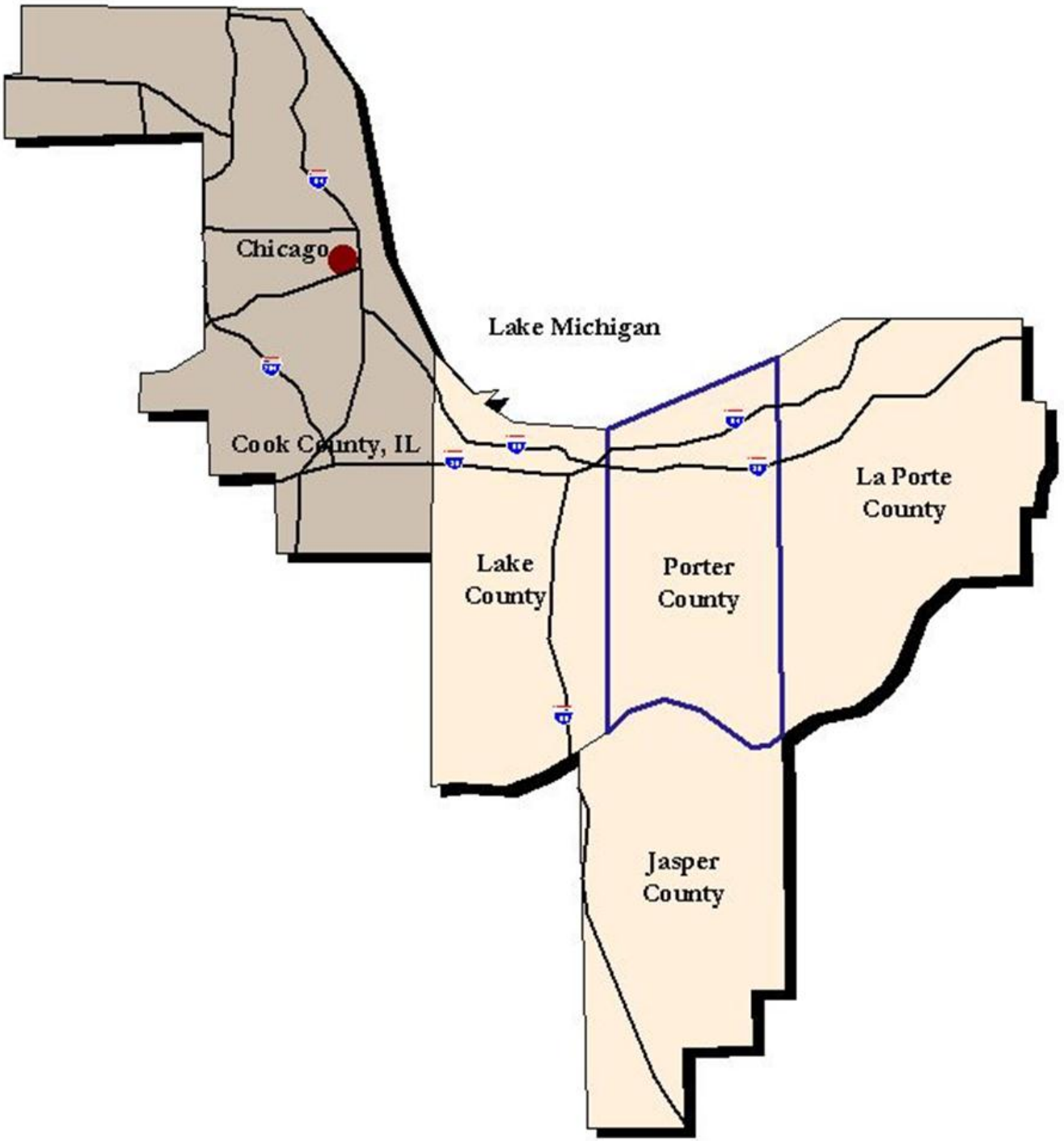
One County's Success in Linking Watershed Protection and Land Use Planning

Bob Thompson
Porter County Plan Commission


Chicago
Lake Michigan
Cook County, IL
Lake
County
Porter
County
La Porte
County
Jasper
County

Porter County

- Population – 160,000
- Approximately half of this population resides in the unincorporated area.
- Growth rate of 1 to 2 percent per year.
- Major industries – manufacturing (steel), service, agriculture and construction.
- Major port located on the shores of Lake Michigan.

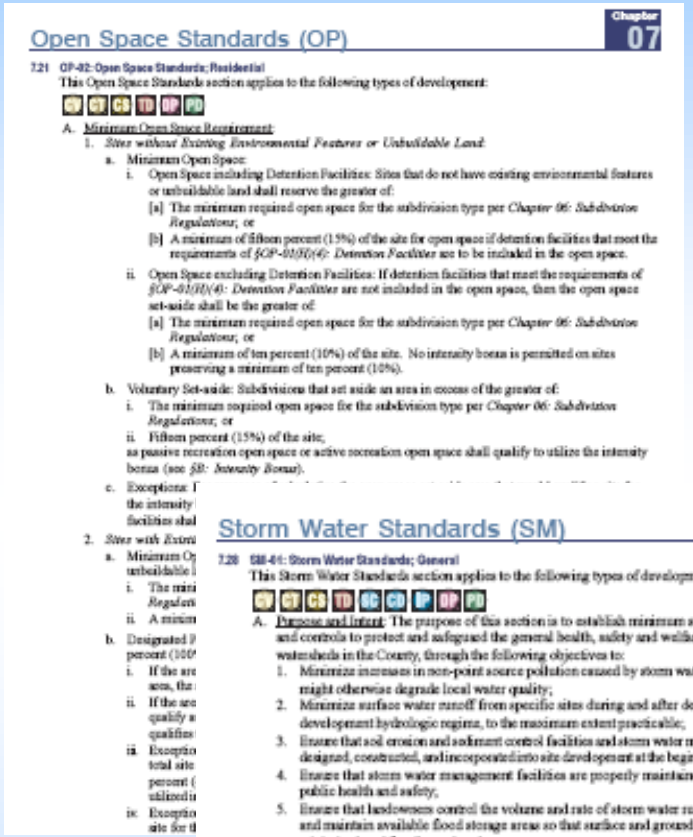
History of Smart Growth and Conservation

