

Implementation

Furnace Run

Preferred implementation tools

The Watershed Partnership members reviewed tools typically available for promoting watershed stewardship and implementing a watershed management plan.

- Some tools are regulatory and restrict potentially damaging actions
- Others are proactive to promote or reward good stream stewardship
- Some tools are designed to help to inform the citizens about the watershed and their responsibilities to promote a watershed friendly community culture
- Some tools directly target restoration actions of important stream features

These priorities were initially defined in March 2010 and revisited and refined by the WPP in 2011 as final plan implementation goals were set. The refined implementation priorities selected by the Partnership emphasize official recognition of critical watershed features in an official map and cooperative protection of these features through setbacks, restoration strategies and incentives:

1. Develop and adopt map that defines key features for non-structural distributed storm water storage and watershed management areas- PCAs / PDAs / PAAs
2. Adopt and enforce a consistent suite of setback regulations to protect critical stream features
 - Steep slopes
 - Riparian corridors
 - Wetlands
 - Flood zones - Protect flood zones & eliminate encroachments
 - Protect fragile & critical soils from erosion
3. Develop a forest protection and restoration management strategy and plan
4. Adopt and promote low impact design and on-site water retention practices
5. Restrict and promote new economic development to existing urbanized areas as infill or redevelopment of underused sites
6. Maintain the Watershed Partnership to sustain ongoing and planned collaborative stewardship efforts
7. Develop incentives to promote desired behaviors including:
 - Minimize paving requirements and promote infiltration and filter strips
 - Promote conservation easements

Furnace Run Balanced Growth Plan

Proposed Plan Implementation Actions & Timetable

ITEM	PREFERRED TOOL	ACTION	PROPOSED COMPLETION
1	Develop and adopt map of defined critical watershed features that identifies non-structural distributed stormwater storage and watershed management areas – PCAs / PDAs / PAAs	1) WPP recommends adoption to local governments 2) Local government adoption	November 2011 December 2011
2	Adopt and enforce a consistent suite of setback regulations to protect the critical stream features a. Steep slopes b. Riparian corridors c. Wetlands* d. Flood zones - protect & eliminate encroachments e. Protect fragile & critical soils from erosion <i>* Review prioritized wetlands for possible mitigation and grant opportunities</i>	1) Joint ordinance review with subcommittee 2) Regular meetings of WPP, Planning Commission and BZA reps to promote watershed consistency in stream protection and enforcement 3) Seek RAP assistance	December 2011 Quarterly As needed
3	Develop forest protection and restoration management strategy and plan	WPP to participate in RAP Cuyahoga ReLEAF program	2011 - 2013
4	Adopt and promote low impact design and on-site water retention practices	1) Joint ordinance review 2) Regular meetings of WPP and local Planning Commissions and BZA reps	March 2012 Quarterly
5	Restrict greenfield development and promote new economic development in existing urbanized areas as infill, adaptive reuse or redevelopment of underused sites	1) Regular meetings of WPP, local Planning Commissions, BZA reps and Economic Development departments 2) Seek grants for economic development in PDAs with Ohio Lake Erie Commission assistance.	Quarterly As needed
6	Maintain Watershed Partnership to sustain ongoing and planned collaborative stewardship efforts	Recommend to local governments along with plan and map.	June 2011
7	Tax-based incentives, e.g. tax credits for land in PCAs/PAAs/PDAs	Participate in regional discussions	As scheduled
8	Defined measurable outcomes with ongoing monitoring and reporting and feedback loop	Annual Report to OLEC of actions taken - RAP assistance	June 2012

Notes

Item 2 – Wetlands, prioritized for importance to watershed plan goals, is included as an Appendix as part of the Plan report. These provide guidance to local communities for mitigation opportunities. Restoration Projects planned by Metroparks Serving Summit County and CVNP will be included in the suite of projects in order to facilitate eligibility for State incentives.

Item 3 – Forest priorities: RAP Cuyahoga ReLEAF project brochure is included in Appendices.

Tools for Watershed Stewardship

PRACTICES & STRATEGIES

Stormwater management begins with site planning and design. Development projects can be designed to reduce their impact on watersheds when careful efforts are made to conserve natural areas, reduce impervious cover and better integrate stormwater treatment.

By implementing a combination of these nonstructural approaches, it is possible to reduce the amount of runoff and pollutants that are generated from a site and provide for some nonstructural on-site treatment and control of runoff.

Better site design for stormwater management includes a number of site design techniques, such as preserving natural features and resources, effectively laying out the site elements to reduce impact, reducing the amount of impervious surfaces, and using natural features on the site for stormwater management. Many of the better site design concepts can reduce the cost of infrastructure while maintaining or even increasing the value of the property.

- Adopt watershed map for community guidance
- Conserve streams and riparian corridors
- Conserve wetlands and enforce setbacks
- Avoid floodplains
- Avoid steep slopes
- Minimize development on critical soils
- Use Low Impact Design (LID) measures
- Support conservation development practices
- Protect woodlands / tree canopy

Identifying Conservation Areas & Incorporating Better Site Design

Site design should be done in concert with the design and layout of stormwater infrastructure in order to reach stormwater management goals.

First, significant natural features and resources on a site are identified, such as undisturbed forest areas, stream buffers and steep slopes that should be preserved to retain some of the original hydrologic function of the site.

Next, the site layout is designed such that these conservation areas are preserved and the impact of the development is minimized. A number of techniques can then be used to reduce the overall imperviousness of the development site.

Finally, natural features and conservation areas can be used to manage stormwater quantity and quality.

Use Critical Watershed Feature Map as Guidance for Community Development and Conservation

Design Site Layout to Preserve Conservation Areas and Minimize Impervious Cover & Stormwater Impacts

Use Natural Features and Conservation Areas to Manage Stormwater Quantity and Quality

THE GOALS OF BETTER SITE DESIGN include:

- Managing stormwater (quantity and quality) as close to the point of origin as possible
- Preventing stormwater impacts rather than mitigating them
- Using simple, nonstructural methods for stormwater management that are lower cost and lower maintenance than structural controls
- Using hydrology as a framework for site design

Tools & Practices

#1

ADOPT CRITICAL WATERSHED FEATURES MAP IN COMPREHENSIVE PLAN for Community Guidance

Important natural features such as primary headwater streams, wetlands and other important site features, when identified in the community's Comprehensive Plan, can assist with development and support conservation efforts.

