructure*

---

Allow a wide variety of housing types and sizes within infill areas and reduced minimum lot sizes.

---

#### *Mixed-Use Development*

---

Comprehensive plans identify appropriate areas for higher-density mixed-use developments (e.g., at transit stops) and recommend policies to encourage their development.

---

Reduce parking requirements to reflect decreased automobile use.

---

Encourage shared parking and alternative parking arrangements.

---

Mixed-use districts/areas feature increased densities and height.

---

Zoning code requires a minimum mix of uses and minimum density in designated mixed-use and transit-oriented development areas.

---

### *Goal #3: Design Complete, Smart Streets that Reduce Overall Imperviousness*

#### *Street Design*

---

Comprehensive plan endorses context-sensitive street design with narrower streets in appropriate locations.

---

Promote street standards for fire safety that include attributes of narrow streets (20 feet widths) while identifying factors relevant to local government departments involved with streets such as public works, engineering, and utilities.

---

Revamp local government technical street specifications to allow context-sensitive, innovative street design with narrower travel lanes, without curb and gutter, etc., in appropriate circumstances.

---

#### **Resources:**

Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, Institute of Transportation Engineers: <http://www.ite.org/css/> (Ch. 6, pages. 65-87)

MDOT Context Sensitive Solutions and Complete Streets.

[http://www.michigan.gov/mdot/0,4616,7-151-9621\\_41446---,00.html](http://www.michigan.gov/mdot/0,4616,7-151-9621_41446---,00.html)

---

Emergency response professionals and other local government departments involved with streets (e.g. public works, engineering, utilities) have endorsed or adopted design standards for narrower neighborhood streets.

---

Development review process involves emergency response early on to reach consensus on appropriate project street design and access.

---

Shared driveways are permitted or required for single-family residential developments.

---

Minimum widths for single-family driveways reduced to 9 feet.

---

#### *Green Infrastructure and Street Design*

---

Comprehensive/transportation plans promote green infrastructure practices in street design.

---

---

Technical street specifications allow/require integration of green infrastructure elements into street project construction.

---

Allow street-side swales to replace conventional curb and gutter for managing stormwater and for separating sidewalks from street traffic in appropriate circumstances.

---

Undertake consistent effort to secure state and federal funds (e.g., transportation enhancements) to pay for green infrastructure elements.

---

Streets with green infrastructure count towards stormwater requirements.

---

Adopt technical specifications and design templates for green infrastructure in private and public rights-of-way.

---

**Resources:**

SEMCOG Washtenaw Avenue Corridor Plan. <http://www.semco.org/Stormwater.aspx>

SEMCOG. Great Lakes Green Streets Guidebook. [Under development] For more information:

<http://www.semco.org/SEMCOGBlog.aspx?id=90270&blogid=87637>

---

Sponsor/approve pilot programs to determine appropriate pervious materials for different paving areas (e.g., permeable concrete for sidewalks, permeable pavers for driveways), as well as process for installation and maintenance.

---

Pilot project results incorporated into standard practice for all new paved areas and retrofits of existing paved surfaces.

---

Adopt policy to replace impervious materials with pervious materials where practical.

---

**Resource:**

ForwardDallas! Comprehensive Plan. [http://dallascityhall.com/forwardDallas/comprehensive\\_plan.html](http://dallascityhall.com/forwardDallas/comprehensive_plan.html)

---

Technical street specifications allow pervious paving materials in appropriate circumstances (e.g., not allowed over aquifer recharge areas).

---

## *Goal #4: Encourage Efficient Parking*

### *Reduced Parking Requirements*

---

The comprehensive plan recommends alternative, flexible approaches to meeting parking demands (e.g., shared parking, counting on-street spaces towards site parking requirements).

---

Allow flexibility in meeting parking space requirements through shared parking, off-site parking, and similar approaches. Specifically include language in code that describes conditions necessary to allow for shared parking in all zones, off-site parking or other proposed alternatives. Require shared parking for appropriate uses.

---

Permit businesses with different peak demand periods to share their required parking spaces.

---

Allow by-right reduction in required parking spaces (e.g., 25%) in mixed-use and transit-oriented developments and districts.

---

Allow new construction to apply for modified parking requirements based on the criteria found at code § 39-25(e) and others such as proximity to mass transit, bicycle paths, etc.