Porter County Land Use & Thoroughfare Plan

Prepared for:
Porter County, Indiana

By:
HNTB

Porter County 2020 Building the Foundation for the Future



Open Space Standards (OP)

Chapter 07

7.21 OP-02: Open Space Standards; Residential

This Open Space Standards section applies to the following types of development:

A. Minimum Open Space Requirement:

1. *Sites without Existing Environmental Features or Unbuildable Land:*

a. Minimum Open Space:

i. Open Space including Detention Facilities: Sites that do not have existing environmental features or unbuildable land shall reserve the greater of:

[a] The minimum required open space for the subdivision type per *Chapter 06: Subdivision Regulations*; or

[b] A minimum of fifteen percent (15%) of the site for open space if detention facilities that meet the requirements of *§OP-01(E)(4): Detention Facilities* are to be included in the open space.

ii. Open Space excluding Detention Facilities: If detention facilities that meet the requirements of *§OP-01(E)(4): Detention Facilities* are not included in the open space, then the open space set-aside shall be the greater of:

[a] The minimum required open space for the subdivision type per *Chapter 06: Subdivision Regulations*; or

[b] A minimum of ten percent (10%) of the site. No intensity bonus is permitted on sites preserving a minimum of ten percent (10%).

b. Voluntary Set-aside: Subdivisions that set aside an area in excess of the greater of:

i. The minimum required open space for the subdivision type per *Chapter 06: Subdivision Regulations*; or

ii. Fifteen percent (15%) of the site;

as passive recreation open space or active recreation open space shall qualify to utilize the intensity bonus (see *§B: Intensity Bonus*).

c. Exceptions:

2. *Sites with Existi*

a. Minimum O
unbuildable

i. The mini
Regulati

ii. A minim

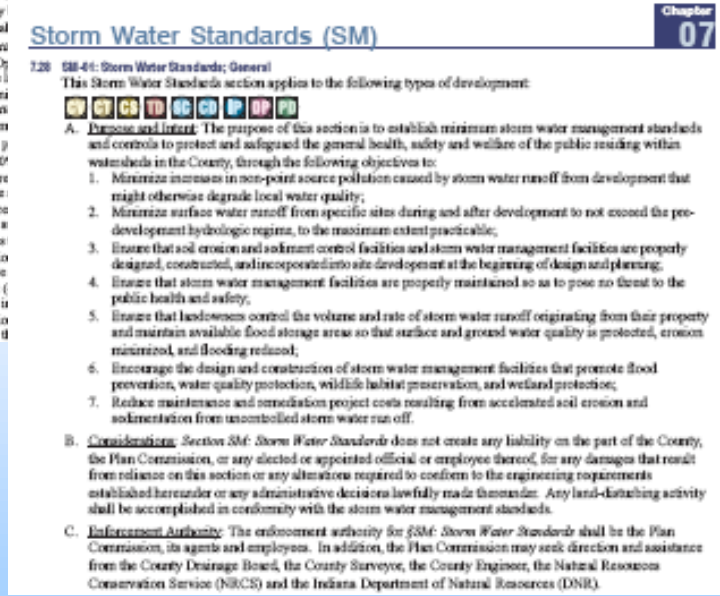
b. Designated
percent (10

i. If the are
area, tha

ii. If the are
qualify a
qualifies

iii. Exceptio
total site
percent (
utilized u

iv. Exceptio
site for t



Storm Water Standards (SM)

Chapter 07

7.28 SM-01: Storm Water Standards; General

This Storm Water Standards section applies to the following types of development:

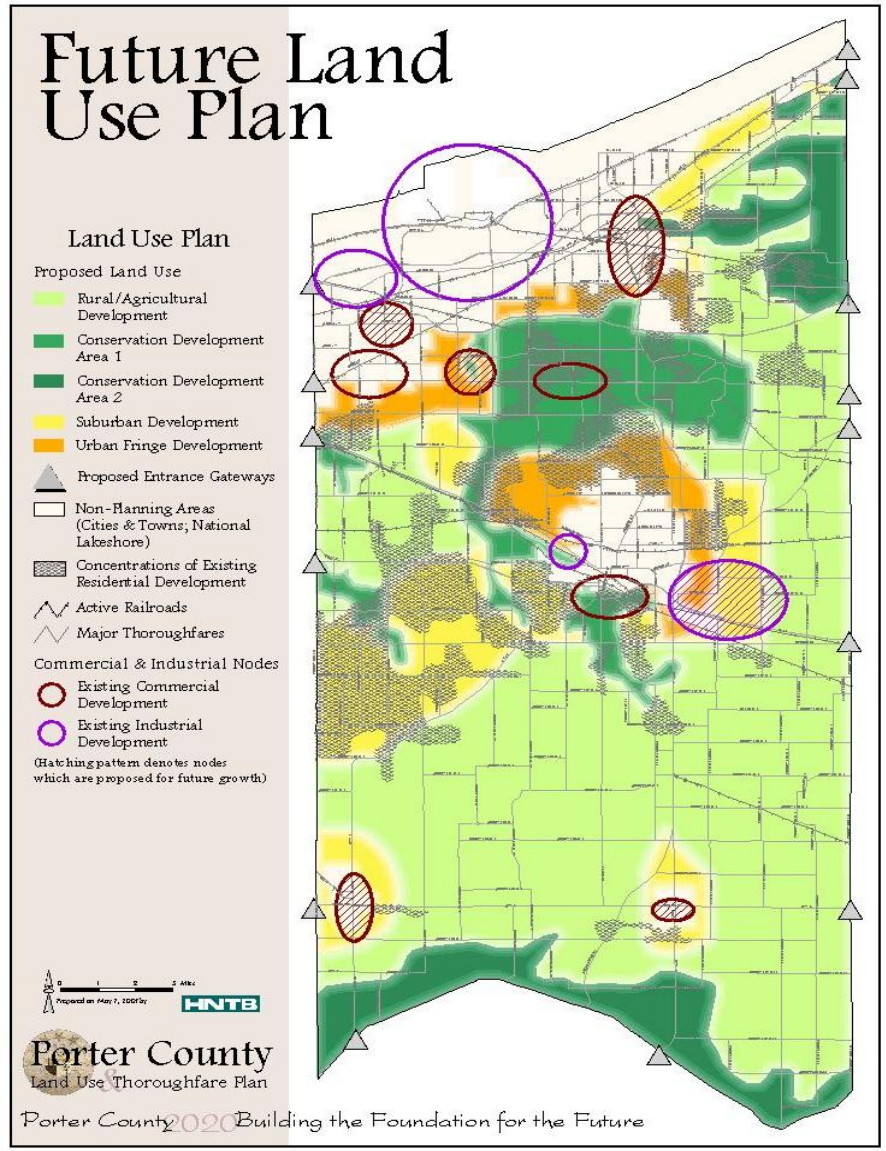
A. Purpose and Intent: The purpose of this section is to establish minimum storm water management standards and controls to protect and safeguard the general health, safety and welfare of the public residing within watersheds in the County, through the following objectives to:

1. Minimize increases in non-point source pollution caused by storm water runoff from development that might otherwise degrade local water quality;
2. Minimize surface water runoff from specific sites during and after development to not exceed the pre-development hydrologic regime, to the maximum extent practicable;
3. Ensure that soil erosion and sediment control facilities and storm water management facilities are properly designed, constructed, and incorporated into site development at the beginning of design and planning;
4. Ensure that storm water management facilities are properly maintained so as to pose no threat to the public health and safety;
5. Ensure that landowners control the volume and rate of storm water runoff originating from their property and maintain available flood storage areas so that surface and ground water quality is protected, erosion minimized, and flooding reduced;
6. Encourage the design and construction of storm water management facilities that promote flood prevention, water quality protection, wildlife habitat preservation, and wetland protection;
7. Reduce maintenance and remediation project costs resulting from accelerated soil erosion and sedimentation from uncontrolled storm water run off.

B. Considerations: *Section SM: Storm Water Standards* does not create any liability on the part of the County, the Plan Commission, or any elected or appointed official or employee thereof, for any damages that result from reliance on this section or any alterations required to conform to the engineering requirements established hereunder or any administrative decisions lawfully made thereunder. Any land-disturbing activity shall be accomplished in conformity with the storm water management standards.

C. Enforcement Authority: The enforcement authority for *§SM: Storm Water Standards* shall be the Plan Commission, its agents and employees. In addition, the Plan Commission may seek direction and assistance from the County Drainage Board, the County Surveyor, the County Engineer, the Natural Resources Conservation Service (NRCS) and the Indiana Department of Natural Resources (DNR).

Porter County Land Use Plan



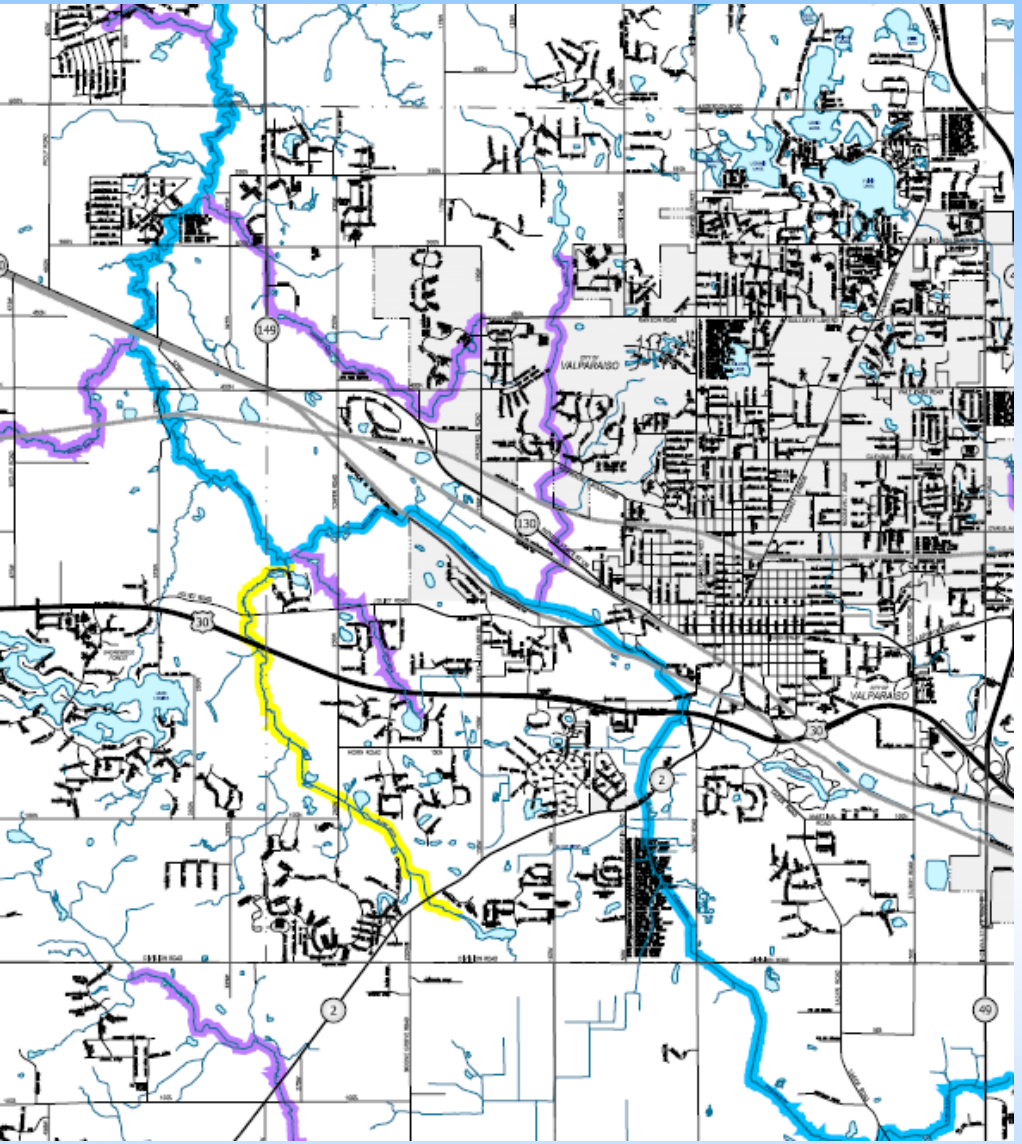
- **Urban Development Area located around cities.**
- **Suburban Development located by towns and areas with municipal type services.**