KEY BENEFITS

Provides an opportunity to update community zoning & plans

- Helps a community plan for, rather than react to proposed development
- Assists in managing floodplains, wetlands, riparian corridors that are currently providing flood control, erosion control and water quality protection.

A community's comprehensive plan helps to provide the framework for zoning that affects watershed quality. Priority Conservation and Development Areas should be included with the plan.

This should be done while examining local economics, plans for densities and land uses.

Preserving natural conservation areas such as undisturbed forested and vegetated areas, stream corridors and wetlands on a development site helps to preserve the original hydrology of the site and aids in reducing the generation of stormwater runoff and pollutants. Undisturbed vegetated areas also promote soil stabilization and provide for filtering, infiltration and evapotranspiration of runoff.

Conservation areas should be delineated before any site design, clearing or construction begins. When done before the concept plan phase, the planned conservation areas can be used to guide the layout of the site.

Conservation areas should be incorporated into site plans and clearly marked on all construction and grading plans to ensure that equipment is kept out of these areas and that native vegetation is kept in an undisturbed state. The boundaries of each conservation area should be mapped by carefully determining the line which should not be crossed by construction activity.

Once established, natural conservation areas must be protected during construction and managed after occupancy by a responsible party able to maintain the areas in a natural state in perpetuity. Typically, conservation areas are protected by legally enforceable deed restrictions, conservation easements, and maintenance agreements.

RECOMMENDATIONS:

- Review material and support data for Priority Development Areas (PDAs) and Priority Conservation Areas (PCAs).
- Incorporate the Priority Conservation Areas (PCA) and Priority Development Areas (PDA) into the Master Plan.
 - ~ Assess PDAs and PCAs locations as necessary for the nature of current development, ownership, and other relevant characteristics.
 - ~ Modify PDAs and PCAs for your community based on local data and development goals.
 - ~ Accept PDAs and PCAs for your community through resolution or ordinance.
 - ~ Revise comprehensive/master plan to include PDAs and PCAs. Review current zoning for PDAs and PCAs.
 - ~ Discuss possible zoning changes, land owner assistance, and other steps necessary to facilitate development in PDAs and conservation / innovative site design in PCAs.
- Routinely Update Community Master Plans-
 - the best local planning practice is "continuous planning"
 - compare plan to current conditions and update
 - plan for, rather than react to, proposed development.

Tools & Practices

Adopt Critical Watershed Features Map

KEY ROLES	KEY ACTIONS
Legislators	<ul style="list-style-type: none"> • Update Community Master Plans, adopting Critical Features Map as overlay to guide land use decisions. • Incorporate Priority Conservation Areas (PCA) and Priority Development Areas (PDA) into community's Comprehensive Plan to guide zoning and identify natural areas as storm water management infrastructure assets • Develop or update building codes to include protections for critical areas • Use Map as reference to budget for protection, restoration and/or maintenance of natural infrastructure as is done for structural storm water infrastructure
Planning Commissions	<ul style="list-style-type: none"> • Develop and adopt Critical Features Map • Define specific allowable adjustments or variances, based on the value and location of critical features, to guide appeals process
Zoning Appeals Boards	<ul style="list-style-type: none"> • Use Map as reference for decision-making • Create guidelines, using Map to define allowable variances based on their potential impact on Priority Conservation Areas, and to direct site design adjustments toward Priority Development Areas
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Work with communities that share the watershed to approve the Critical Features Map, PCA and PDA designations • Adopt the Map and use it to guide development and conservation • Establish policy to direct new development to Priority Development Areas and reduce impacts on Priority Conservation Areas and Critical Watershed Features • Educate residents, business owners and developers on the significance of critical watershed features and their roles in stewardship
Service and Engineering	<ul style="list-style-type: none"> • Use the Map as a guide to take advantage of the natural storm water management infrastructure • Respect the Map designations and establish policies to manage infrastructure improvements or repairs in ways that do not negatively affect Priority Conservation Areas
Residents, Business Owners and Property Owners or Managers	<ul style="list-style-type: none"> • Support adoption of the Map in your community • Learn about the areas that hold your watershed's critical features and need conservation • Understand how activities that degrade or change the size, location or character of wetlands, forested areas, streams and soils affects your property
Developers	<ul style="list-style-type: none"> • Familiarize yourself with the Map and the watershed • Design sites so as not to infringe on Critical Features or Priority Conservation Areas

Tools & Practices

#2

CONSERVE STREAMS & RIPARIAN CORRIDORS

Natural riparian corridors are vegetated lands along rivers and streams. They can stretch from a stream's headwaters down to its mouth.

Key Benefits

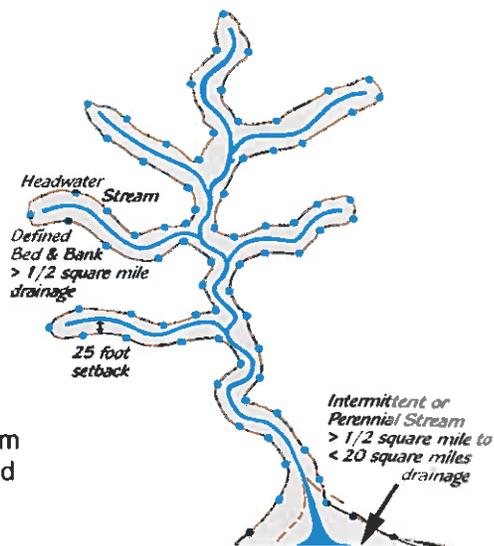
- Reduces flooding and erosion problems
- Keep structures away from flood prone areas
- Filters stormwater runoff
- Provides connected wildlife habitat

A riparian buffer is a special type of natural conservation area along a stream, wetland or shoreline where development is restricted or prohibited. The primary function of buffers is to protect and physically separate a stream, lake or wetland from disturbance or encroachment.

A properly designed buffer can provide stormwater management functions, can act as a right-of-way during floods, and can sustain the integrity of stream ecosystems and habitats. Forested riparian buffers should be maintained and reforestation should be encouraged where no wooded buffer exists. Proper restoration should include all layers of the forest plant community, including understory, shrubs and groundcover, in addition to trees.