---

Revise parking regulations to reduce minimums below standard ITE (Institute of Transportation Engineers) requirements based on analysis of local developments and actual parking demand/experience.

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Create zones with reduced parking requirements (e.g., transit overlay districts, mixed-use activity centers, multi-modal districts). Allow for reduced parking, by-right, in mixed use zones.

---

Waive all parking minimums in downtown and other locations that are pedestrian-oriented and/or have good transit access.

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#### *Minimizing Runoff from Parking Lots*

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Comprehensive plan calls for landscaping in parking lots to help reduce stormwater runoff.

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Allow alternative or innovative landscaping solutions that provide stormwater management functions to count towards perimeter or other landscaping requirements.

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Parking lot landscaping and green roofs on parking structures credited towards meeting local stormwater management requirements.

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Give additional landscaping credit for preservation of large, mature trees within parking lots.

---

In parking lot landscaping regulations, specify the types and sizes of shrubs and trees most appropriate for controlling/reducing stormwater runoff.

---

### *Goal #5: Adopt Green Infrastructure Stormwater Management Provisions*

#### *Green Infrastructure Practices*

---

Inform the public, through education and outreach programs, that green infrastructure practices can manage stormwater runoff on their property.

---

Create a green infrastructure workshop or training program for internal and external reviewers to ensure that the stakeholders who use this tool will have the ability to understand and use it effectively.

---

Development and other codes encourage and allow property owners to adopt home-based green infrastructure practices, such as rain gardens, rain barrels, and other rainwater harvesting practices.

---

Review and change, where necessary, building codes or other local regulations to ensure that all local government departments/agencies have coordinated with one another to ensure that green infrastructure implementation is legal, e.g. remove restrictions on downspout disconnection.

---

Credit green infrastructure practices towards required controls for stormwater runoff.

---

Zoning/subdivision regulations specifically permit green infrastructure facilities, including but not limited to:

- Green roofs;
- Infiltration approaches—rain gardens, curb extensions, planters, permeable and porous pavements, and other designs where the intent is to capture and manage stormwater using soils and plants;
- Water harvesting devices, such as rain barrels and cisterns; and
- Downspout disconnection

#### **Resources:**

Town of Huntersville LID Ordinance:

<http://www.docstoc.com/docs/115239270/Town-of-Huntersville-Post-Construction-Storm-Water-Ordinance>  
San Antonio Unified Development Code. Sec. 35-504(f). - Stormwater Detention and Other Stormwater Management Facilities. <http://library.municode.com/index.aspx?clientId=14228>

---

Encourage/require a pre-site plan meeting with developers to discuss stormwater management and green infrastructure approaches.

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Preliminary stormwater plan review occurs contemporaneously with preliminary site plan review and before any development approvals.

---

For infill and redevelopment areas, off-site green stormwater management plans should be developed in cooperation between local government and landowners/developers. Allowing off-site management of stormwater runoff requires sewershed designation within the local government to ensure that true mitigation is possible and realize the equal stormwater management and water quality benefits through off-site management.

---

Retrofit projects that will utilize green infrastructure stormwater management techniques should be identified and prioritized within the sewershed.

---

Amend stormwater management regulations and development codes as necessary to allow off-site stormwater management, especially for infill and redevelopment areas.

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**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix H: Model LID Stormwater Ordinances (pg 477)

---

Establish system that allows/requires payment-in-lieu fees for off-site stormwater management facilities. Fees should be set sufficiently high as to cover the true cost of off-site management. Consider limitations on amount of off-site management allowed (more for infill areas, less for greenfield sites).

---

### *Maintenance and Enforcement*

---

Ensure that proper local agencies have authority to enforce maintenance requirements.

---

Require long-term maintenance agreements that allow for public inspections of the management practices and account for transfer of responsibility in leases and/or deed transfers.

---

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix G: Stormwater Management Practices Maintenance Agreement (pg 455)

---

Conduct inspections every 3 to 5 years, prioritizing properties that pose the highest risk to water quality, inspecting at least 20% of approved facilities annually.

---

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>  
Appendix F: Maintenance Inspection Checklists (pg 445)

---

Develop a plan approval and post-construction verification process to ensure compliance with stormwater standards, including enforceable procedures for bringing noncompliant projects into compliance.