Public Preferences for Sustainable Land Development

- Adjacent to or within incorporated boundaries or urbanized / town areas – compact development
- Inward facing commercial development with corridor buffers and cross-access (interconnectivity)
- Enhanced preservation and protective buffering near streams, wetlands, and other natural features
- Residential development that ensures natural resource preservation through conservation subdivision or neo-traditional subdivision style

Porter County
Unified Development Ordinance

- Open space requirements for all developments
- Watershed overlay districts
- Storm water calculations for water quality



WSO: Watershed Overlay District

3.11 WSO District Intent, Effect on Uses and Effect on Standards

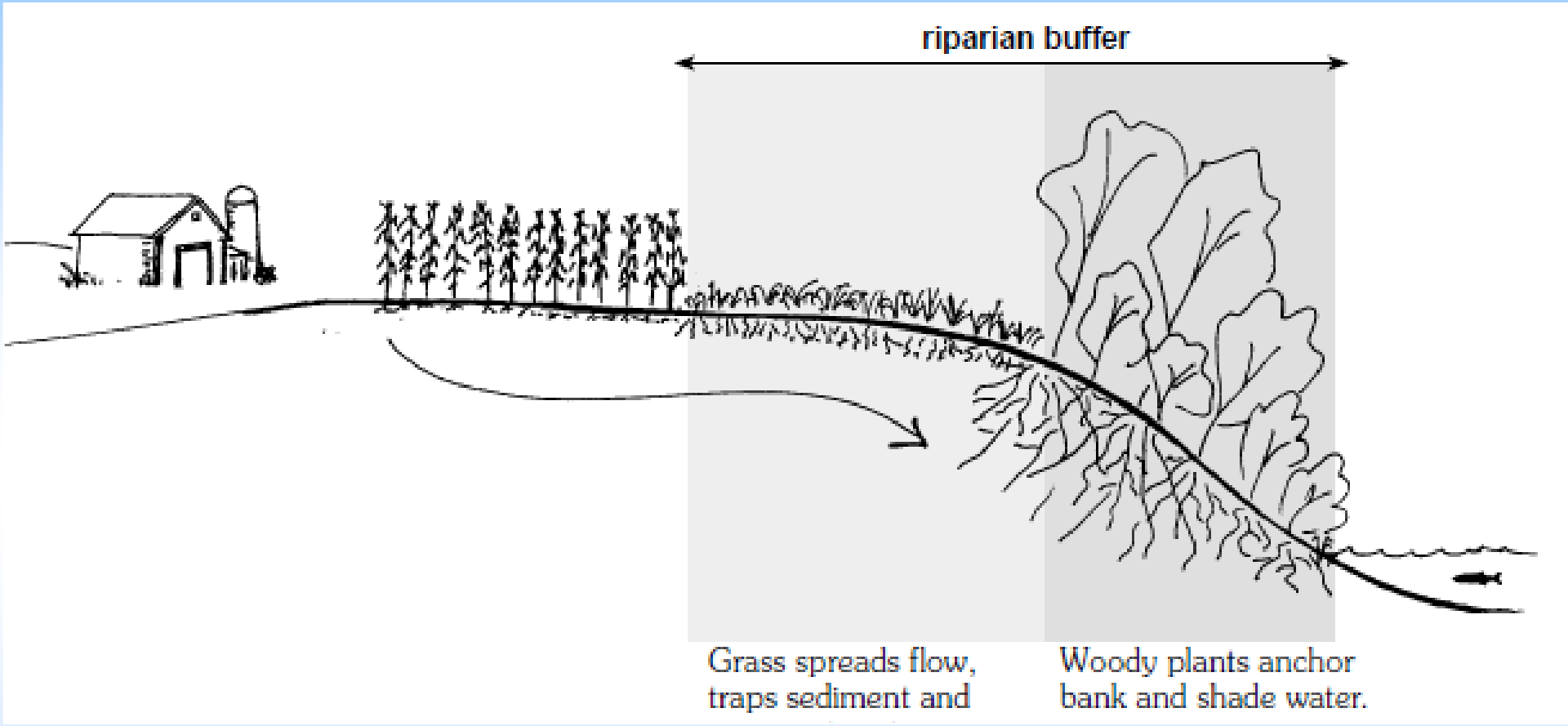
District Intent	Effect on Uses	Effect on Standards
The purpose of the Watershed Overlay District is to: • Reduce soil and nutrient loss by slowing surface runoff; • Maintain the quality of water by reducing erosion and minimizing siltation; • Provide a buffer to reduce sedimentation and nutrient pollution of streams and rivers from non-point sources; • Help moderate floods by establishing vegetation that will absorb some of the water's energy, thereby slowing the flow of floodwaters; • Protect wetlands; • Provide critical habitat for wildlife; • Provide wildlife corridors to connect natural areas that would otherwise be isolated; and • Shade streams in order to help provide good spawning sites for fish and other aquatic animals. **Applicability** • *Priority 1*: Consists of major drainageways and bodies of water that are to be given highest priority for protection. The WSO District extends five hundred (500) feet on each side of a Priority 1 water body, measured from the top of bank; • *Priority 2*: Consists of major collectors, continually flowing drainways to Priority 1 water bodies, and may include small lakes, to be given second highest priority for protection. The WSO District extends three hundred (300) feet on each side of a Priority 2 water body, measured from the top of bank; • *Priority 3*: Consists of minor drainways and may include tertiary waterways with intermittent flow. The WSO District extends one hundred (100) feet on each side of a Priority 3 water body, measured from the top of bank. • *Establishment and Maintenance*: Where the WSO District crosses parcel lines, the owner of each affected parcel shall only be responsible for establishing and maintaining that portion of the WSO District that is located on that owner's parcel. **Appropriate Base Districts** • GW, P1, P2, A1, A2, RR, R1, R2, R3, R4, RL, MP, IN, CN, and CM	**Required Approvals:** • Landscape Plan **Excluded Uses, All Priority Areas:** • All Permitted Uses listed in *Chapter 02: Zoning Districts* for the I3 and HI zoning districts • automobile gas station • construction material landfill • dry cleaning service (on-site) • junk yard • manufacturing, heavy • scrap metal yard • stables • storage tanks (hazardous)	The development standards of *Chapter 02: Zoning Districts* and *Chapter 05: Zoning District Development Standards* apply where an alternative development standard has not been specified herein for the WSO District. The design standards of *Chapter 06: Subdivision Regulations* and *Chapter 07: Subdivision, Development Plan & PUD Design Standards* apply where an alternative design standard has not been specified herein for the WSO District.