The setback width needed to perform properly will depend on the size of the stream and the surrounding conditions, The setback should be continuous and not interrupted by impervious areas that would allow stormwater to concentrate and flow into the stream without first flowing through the buffer. Should the 100-year floodplain be wider than the riparian setback on either or both sides of the watercourse, the setback is extended to the outer edge of the 100-year floodplain.

Development within the riparian buffer should be limited only to those structures and facilities that are absolutely necessary. Such limited development should be specifically identified in any codes or ordinances enabling the buffers. When construction activities do occur within the riparian corridor, specific mitigation measures should be required, such as deeper buffers or riparian buffer improvements.



RECOMMENDATIONS:

It is recommended that communities adopt zoning and other appropriate land-use and management provisions to address riparian protection. Protective areas along riparian corridors and around wetlands are best provided through local zoning setbacks.

Communities should adopt the Northeast Ohio Regional Stormwater Task Force Model riparian setback.

The riparian setback should :

- Apply to all designated watercourses in the community
- Conform to minimum widths (see recommended distances)
- Include 100-year floodplain and riparian wetlands
- Prohibit construction in riparian corridor
- Include variance and mitigation provisions to keep function within the same watershed.
- Provide for inspection and enforcement

As with all setbacks, riparian setbacks should be used in conjunction with conservation development design so that an economic hardship is not created for the landowner. The purpose is to preserve and protect existing riparian corridors from degradation and environmental damage, to restore the quality of degraded and damaged corridor, and to plan and control development around these features.

Recommended Riparian Distances

DRAINAGE AREA	SETBACK DISTANCE
<0.5 sq. miles	25 ft
0.5-20 sq. miles	75 ft.
20-300 sq. miles	100 ft.
>300 sq. miles	300 ft.

Tools & Practices Conserve Streams & Riparian Corridors

KEY ROLES	KEY ACTIONS
Legislators, Planning Commissions	<ul style="list-style-type: none"> • Include riparian setbacks in zoning • Apply the setback to all designated watercourses in the community • Design setback codes to: <ul style="list-style-type: none"> • Conform to minimum widths and recommended distances • Include 100 year floodplain and riparian wetlands • Prohibit construction in riparian corridor • Include variance and mitigation provisions to keep function within the same watershed • Provide for inspection and enforcement • Extend setbacks at least to the 100-year floodplain
Zoning Appeals Boards	<ul style="list-style-type: none"> • Respect riparian setback codes and be reluctant to allow incursions into riparian buffer areas
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Create incentives for preservation and improvement of existing vegetated buffers, and restoration of areas where riparian plantings have been lost
Service and Engineering	<ul style="list-style-type: none"> • Limit incursions into riparian zones when doing structural infrastructure repairs or improvements by adding a “no dig zone” beyond the setback written in the code, and/or use proper protection at zone edges. • Reduce the burden on riparian zones adjacent to paved or turf areas, where excessive runoff is common, by using infiltration calculations that reflect the actual soil infiltration conditions in the area.
Tree Commissions	<ul style="list-style-type: none"> • Institute a forest mitigation program wherein developers or property owners who remove trees and/or forested areas can replant trees or replace forest cover in riparian zones • Use riparian zones as forest mitigation banks to receive trees and forest cover • Create a forest mitigation fund to receive payments in lieu of planting from developers or property owners who remove trees or forest cover, and: <ul style="list-style-type: none"> • use the funds to improve riparian areas on public lands, • work with private property owners to restore riparian areas if buffer zones on public land are not available, • in cases where neither of the above solutions are applicable, use the funds to support the city’s urban forest/street tree planting program
Residents, Business Owners and Property Owners or Managers	<ul style="list-style-type: none"> • Plant or improve riparian zones using the full range of forest vegetation – tree canopy, understory trees and shrubs, floor vegetation and ground cover, giving preference to native species and totally avoiding invasive or exotic species. • Commercial property owners can take advantage of the increase in bird life resulting from healthy riparian areas by working with local birding clubs and producing birdwatchers’ guides.
Developers	<ul style="list-style-type: none"> • Familiarize yourself with the Map and the watershed • Design sites so as not to infringe on critical features or conservation areas

Tools & Practices

#3

CONSERVE WETLANDS & SETBACKS

Wetlands are areas that are inundated or saturated by surface or ground water often enough to support vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

Key Benefits

- Reduces Flooding and Erosion Problems
- Keep Structures away from Flood Prone Areas
- Filters Storm Water Runoff
- Provides Wildlife Habitat

Wetlands are important and complex ecosystems in the Furnace Run Watershed. Wetlands function as natural sponges, to absorb excess stormwater and as natural kidneys, to filter pollutants from the water. They minimize flooding problems by retaining stormwater and allowing the water either to evaporate or slowly release into stream systems.

In Furnace Run many wetlands are located along the stream and therefore fall within the riparian corridor and proposed setback. A properly-sized riparian setback will completely include the wetlands plus a 50-foot setback extending beyond the outer boundary of a Category 3 wetland and a 30-foot setback extending beyond the outer boundary of a Category 2 wetland. As for Category 1 wetlands no setback has been suggested in the model ordinance. However, these wetlands have the potential for enhancement and can be improved to Category 2 wetlands.

It is also important to protect wetlands that do not fall within the riparian corridor. These "isolated wetlands" should receive the same amount of attention and setback protection. Many communities in Ohio require isolated wetlands to have buffers. Many have adopted policies of no-net-loss of wetlands where mitigation is required to replace destroyed wetlands.

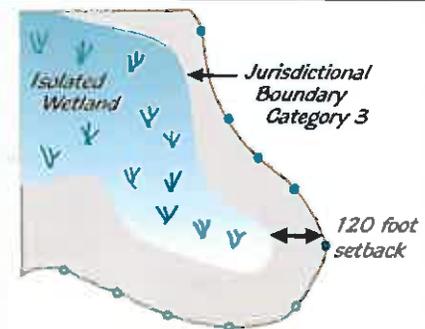
RECOMMENDATIONS:

It is recommended that communities adopt zoning and other appropriate land-use and management provisions to address wetland protection. Protective areas along riparian corridors and around wetlands are best provided through local zoning setbacks.