---



### 3.5 City of Zeeland

EPA conducted a review of the City of Zeeland's relevant standards and specifications, policies, and procedures, including the following:

- Municipal Code
  - ✓ Chapter 18 – Environment
  - ✓ Chapter 22 – Land Divisions and Subdivisions
  - ✓ Chapter 34 – Streets, Sidewalks and Other Public Places
  - ✓ Chapter 38 – Traffic and Vehicles
  - ✓ Chapter 42 – Zoning
- Adopted Master Plan (2011)
- Zeeland Complete Streets
- 2012 Strategic Action Plan
- Downtown Vision Plan

On the basis of that review, EPA developed recommended action items for each Scorecard goal, as applicable. Those action items are summarized below.

#### *Goal #1: Protect Natural Resources and Open Space*

##### *Natural Area Preservation (including Water Resources)*

Update applicable stormwater management post-construction performance standards for receiving water and wetlands as follows:

- Reduce the required capacity of open conveyance channels to the 10-yr discharge which could allow for use of wetland swales or bioswales.
- Mandate a volume reduction component or universal extended detention for water quality improvement.
- Specifically allow other green infrastructure practices and generate design guidance for implementation.
- Provide drainage duration requirements to prevent permanent pools of water in retention facilities.
- Credit green infrastructure practices toward volume storage requirements of retention/detention design.
- Remove catch basin spacing requirement to allow for use of green infrastructure.

##### **Resource:**

Washtenaw County (Michigan) Water Resources Commissioner Design Standards.

[http://www.ewashtenaw.org/government/drain\\_commissioner/dc\\_webPermits\\_DesignStandards/dc\\_Rules](http://www.ewashtenaw.org/government/drain_commissioner/dc_webPermits_DesignStandards/dc_Rules)

Update the local comprehensive and open space plans to include natural resource protection element with goals calling for preservation of identified critical natural resource areas (including critical water features) and to identify area which are a priority for preservation.

More specifically define what constitutes a “significant natural feature” as defined in the municipal code, i.e. only impaired surface waters or all surface waters.

Identify and map those areas identified as “significant natural features” (to include critical water features) as defined in the municipal code on private and in the City's parks and open space.

---

Assist landowners in identifying sensitive natural areas and laying out development and redevelopment projects to avoid such areas.

---

Update regulations to allow for the protection of natural areas (to include protection of critical water features, e.g. buffers and riparian/wetland restoration) to count towards open space requirements.

---

Adopt regulations to protect steep slope, hillsides, and other sensitive natural lands. For example, regulations could limit development on slopes > 30% or require larger lot sizes in sensitive areas.

---

**Resource:**

BMP Fact Sheet: Protect Sensitive Areas. Michigan Low Impact Development Manual.  
<http://www.swmpc.org/downloads/lidmanual.pdf> (p. 97)

---

Update development regulations to require buffers around critical water features such as waterways and wetlands.

---

Update applicable regulations to require restoration of degraded riparian/wetland areas on development sites.

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### *Open Space Preservation*

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Adopt a community-wide open space and parks plan and incorporate an open space/parks element into the City's comprehensive plan that recognizes the role of open space in sustainable stormwater management.

**Resources:**

Grants Management, Michigan Department of Natural Resources. Guidelines for the Development of Community Park, Recreation, Open Space, and Greenway Plans.

[http://www.michigan.gov/documents/dnr/IC1924-Guidelines for the Development of Community Park Recreation Open Space and Greenways Plans - 2012 373874 7.pdf](http://www.michigan.gov/documents/dnr/IC1924-Guidelines_for_the_Development_of_Community_Park_Recreation_Open_Space_and_Greenways_Plans_-_2012_373874_7.pdf)

Public Sector Consultants, Inc. Analysis of Initiatives and Best Practices for Regional Green Infrastructure Visioning and Policy Setting. Lansing, Michigan, 2003.

[http://pscinc.com/Portals/0/Publications/WMSA/2003/RPT0458\\_2003\\_WMSA\\_Green\\_Scan.pdf](http://pscinc.com/Portals/0/Publications/WMSA/2003/RPT0458_2003_WMSA_Green_Scan.pdf)

---

Allow green infrastructure practices count towards local open space set aside requirements up to 50% of total with additional credits being possible for green infrastructure practices that are improved or designed for public recreational purposes.