Applicability

- **Priority 1:** (Blue lines) Consists of major drainage ways and bodies of water that are to be given highest priority for protection. WSO District extends 500 feet.
- **Priority 2:** (Yellow Lines) Consists of major drainage collectors, continually flowing drainage ways to Priority 1 water bodies. WSO District extends 300 feet.
- **Priority 3:** (Purple lines) Consists of minor drainage ways and may include tertiary waterways and intermittent flow. WSO District extends 100 feet.

Additional Standards

- Each priority area is broken down into 3 buffer areas; Zone 1 is to protect the physical and ecological integrity of the ecosystem, especially stream bank and riverbank stabilization. Zone 2; protects the stream with vegetative filters to trap soil particles and to trap nitrogen and phosphorus. Zone 3; Will start yards for residential developments but no structures in this zone.
- Use limitations: gas stations, sanitary fills, junk yards, heavy manufacturing are not allowed within the WSO.


riparian buffer
Grass spreads flow, traps sediment and
Woody plants anchor bank and shade water.

Conservation Subdivision (CS)

Chapter 06

6.07 Conservation Subdivision Intent

The Conservation type of subdivision is intended to be used as follows:
- Facilitate clustered development of land while ensuring maximum protection of environmentally sensitive features and set asides of significant common open space;
- Provide for necessary connectivity to adjoining street systems to provide adequate levels of emergency service and traffic mitigation;
- Allow very limited development for those parcels containing environmental constraints such as mature tree stands, steep slopes, and water resources; and
- Provide subdivision design controls that ensure the space-efficient installation of utilities, street and sidewalk networks, as well as the placement of individual building lots.

6.08 Conservation Subdivision Prerequisites

Prerequisite Base Zoning District:
- RR, R1, R2, or R3

Minimum Parent Tract:
- 5 acres (217,800 square feet)

Maximum Parent Tract:
- None

Conservation Subdivision (CS)

Chapter 06

6.09 Conservation Subdivision Standards and Effect on Development Standards

Retention Pond Location:
- In natural areas or along primary roadways

Minimum Perimeter Landscaping:
- 50 feet of common area between all lots and any arterial or collector street; and
- 30 feet of common area between all lots and all other parent tract boundaries

Minimum Open Space:
- 40%

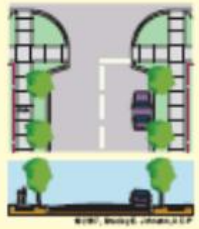
Minimum Block Length:
- 100 feet

Maximum Block Length:
- 1,000 feet

Minimum Cul-de-sac Length:
- 100 feet

Maximum Cul-de-sac Length:
- 1,000 feet

Sidewalks/Perimeter Paths:
- Sidewalks are required on one side of all streets in the R2 and R3 districts
- Perimeter paths and sidewalks required as per the Thoroughfare Plan on arterial and collector streets