- Communities should adopt the Northeast Ohio Regional Stormwater Task Force Model Wetland Setback. The Northeast Ohio Regional Stormwater Model ordinances are available to protect and mitigate wetlands as part of a community's management program for flood control, erosion control, ground water recharge, and water quality protection.
- Include variance and mitigation provisions to keep function within the same watershed.
- As with all setbacks, wetlands setbacks should be used in conjunction with conservation development design so that an economic hardship is not created for the landowner. The purpose is to preserve and protect existing wetlands from degradation and environmental damage, to restore the quality of degraded and damaged wetlands, and to plan and control development around wetlands with acceptable levels of quality and ecological character.
- Conserve and enhance Category 1, 2 and 3 wetlands. It is recommended that when wetlands are scarce in a drainage basin, the low quality wetlands still protect public health and safety and water quality and quantity, and deserve protection. Category 1, 2 and 3 wetlands are defined by Ohio EPA using a Qualitative Assessment Form.

Recommended Wetland Setbacks

WETLAND CLASS	SETBACK DISTANCE
1	Protect and enhance
2	75 ft.
3	120 ft.



WETLAND CATEGORIES

Category 3 wetlands have superior habitat, or superior hydrological or recreational functions. They are typified by high levels of diversity, a high proportion of native species, and/or high functional values.

Category 2 wetlands support moderate wildlife habitat, or hydrological or recreational functions, and as wetlands which are dominated by native species but generally without the presence of, or habitat for, rare, threatened or endangered species; and have a potential for reestablishing lost wetland functions.

Category 1 wetlands support minimal wildlife habitat, and minimal hydrological and recreational functions. They do not provide critical habitat for threatened or endangered species or contain rare, threatened or endangered species. In addition, Category 1 wetlands are often hydrologically isolated, and usually have: low species diversity, no significant habitat or wildlife use, limited wetland functions, and/or a predominance of non-native species.

KEY ROLES	KEY ACTIONS
Legislators, Planning Commissions	<ul style="list-style-type: none"> • Include wetland setbacks in zoning • Apply the setback to all Category 2 and 3 wetlands, and on a selective basis to Category 1 wetlands (if only as flood control resources) • Design setback codes to: <ul style="list-style-type: none"> • Conform to minimum widths and recommended distances • Include 100-year floodplains • Include variance and mitigation provisions to keep function within the same watershed • Provide for inspection and enforcement • Integrate in Conservation Development zoning
Zoning Appeals Boards	<ul style="list-style-type: none"> • Enforce wetland protection codes
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Create incentives for preservation and improvement of existing wetlands, and restoration of Category 1 wetlands to provide in-watershed mitigation sites
Service, Engineering, Building Inspectors	<ul style="list-style-type: none"> • Observe Clean Water Act regulations and enforce US Army Corp of Engineers permits • Monitor construction sites closely for deviation from approved plans • Require construction vehicles to stay proper distances away from wetlands
Residents, Business Owners and Property Owners or Managers	<ul style="list-style-type: none"> • See wetlands as enhancements and scenic, educational or recreational resources • Maintain a dense buffer of native vegetation between any paved surfaces and the wetland • Do not plant invasive species where seeds can be blown or washed into wetlands
Developers	<ul style="list-style-type: none"> • Recognize the value of wetlands and preserve whenever possible • Mitigate lost wetlands on site when possible • Building "up" rather than "out" can help you use a site footprint limited by setback requirements • Respect permit requirements and keep construction vehicles far away
Stewardship Groups	<ul style="list-style-type: none"> • Use wetlands as educational resources • Create a guide to the birds and animals that live in or visit the wetland

Tools & Practices #4

CONSERVE FLOODPLAINS

Floodplains are the low-lying flat lands that border streams and rivers. When a stream reaches its capacity and overflows its channel after storm events, the floodplain provides for storage and conveyance of these excess flows.

Key Benefits

- Preserving floodplains provides a natural right-of-way and temporary storage for large flood events
- Keeps people and structures out of harm's way
- Helps to preserve riparian ecosystems and habitats
- Can be combined with riparian buffer protection to create linear greenways

Floodplain areas should be avoided for homes and other structures to minimize risk to human life and property damage, and to allow the natural stream corridor to accommodate flood flows. In their natural state they reduce flood velocities and peak flow rates by the passage of flows through dense vegetation.

Floodplains also play an important role in reducing sedimentation and filtering runoff, and provide habitat for both aquatic and terrestrial life. Development in floodplain areas can reduce the ability of the floodplain to convey stormwater, potentially causing safety problems or significant damage to the site in question, as well as to both upstream and downstream properties. Most communities regulate the use of floodplain areas to minimize the risk to human life as well as to avoid flood damage to structures and property.

Floodplain protection is complementary to riparian corridor preservation. Both of these better site design practices preserve stream corridors in a natural state and allow for the protection of vegetation and habitat. Depending on the site topography, 100-year floodplain boundaries may lie inside the riparian setback. In other cases, the riparian corridor should be extended outward to meet the flood zone boundary.

RECOMMENDATIONS:

Floodplain areas should be avoided on a development site in the Big Creek Watershed. Ideally, the entire 100-year floodplain should be avoided for clearing or building activities, and should be preserved in a natural undisturbed state where possible.

- Review Ohio Department of Natural Resources latest floodplain regulations and map modernization program
- Incorporate most up-to-date maps into zoning
- Riparian setback should extend out to FEMA 100-year floodplain.
- Adopt ODNR floodplain regulations.
- Focus development in areas where it will have the least impact - out of the floodway.