---

Allow and encourage retrofits of abandoned or underutilized public lands to serve as permanent or temporary open space and green infrastructure sites

---

Provide financial support to or collaborate with land trusts to acquire critical natural areas.

---

### *Tree Preservation*

---

Update community plans specifically to include tree preservation and replacement as community goals.

---

Require permits before removing trees on proposed development or redevelopment sites.  
Provide fines and/or stop-work authority for permit violations.

---

Set minimum tree preservation standards for new development sites

---

Require site plans or stormwater plans to include tree preservation.

---

Conduct educational sessions for builders and developers regarding appropriate tree protection techniques and/or publish a technical tree protection manual

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Select street tree species preferred by the City based on known performance for managing stormwater runoff. Publish list and make widely available for homeowners/others that plant street trees.

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Require all private and public developments are required to plant street trees in accordance with size, spacing, and other local government requirements.

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Provide financial incentives for tree purchases and planting.

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Conduct education and outreach about tree protection, proper maintenance, and replanting opportunities through printed materials, workshops, events, and signage.

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Per § 18-281 of the Municipal Code, adopt a policy/plan to protect existing trees on local government development sites (e.g., municipal parking lots, municipal buildings) and codify regulations which include construction protection rules for all public trees.

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Require any public trees removed or damaged during construction associated with private development to be replaced on- or off-site with an equivalent amount of tree caliper (e.g., remove a 24-inch diameter tree/replace with 6 four-inch diameter trees).

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Offer incentives, such as reduced setbacks or increased building densities, in exchange for additional tree preservation beyond ordinance requirements.

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Ensure that new street designs and redesigns of existing streets take into account space for tree development and require necessary surface area and volume of soil dependent on type of tree species selected (this includes lateral root growth as well as direct downward growth to accommodate mature tree canopy and roots without adversely affecting other utilities).

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## *Goal #2: Promote Efficient, Compact Development Patterns and Infill*

### *Infill and Redevelopment*

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Off-site, regional water retention/detention encouraged/allowed to avoid costly on-site retention in densely developed infill areas and to provide benefit to priority retrofit sites, such as schools.

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### *Development in Areas with Existing Infrastructure*

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Allow a wide variety of housing types and sizes within infill areas and reduced minimum lot sizes.

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Increase development densities and allowable height in infill areas.

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### *Mixed-Use Development*

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Amend the zoning code to require a minimum mix of uses and minimum density in designated mixed-use and transit-oriented development areas.

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## *Goal #3: Design Complete, Smart Streets that Reduce Overall Imperviousness*

### *Street Design*

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Comprehensive plan endorses context-sensitive street design with narrower streets in appropriate locations.

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Promote street standards for fire safety that include attributes of narrow streets (20 feet widths) while identifying factors relevant to local government departments involved with streets such as public works, engineering, and utilities.

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Revamp local government technical street specifications to allow context- sensitive, innovative street design with narrower travel lanes, without curb and gutter, etc., in appropriate circumstances.

**Resources:**

Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, Institute of Transportation Engineers: <http://www.ite.org/css/> (Ch. 6, pages. 65-87)

MDOT Context Sensitive Solutions and Complete Streets.

[http://www.michigan.gov/mdot/0,4616,7-151-9621\\_41446---,00.html](http://www.michigan.gov/mdot/0,4616,7-151-9621_41446---,00.html)

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Work with emergency response professionals and other local government departments involved with streets (e.g. public works, engineering, utilities) to endorse or adopted design standards for narrower neighborhood streets.

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Shared driveways are permitted or required for single-family residential developments.

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Minimum widths for single-family driveways reduced to 9 feet.

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*Green Infrastructure and Street Design*

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Comprehensive/transportation plans promote green infrastructure practices in street design.

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Technical street specifications allow/require integration of green infrastructure elements into street project construction.

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Allow street-side swales to replace conventional curb and gutter for managing stormwater and for separating sidewalks from street traffic in appropriate circumstances.

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Undertake consistent effort to secure state and federal funds (e.g., transportation enhancements) to pay for green infrastructure elements.

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Streets with green infrastructure count towards stormwater requirements.

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Adopt green infrastructure technical specifications and design templates in private and public rights-of-way.