Minimum ROW on Local Streets:
- 60 feet

Maximum Design Speed:
- 20 to 25 mph

Minimum Pavement Width:
- 24 feet with no curbs
- 28 feet with ribbon curbs

On-street Parking:
- Not permitted

Minimum Tree Plot Width:
- 6 feet if sidewalks installed along streets

Minimum Sidewalk Width:
- per Thoroughfare Plan

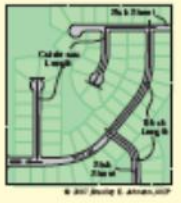
Additional Design Standards that Apply

Cluster Subdivision (CT)

Chapter 06

6.06 Cluster Subdivision Standards and Effect on Development Standards

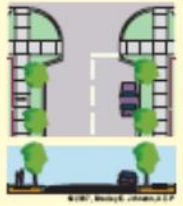
Minimum Perimeter Landscaping:
- 50 feet of common area between all lots and any arterial or collector street; and
- 30 feet of common area between all lots and all other parent tract



Minimum Block Length:
- 140 feet

Maximum Block Length:
- 1,000 feet

Minimum Cul-de-sac Length:



Minimum ROW on Local Streets:
- 60 feet

Maximum Design Speed:
- 25 to 35 mph

Minimum Street Width:

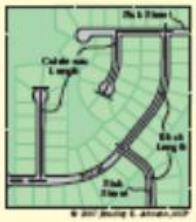
Traditional Subdivision (TD)

Chapter 06

6.12 Traditional Subdivision Standards and Effect on Development Standards

Minimum Perimeter Landscaping:
- 40 feet along arterial or collector streets
- 0 feet if abutting another TD subdivision
- 20 feet along all other perimeters

Minimum Open Space:
- 10% if no environmental features
- 20% if environmental features



Minimum Block Length:
- 200 feet

Maximum Block Length:
- 660 feet (1/8 mile)

Average Block Length:
- Between 400 and 600 feet

Minimum Cul-de-sac Length:
- Cul-de-sacs are not allowed

Maximum Cul-de-sac Length:
- Cul-de-sacs are not allowed

Sidewalks/Perimeter Paths:
- Sidewalks required on both sides of internal streets
- Perimeter paths and sidewalks required as per the Thoroughfare Plan on arterial and collector streets

Minimum ROW on Local Streets:
- 60 feet with one parking lane
- 52 feet with two parking lanes

Maximum Design Speed:
- 15 to 25 mph

Minimum Street Width:
- 30 feet

On-street Parking:
- Required on at least one side

Minimum Tree Plot Width:
- 7 feet in residential areas
- 0 feet in commercial areas