Tools & Practices Conserve Floodplains

KEY ROLES	KEY ACTIONS
Legislators, Planning Commissions	<ul style="list-style-type: none"> • Incorporate the most up-to-date flood plain maps into zoning and building codes • Recognize that increased impervious surfaces in one area will have the effect of enlarging flood plains of downstream areas • Provide incentives or relief to landowners in areas where floodplains create un-buildable areas • Allow increased density on development sites in lowest-impact areas • Change codes to allow higher “weed” growth in flood plains
Zoning Appeals Boards	<ul style="list-style-type: none"> • Respect floodplain boundaries • Recognize that variances allowing structures to encroach on floodplains will inevitably create problems
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Support floodplain preservation with policies that support generous setbacks and encourage landowners to vegetate and maintain riparian corridors and floodplains • Focus development in areas where it will have the least impact • Encourage developers to design sites with structures away from flood plains, and with pervious surfaces and dense, natural landscaping close to flood plain boundaries
Service and Engineering	<ul style="list-style-type: none"> • Use structural flood management systems only as complements to natural systems. • Reduce channelization and culverts upstream so that floodplains downstream can handle increased loads • Keep riparian areas and flood plains vegetated by reducing mowing
Residents, Business Owners and Property Owners or Managers	<ul style="list-style-type: none"> • Be aware that solutions to “rush and flush” water off your land will invariably create flooding problems downstream • Accept the fact that streams will flood on occasion, and keep any structural solutions such as berms or dikes as far from the stream and as close to your buildings as possible • Use permeable paving surfaces in areas near flood zones to increase the speed at which the water infiltrates into soils • Let vegetation grow higher along flood plains
Developers	<ul style="list-style-type: none"> • Design sites so as to leave plenty of room beside flood plains • Keep areas along flood plain boundaries heavily vegetated • Use permeable paving throughout the site, and include vegetated areas to hold excess water (rain gardens, etc.)

Tools & Practices

#5

AVOID STEEP SLOPES

Steep slopes should be avoided due to the potential for soil erosion and increased sediment loading; especially those with a grade of 12% or greater. Excessive grading and flattening of hills and ridges should be minimized.

Key Benefits

- Prevents soil erosion and stormwater runoff
- Prevents property damage
- Building on flatter areas reduces the need for cut-and-fill and grading
- Keeping steep slopes vegetated helps to stabilize hillsides
- Maintains aesthetics

Vegetated steep slopes provide an important resource to be preserved because any significant disturbance to the hillside's environment may result in:

- Landslides or land instability;
- Unacceptable alteration in the drainage patterns and
- Loss of scenic value.

When development takes place on or near steep slopes, vegetative cover is greatly reduced. Loss of this vegetative cover on steep terrain significantly increases soil instability, and thus the risk of erosion.

Soil erosion and sedimentation into waterways pose several threats to public health and safety, which are difficult and expensive to correct. Property damage is commonly associated with development on steep slopes. Soil erosion and sedimentation into nearby waters increase the potential for flooding. In addition, the nature of steep slopes means that greater areas of soil and land area are disturbed to locate facilities on them compared to flatter slopes

The need to protect these slopes is based on percent slope, the length of that percent slope, soil erodibility, percent of vegetation, and proximity to streams or wetlands. The maximum retention of natural topographical features such as natural drainage swales, slope ridge lines, and trees and other natural plant formations should be encouraged. Steep slope protection will conserve and promote public health and safety by minimizing problems due to water runoff and soil erosion incurred in adjustments of topography to meet developmental needs. In addition to public health and safety concerns, protecting steep slopes preserves the unique scenic resources and habitats.

RECOMMENDATIONS:

The development of areas containing steep slopes should generally be discouraged. In situations where this is not feasible, development should be done with the intent of minimizing soil disturbances, maximizing retention of trees and vegetation, and complementing steep slope character. Existing patterns of vegetation should be retained on all slopes over 12% to avoid erosion or slippage.

Three options can help in establishing setback widths that provide the same watercourse protection as flatter areas.

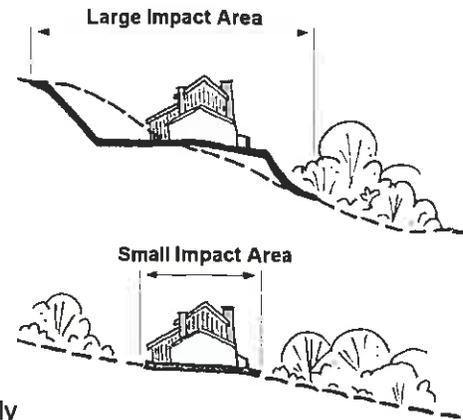
Option 1: Permit Based Hillside Protection Zones

Regulations are passed that limit development activity in areas with slopes between 12% and 30%. In order for permits to be given for disturbances in these areas, additional information including topographic maps, grading and site plans, geotechnical reports, details on future and present site stability, and an erosion and sediment control plan must be submitted for review. Option 1 focuses mainly on structural integrity and not the functioning of the riparian area and watercourse. The recommendations given under this option may also not be appropriate for all areas of the watershed. Example- Summit County Ordinance- steep slope development a conditional use

Option 2: Expansion of Riparian Setback for % Slope

For many communities in the nation, minimum widths are usually established for riparian setbacks. In areas in which steep slopes exist within the designated riparian setbacks, these widths are expanded. The expansions to the original widths are as follows:

- Add 10 feet for slopes between 12-17%
- Add 30 feet for slopes between 18-20%



RECOMMENDATIONS, continued

- Add 50 feet for slopes between 21-23%
- Add 60 feet for slopes between 24-25%

Option 2 (preferred) focuses on the degree of sloping and may not cover other important factors that play a role in riparian effectiveness. An example is North Royalton's riparian setback adjustment, which is based on % slope.

Option 3: Expansion of Riparian Setbacks Based on Analysis of Slope, Slope Length, Soil Erodibility and Existing Vegetation

Riparian setbacks are adjusted where steep slopes, 12% or greater, exist within 500 feet of a watercourse. In these areas, a plan is required that details the degree of sloping, the slope length, soil erodibility, vegetative cover, and sediment delivery.



Option 3 (Preferred) provides the best alternative, as it based on site-specific conditions and recommendations.

KEY ROLES	KEY ACTIONS
Legislators, Planning Commissions	<ul style="list-style-type: none"> • Expand riparian setbacks based on site-specific conditions, especially where slopes are greater than 12% and are within 500 feet of a watercourse. • Conserve steep slopes, especially those close to riparian corridors, with special permitting that limits development and disturbances in areas with slopes greater than 12%.
Zoning Appeals Boards	<ul style="list-style-type: none"> • Do not allow variances that encroach on setbacks from steep slopes • Do not allow replacement of vegetation around steep slopes with impervious surfaces, including turf grass.
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Discourage development on or adjacent to steep slopes • Work with private landowners to establish conservation areas where steep slopes exist. • Invest in restoration where development may already be negatively impacting soils and degrading slopes.
Developers	<ul style="list-style-type: none"> • Design sites to avoid building near steep slopes. Structural solutions may be short term remedies, but soils erode. Period. • Avoid disturbing steep slopes during construction. Construction equipment will change soil character and compaction. • Replace any disturbed soils with native vegetation, preferably the type with large and/or dense root systems
Stewardship Groups	<ul style="list-style-type: none"> • Support preservation and enhancement of these areas, which are usually wooded • Educate landowners about the importance of conservation

Percent Slope is the ratio of the vertical distance to the horizontal distance, or the elevation change in feet divided by the distance in feet.