**Resources:**

SEMCOG Washtenaw Avenue Corridor Plan. <http://www.semco.org/Stormwater.aspx>

SEMCOG. Great Lakes Green Streets Guidebook. [Under development] For more information:

<http://www.semco.org/SEMCOGBlog.aspx?id=90270&blogid=87637>

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Sponsor/approve pilot programs to determine appropriate pervious materials for different paving areas (e.g., permeable concrete for sidewalks, permeable pavers for driveways), as well as process for installation and maintenance.

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Pilot project results incorporated into standard practice for all new paved areas and retrofits of existing paved surfaces.

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Adopt policy to replace the use of impervious materials with pervious materials where practical. For example, language could be included within the City's comprehensive plan which specifies that the City will promote the use of pervious landscaping and paving materials.

**Resource:**

ForwardDallas! Comprehensive Plan. [http://dallascityhall.com/forwardDallas/comprehensive\\_plan.html](http://dallascityhall.com/forwardDallas/comprehensive_plan.html)

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Technical street specifications allow pervious paving materials in appropriate circumstances (e.g., not allowed over aquifer recharge areas).

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## Goal #4: Encourage Efficient Parking

### Reduced Parking Requirements

The comprehensive plan recommends alternative, flexible approaches to meeting parking demands (e.g., shared parking, counting on-street spaces towards site parking requirements).

Allow flexibility in meeting parking space requirements through shared parking, off-site parking, and similar approaches. Encourage shared parking in all Districts for non-residential uses.

Permit businesses with different peak demand periods to share required parking spaces. Encourage shared parking in all Districts for non-residential uses, especially for businesses with different peak demand times.

Permit developers to undertake parking studies to establish that specific developments (e.g., senior housing, affordable housing) require fewer parking spaces than typical projects.

Revise parking regulations to reduce minimums below standard ITE (Institute of Transportation Engineers) requirements based on analysis of local developments and actual parking demand/experience.

Waive all parking minimums in downtown and other locations that are pedestrian-oriented and/or have good transit access.

### Minimizing Runoff from Parking Lots

Comprehensive plan calls for landscaping in parking lots to help reduce stormwater runoff.

Allow alternative or innovative landscaping solutions that provide stormwater management functions to count towards perimeter or other landscaping requirements.

Parking lot landscaping credited towards meeting local stormwater management requirements

Give additional landscaping credit for preservation of large, mature trees within parking lots.

Adopt parking lot landscape regulations that require a minimum percent of parking lot interior area to be landscaped (e.g., 10%).

#### Resource:

"Sustainable Green Streets and Parking Lots Design Guidebook," San Mateo County, California Water Pollution Prevention Program: [http://www.flowstobay.org/ms\\_sustainable\\_streets.php](http://www.flowstobay.org/ms_sustainable_streets.php)

In parking lot landscaping regulations, specify the types and sizes of shrubs and trees most appropriate for controlling/reducing stormwater runoff.

## Goal #5: Adopt Green Infrastructure Stormwater Management Provisions

### Green Infrastructure Practices

Inform the public, through education and outreach programs, that green infrastructure practices can manage stormwater runoff on their property.

Create a green infrastructure workshop or training program for internal and external reviewers to ensure that the stakeholders who use this tool will have the ability to understand and use it effectively.

Development and other codes encourage and allow property owners to adopt home-based green infrastructure practices, such as rain gardens, rain barrels, and other rainwater harvesting practices.

Review and change, where necessary, building codes or other local regulations to ensure that all local government departments/agencies have coordinated with one another to ensure that green infrastructure implementation is legal, e.g. remove restrictions on downspout disconnection.

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Credit green infrastructure practices towards required controls for stormwater runoff.

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Update zoning and subdivision regulations specifically to permit green infrastructure facilities, including but not limited to:

- Green roofs;
- Infiltration approaches—rain gardens, curb extensions, planters, permeable and porous pavements, and other designs where the intent is to capture and manage stormwater using soils and plants;
- Water harvesting devices, such as rain barrels and cisterns; and
- Downspout disconnection.