Minimum Sidewalk Width:
- per Thoroughfare Plan

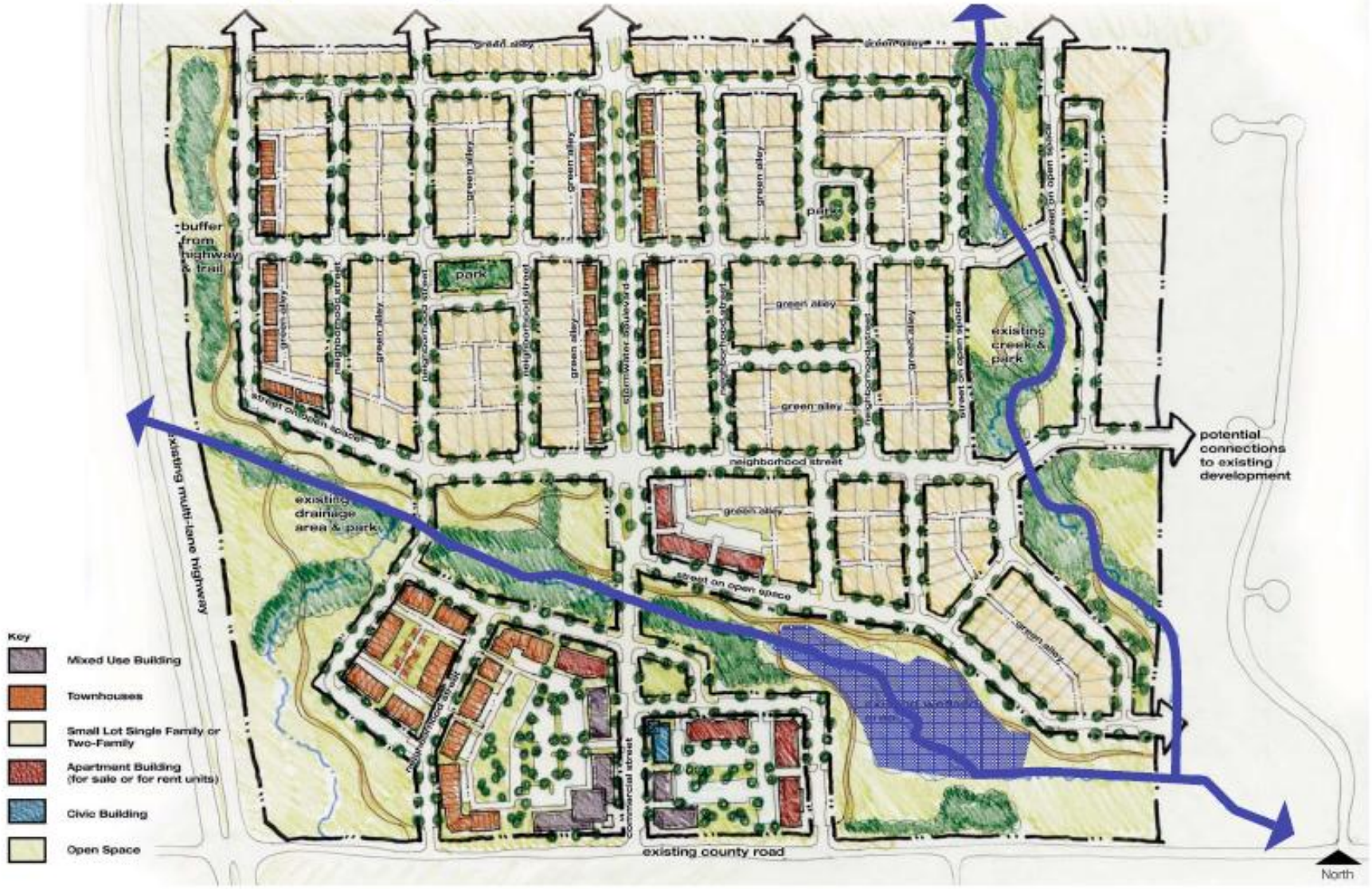
Additional Design Standards that Apply

FARR ASSOCIATES

Architecture | Planning | Preservation

TND: Maintain Existing Natural Features

TND: Utilize Waterways to Define Natural Open Space



TND: Provide a Variety of Types of Open Space within 1/6 of a Mile of Each HH


UTILITY
8' STONE TRAIL
ALONG CREEK
8' STONE TRAIL
ALONG
MERIDIAN
UTILITY

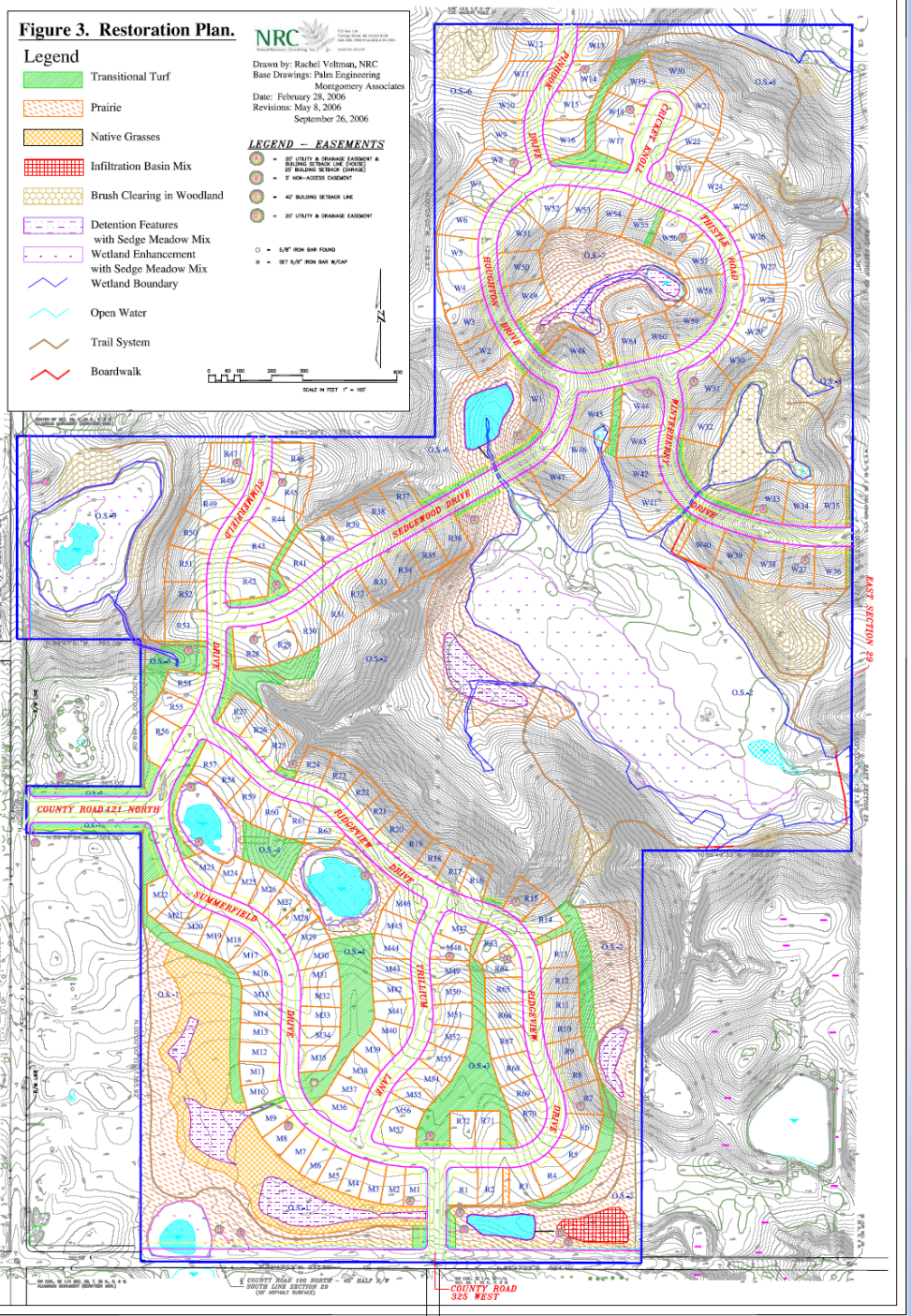


Figure 3. Restoration Plan.
Legend
Transitional Turf
Prairie
Native Grasses
Infiltration Basin Mix
Brush Clearing in Woodland
Detention Features with Sedge Meadow Mix
Wetland Enhancement with Sedge Meadow Mix
Wetland Boundary
Open Water
Trail System
Boardwalk
NRC
Drawn by: Rachel Veltman, NRC
Base Drawings: Palm Engineering
Montgomery Associates
Date: February 28, 2006
Revisions: May 8, 2006
September 26, 2006
LEGEND – EASEMENTS
SCALE IN FEET 1" = 100'
COUNTY ROAD 42 NORTH
COUNTY ROAD 325 WEST
EAST SECTION 28
SEDGEWOOD DRIVE
SUMMERFIELD DRIVE
RIDGEVIEW DRIVE
HAMPTON DRIVE
THISTLE ROAD
WHITEWATER DRIVE