Tools & Practices

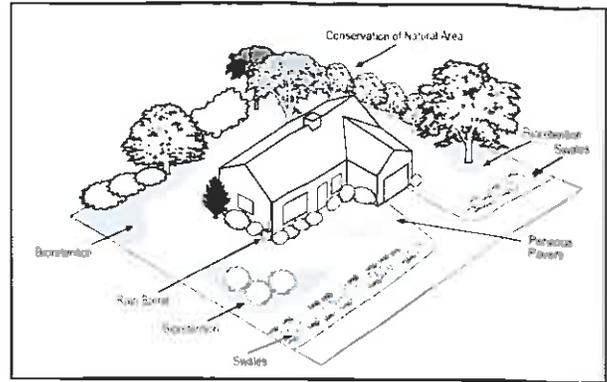
#6

USE LOW IMPACT DESIGN (LID)

Low-impact design (LID) is a site design approach that seeks to integrate hydrologically functional design with pollution prevention measures to compensate for land development impacts on hydrology and water quality.

Key Benefits

- Reduces Impervious cover
- Manages stormwater onsite
- Minimizes downstream flooding
- Maintains predevelopment runoff levels through innovative practices.



LID's goal is to mimic natural hydrology and processes by using small-scale, decentralized practices that infiltrate, evaporate, detain, and transpire stormwater, strategically located throughout the site.

LID is achieved by:

- Minimizing stormwater runoff impacts to the extent practicable through preservation of existing landscape features and their hydrologic functions.
- Maintaining predevelopment time of concentration through strategic routing of flows using a variety of site design techniques.
- Dispersing runoff storage measures through a site's landscape through the use of a variety of detention, retention, and runoff practices.

LID practices manage stormwater at its source. LID measures reduce impervious cover, minimize disturbance, preserve and recreate natural landscape features, increase hydrologic disconnects and facilitate infiltration and detention opportunities. LID creates a multifunctional landscape which relies on natural features and processes and emphasizes simple, nonstructural, low-tech methods.

Due to maintenance considerations, LID may be most appropriately used on institutional, industrial, commercial and governmental developments. However, LID in tandem with conventional stormwater control features can be successfully integrated into any development. LID has been demonstrated to work in new developments and constrained sites involving urban infill.

RECOMMENDATIONS:

- **Adopt Low Impact Design provisions:** Adopt zoning and other appropriate land-use and management provisions to allow for the use of low impact development techniques for residential, business and industrial districts. This may be done through a comprehensive regulation related to site development or a set of related regulations.
- **Parking lot standards:** Set maximum numbers of parking spaces rather than minimums, using average demand rather than peak demand, minimize the dimensions of lot spaces, use alternative pavers in overflow parking areas, use bioretention areas to treat stormwater.
- **Impervious surface limits:** Place a percentage limit on impervious surface coverage. Examples include 10-20% in residential areas and 30% and up in commercial/high density residential.
- **Compacted Soils:** Unpaved areas of pervious soils should be left undisturbed. Retaining natural drainage features and encouraging conservation site design to protect against excessive soil compaction.
- **Allow for integrated stormwater management practices:** LID principles are designed to minimize disturbance and manage storm water as close to its source as possible. Specific low impact design controls, called Integrated Management Practices (IMPs), are tools for developers to use to manage storm water at its source rather than relying solely on centralized Best Management Practices (BMP's) such as detention basins. These IMPs include a variety of non-structural and structural practices such as:

- o Riparian and wetland setbacks
- o Biofiltration facilities
- o Vegetated swales
- o Cistern & rain barrels
- o Infiltration trenches
- o Green roofs

Example: City of Kent's Low Impact Development Ordinance - Chapter 1203

Tools & Practices Use Low Impact Design (LID)

KEY ROLES	KEY ACTIONS
Legislators, Planning Commissions	<ul style="list-style-type: none"> • Allow for implementation of LID techniques in building codes • Adopt LID provisions in zoning of residential, commercial and industrial districts • Set maximum parking lot size rather than minimum. Size for average demand rather than peak demand • Limit area of impervious surface allowed, including roofs and impervious paving, as percentage of total area.
Zoning Appeals Boards	<ul style="list-style-type: none"> • Allow variances for LID techniques
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Encourage residents and businesses to retrofit properties with LID elements, and support code changes if necessary • Incentivize installation of LID practices on existing properties; recognize the stormwater management value and contribution to reduction of cost and burden on municipal systems • Reward developers who use LID practices and reduce your stormwater infrastructure costs
Service and Engineering	<ul style="list-style-type: none"> • Adopt LID for community-owned properties and offer as demonstration sites
Stewardship Groups	<ul style="list-style-type: none"> • Train residents and landscapers to build raingardens, and sponsor demonstrations • Encourage installation of rainbarrels, ponds and other backyard-friendly water storage and management practices
Residents, Business Owners and Property Owners or Managers	<ul style="list-style-type: none"> • Use the areas on your property the way they want to work – an area that holds water wants to be a raingarden or pond, so surround it with decorative rocks and native plants or build a raingarden there, and direct roof runoff to your yard, not to the storm sewer. • Install pervious pavers in place of concrete or asphalt. • Replace turf grass with more pervious ground cover. • Plant trees.
Developers	<ul style="list-style-type: none"> • Use Integrated Management Practices that minimize disturbance and manage stormwater at its source, rather than relying on BMPs such as detention basins. IMPs include structural and non-structural methods such as: <ul style="list-style-type: none"> • Riparian and wetland setbacks • Biofiltration facilities to hold and filter discharge • Vegetated swales to absorb and drain water • Green roofs to reduce runoff • Cisterns & rainbarrels for water harvesting and temporary storage • Infiltration trenches • Use pervious/permeable paving materials for significant portions, if not all, of paved walkways and parking surfaces • Replant trees and forest cover lost during construction

* Pervious pavement is a permeable surface with a stone reservoir underneath. The reservoir temporarily stores surface runoff before infiltrating it into the subsoil or discharging into a sewer system.