**Resources:**

Town of Huntersville LID Ordinance:

<http://www.docstoc.com/docs/115239270/Town-of-Huntersville-Post-Construction-Storm-Water-Ordinance>

San Antonio Unified Development Code. Sec. 35-504(f). - Stormwater Detention and Other Stormwater Management Facilities. <http://library.municode.com/index.aspx?clientId=14228>

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Encourage/require a pre-site plan meeting with developers to discuss stormwater management and green infrastructure approaches.

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Preliminary stormwater plan review occurs contemporaneously with preliminary site plan review and before any development approvals.

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For infill and redevelopment areas, off-site green stormwater management plans should be developed in cooperation between local government and landowners/developers. Allowing off-site management of stormwater runoff requires sewershed designation within the local government to ensure that true mitigation is possible and realize the equal stormwater management and water quality benefits through off-site management.

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Retrofit projects that will utilize green infrastructure stormwater management techniques should be identified and prioritized within the sewershed.

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Amend stormwater management regulations and development codes as necessary to allow off-site stormwater management, especially for infill and redevelopment areas.

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**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>

Appendix H: Model LID Stormwater Ordinances (pg 477)

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Establish system that allows/requires payment-in-lieu fees for off-site stormwater management facilities. Fees should be set sufficiently high as to cover the true cost of off-site management. Consider limitations on amount of off-site management allowed (more for infill areas, less for greenfield sites).

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### *Maintenance and Enforcement*

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Require long-term maintenance agreements that allow for public inspections of the management practices and account for transfer of responsibility in leases and/or deed transfers.

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>

Appendix G: Stormwater Management Practices Maintenance Agreement (pg 455)

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Conduct inspections every 3 to 5 years, prioritizing properties that pose the highest risk to water quality, inspecting at least 20% of approved facilities annually.

**Resource:**

Michigan Low Impact Development Manual. <http://www.swmpc.org/downloads/lidmanual.pdf>

Appendix F: Maintenance Inspection Checklists (pg 445)

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## 4 Summary and Conclusions

MACC and EPA representatives discussed the findings of the evaluation at meetings with each partner held on November 27 and 28, 2012. During the partner agency meetings, EPA representatives, MACC and participating partner agencies reviewed the evaluation findings and identified two key barriers that are the most critical to address:

### *Key Barrier 1: Restrictive stormwater management criteria*

Under the Ottawa County and Allegan County Standards and Specifications, storm water management criteria are provided and the Ottawa County Road Commission and the cities require that development projects adhere to these standards; however, these criteria are extremely restrictive without allowing additional volume control measures throughout the watershed. Green infrastructure should be promoted for meeting this capture volume requirement; rainwater harvesting, bioretention, bioswales, permeable pavements, and green roofs should specifically receive volume reduction credit to offset the required retention basin volume. The general drainage standards do not require water quality-enhancing features (such as extended detention or wetland vegetation). Specific recommendations for removing green infrastructure barriers within the standards and specifications were made in each drain commissioner's summary of recommended actions, however, implementing these recommendations would involve all of the partners.

### *Key Barrier 2: Lack of formalized process to track, inspect, and maintain stormwater control measures*

Currently, no formal process is in place—in the cities or drain commissioners' offices—to proactively track, inspect and maintain (or require maintenance of) existing or new stormwater control measures. Formal tracking and inspection policies and procedures and codified maintenance requirements will help ensure that green infrastructure (and other types of stormwater management) practices remain in proper working condition to provide the performance required by the stormwater ordinance. Specific recommendations were made in each partners' summary of recommended actions.

Through MACC, the partners provided corrections to findings on December 7, 2012; EPA provided comments on February 22, 2013. These comments and corrections have been incorporated into the summary of findings in Appendix B. Appendix B also contains the full Scorecard evaluation results. Where applicable, the recommended actions also include resources to aid the partner agencies in future implementation of these recommendations, specifically where the recommendation focuses on adopting or amending standards and specifications. Appendix C contains additional resources organized by goal for the partner agencies to reference as they move forward with green infrastructure implementation.

Recommendations were very similar for the two cities and for the two county drain commissioners. The Ottawa County Road Commission had recommendations more specific to street design. The MACC and participating partner agencies recognize the importance of green infrastructure in addressing stormwater management as part of an overall approach to protect and restore the Lake Macatawa watershed. With coordination from the MACC, it is clear that the partner agencies are committed to addressing the key barriers and making progress on the recommended actions to support green infrastructure implementation in the future.