Tools & Practices

#7 CONSERVATION DEVELOPMENT

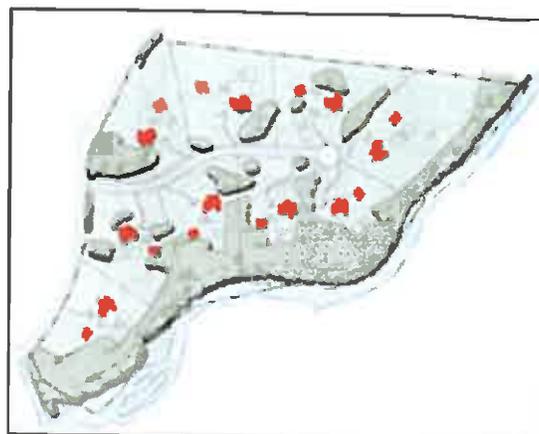
Conservation Development refers to development practices that allow land to be developed while conserving a sense of rural character, protecting natural resource features, and insuring water quality. In the process, property rights are protected, the community retains its unique identity and resources, the developer benefits with a high-quality project, and the environmental impacts of development are reduced.

Key Benefits

- Reduces impervious surface area
- Reduces development and community infrastructure costs
- Protects and integrates open spaces into neighborhoods
- Uses open space to protect natural resources
- Reduces stormwater runoff
- Allows communities to retain rural character

Conservation Development typically allows higher density on a portion of the site in order to leave the rest of the site undeveloped. This results in the same number of structures that would be allowed in a traditional development on a particular parcel of land being located with more flexibility.

This flexibility in housing lot sizes and setbacks makes it much more palatable to developers. As part of the site design, at least 40% of the land should be set aside as permanent open space. The resulting protected open space provides room for conservation practices that serve to buffer the impacts of the development.



Traditional Dispersed Development



Conservation Development

RECOMMENDATIONS:

- **Make Conservation Development the easiest development option available:** This can be done by making conservation development permitted by right (the best option) or as an overlay district (second best option). Add these provisions to residential, commercial and industrial codes.
- **Permanent protection of open space:** At least 40% open space should be permanently protected through conservation easements, deed restriction or a combination. Provisions should be made for, including provisions for access for maintenance and capital improvements.
- **Open space should be high quality and used for resource protection:** Provisions must be made to minimize fragmentation of open space and link to other open spaces in the community. Requirement should be made for developer to prove that the highest quality resources on the site were evaluated and are protected via the open space.
- **A minimum project size should be designated:** In order for projects to have a beneficial impact upon natural resource conservation, a minimum project size of 25 acres should be considered.
- **Density Bonuses (no more than 10%):** when specific conservation criteria are met, proposed developments can be approved with more use of a site (such as more dwelling units per acre) than would otherwise be permitted by the community. Density bonuses are a form of incentive that a community can offer to a developer who does the kind of development that a community seeks.

Residential Conservation Development

- At least a 40% open space requirement must be included for lot sizes less than one acre, with 50% for lot sizes greater than one acre
- Density bonuses should not exceed 10% in order to ensure a conservation benefit result
- Maximum access to the open space by private users should be required

Office Park Conservation Development

- At least 40% open space requirement, of which 25% is natural open space

Commercial Conservation Development

- For areas already zoned commercial, open space requirement is 25%
- Open space requirement should be at least half of the natural functioning open space

Examples:

- Richfield Township, OH Planned Residential District - Chapter 404
- Hudson, OH Rural Residential Conservation - Chapter 1205

KEY ROLES	KEY ACTIONS
Legislators, Planning Commissions	<ul style="list-style-type: none"> • Make Conservation Development the default site design option • Require minimum 40% naturalized open space • Reduce open space credit for heavily-fertilized, barely pervious turf grass cover, and increase for forest area or use as mitigation bank.
Zoning Appeals Boards	<ul style="list-style-type: none"> • Do not allow variances post-construction or post-occupancy that would reduce conservation area percentage. • Require that variances you must approve be mitigated on site in comparable size or watershed function.
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Offer incentives for Conservation Development • Use density bonus as incentives to cluster impervious surfaces
Developers	<ul style="list-style-type: none"> • Choose site design options that maximize preservation and function of natural areas. • Avoid filling open space with barely-pervious turf grass • Use Low Impact Design practices on parcel design

Conservation Development should not be confused with Low Impact Design (LID):

- Conservation Development involves the overall layout of the property to retain open space. It may or may not include Low Impact Design measures in its site plan.
- Low Impact Design practices apply to on-site measures used for stormwater retention and management.

Tools & Practices

#8

WOODLAND/TREE CANOPY PROTECTION

A Tree Canopy program helps communities preserve or restore existing canopy to maintain a certain percent coverage. The percent coverage often depends on the underlying zoning.

Key Benefits

- Stabilizes soils
- Cleanses stormwater, helping to improve water quality
- Reduces flooding problems by managing stormwater
- Conserves household energy costs
- Provides wildlife habitat

Trees help support a community's quality of life by maintaining the proper functions of watersheds. A healthy forest system can reduce storm water infrastructure costs by intercepting rain, increasing ground absorption and slowing the rate of runoff. It also protects drinking water supplies, enhances property values and reduces household energy costs.

RECOMMENDATIONS:

- Communities should protect woodlands and valuable canopy cover by adopting measures in their codified ordinances. In the ordinances, woodland areas of high value to the community should be identified for further attention at the site design level.
- A minimum % coverage of forest cover should be determined for post-construction goals for residential, nonresidential and varying densities. Example: The City of Roanoke, Virginia has recently adopted a 40% canopy goal with targets of 20% for commercial and industrial areas, and 50% for residential areas. Urban areas in Maryland have a target of 40% overall coverage.
- Require professional evaluation of blocks of woodland at the preliminary design stage (avoid the requirement for every tree on a site to be identified). The code should require a tree protection plan and its approval prior to permit, and assure that the plan is implemented and monitored during construction. Provisions for monitoring for at least a year after construction should be included.
- Allow applicants to seek variance to reduce lot sizes in order to preserve more natural features (i.e. forest cover, riparian zones etc.)

In order to establish canopy cover goals, a community must first assess existing tree cover. There is an array of technology to accomplish this, including GIS, aerial photographs, satellite images, and/or ground surveys. Using this benchmark data, the community must then decide, "What is a reasonable canopy goal to attain in a given period of time?" These goals should reflect both conservation efforts and planned restoration activities on public and private lands. Goals may be set for an overall canopy target for the jurisdiction or they may vary by land use— such as residential, industrial/commercial, streets, and/or parks and open spaces. American Forests recommends that urban areas strive for 40% canopy overall, 50% canopy in suburban residential areas, 25% canopy in urban residential areas, and 15% canopy in commercial areas.

There are four stages in the development process at which tree protection provisions can be applied:

- (1) Preliminary design – identifying woodland areas on a site or in a community which are of high value for preservation
- (2) Specific design – identifying specific trees on the site which will be preserved and those which will be removed, and specifying methods for protection of those to remain
- (3) Construction protection – implementation of the specifications for protection of trees during the construction process;
- (4) Post construction monitoring – ongoing evaluation of tree health after construction and implementation of recommendations for remedial care if necessary

Tools & Practices

Woodland/Tree Canopy Protection

Examples of forest management programs

Maryland Forest Conservation Act- Areas that are deforested by development must be partially reforested to:

- 25% of the pre-development forest for medium density residential development
- 20% for high-density residential
- 15% for commercial, industrial, or mixed use, and
- 50% for agricultural and resource areas

Olmsted Falls' Tree Preservation & Management (Chapter 1218) ordinance helps preserve and replant trees. The ordinance organizes tree management into

- A. Natural undisturbed areas
- B. Buffer zones or screening areas
- C. Wooded areas within buildable property

All new development must be designed to preserve healthy trees and woodlands.

Minimum standards:

- minimum of 40 caliper-inches/acre (not including the natural undisturbed, buffer zones or wooded area within buildable property)
- Newly-planted trees have a minimum size of 2 caliper-inches and maximum size of 6 caliper-inches.

Springfield Township's Tree Preservation Ordinance (Chapter 550.5) states existing woodlands shall be maintained and preserved. On residential and nonresidential development:

- A minimum 50% of mature woodlands shall be preserved
- A minimum 25% of young woodlands shall be preserved and
- Large, solitary trees (of a certain caliper), not in conflict with structures, shall be preserved to the extent practicable



A street tree program is not a substitute for a forest canopy plan.

Ordinances protecting individual trees do not address the protection or conservation of forests, which are their own living systems and include the many layers and wide variety of plants living from the forest floor to the top of the canopy.

Caliper Inches is the diameter in inches of the tree trunk twelve (12) inches above the base of the tree

Tools & Practices

Woodland/Tree Canopy Protection

KEY ROLES	KEY ACTIONS
Legislators, Planning Commissions	<ul style="list-style-type: none"> • Establish forest cover goals for your community. American Forests recommends that urban areas strive for 40% canopy overall, 50% canopy in suburban residential areas, 25% canopy in urban residential areas, and 15% canopy in commercial areas. • Goals should reflect both conservation efforts and planned restoration activities on public and private lands. • Apply forest protection provisions at various stages in development: <ul style="list-style-type: none"> • Preliminary site design – Identify high value woodland areas for preservation • Identify specific trees to be preserved and specify protection methods. Measure canopy cover and/or caliper inches of trees to be removed and determine the method of replacing a comparable volume of forest cover on site or in a forest mitigation bank. • Mandate protection of trees and avoidance of soil compaction during construction • Monitor tree/forest health and require maintenance on an ongoing basis post-construction • View forest cover as infrastructure, and provide funds to maintain and improve your urban forest • Require developers to follow forest cover goals and integrate planting areas into parking lots to reduce runoff.
Zoning Appeals Boards	<ul style="list-style-type: none"> • Enforce codes that support preservation • If variances are allowed that remove forest cover, require mitigation
Administration, Economic Development, Community Development	<ul style="list-style-type: none"> • Work with private landowners to establish forest mitigation banks of land to accommodate replacement of lost canopy cover • Recognize the infrastructure value of woodlands and factor into the equation as assets
Tree Commissions	<ul style="list-style-type: none"> • Educate and encourage landowners to preserve, restore or increase tree and forest cover on private land • Create a forest mitigation fund where developers or landowners who remove trees, but whose site cannot accommodate replanting, can contribute payments in lieu of planting, and use those funds to plant, improve or maintain tree canopy and forest cover on public lands and rights-of-way. • Attend ODNR Tree Commission Academy

Tools & Practices

Woodland/Tree Canopy Protection

KEY ROLES	KEY ACTIONS
Stewardship Groups	<ul style="list-style-type: none"> • Support forest preservation, and especially increased planting, throughout the community • Sponsor tree planting events, seedling giveaways, and adopt-a-forest programs • Work with governments and private landowners to designate planting sites. • Educate landowners, especially in commercial and residential areas, about the importance of letting forested areas “go natural”, letting volunteer understory trees, shrubs and vegetation take hold, and allowing leaves to remain to form new soil. Discourage the practice of removing fallen leaves and replacing with store-bought mulch. Let the trees mulch themselves.
Residents, Property Owners and Property Managers	<ul style="list-style-type: none"> • Retain and maintain forested areas, including tree canopy, understory and ground level vegetation. • Restore forested connections between segments of woodland to support wildlife habitat, establish greenways and improve forest function. • Do not rake leaves from woodlands. • Allow “volunteer” seedlings to grow. • Aim for at least 40% of property to be planted, to naturally revert to woodland. • Plant native trees and understory vegetation.
Developers	<ul style="list-style-type: none"> • Design sites to include ample forest cover, preferably in areas where they can reduce surface water runoff. • Incorporate trees throughout parking areas to absorb water and shade vehicles. Surround “tree boxes” with pervious paving strips and fashion the boxes or curbs with ground-level holes to allow runoff from paved areas to enter the root system. • Resist the temptation to rake and mulch under trees – use lower level plantings and ground cover that requires minimal maintenance and reduces root disturbance