SAGAMORE


MODEL
HOME
INFO

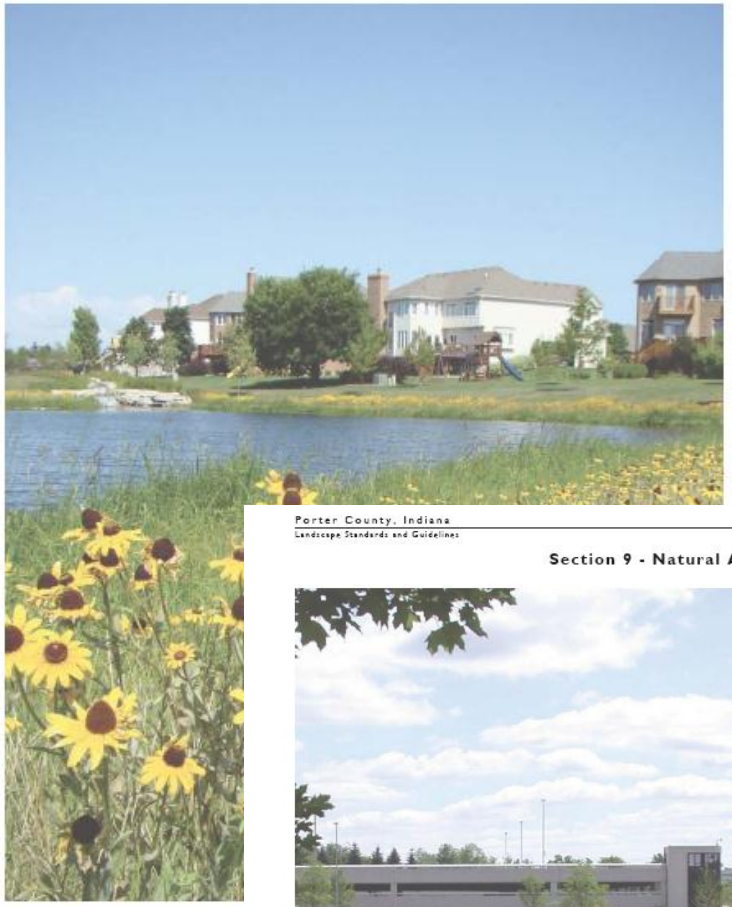
PORTER COUNTY, INDIANA
LANDSCAPE STANDARDS AND GUIDELINES

Draft, October 2009

Prepared by:

Porter County Plan Commission
in conjunction with:
Wolff Landscape Architecture
The Care of Trees
JF New

Section 16 - Stormwater Best Management Practices



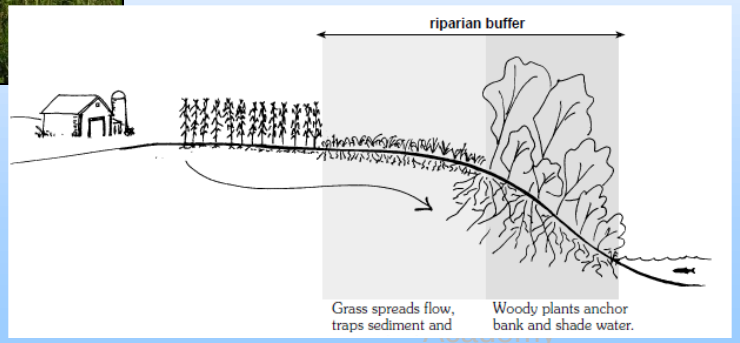
Section 9 - Natural Area Protection

Sustainable Infrastructure

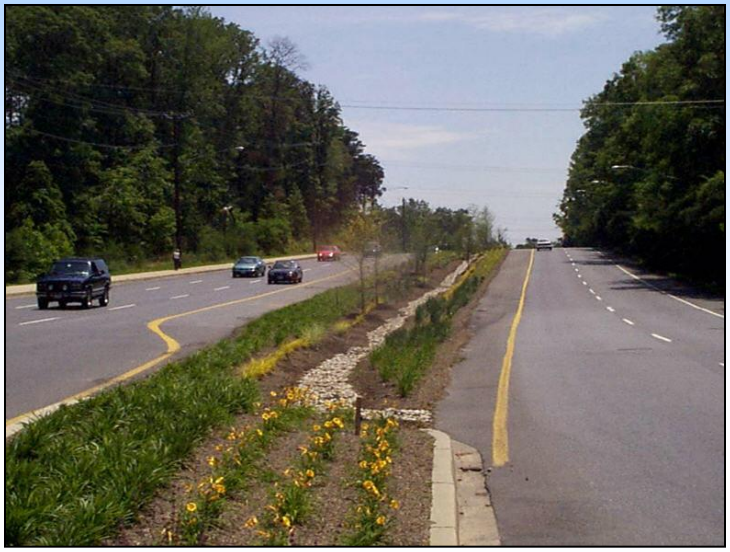
- Best Management Practices for Stormwater
- Green Highways
- Agricultural Practices

Native plants

Riparian/agricultural land buffer



Stormwater Best Management



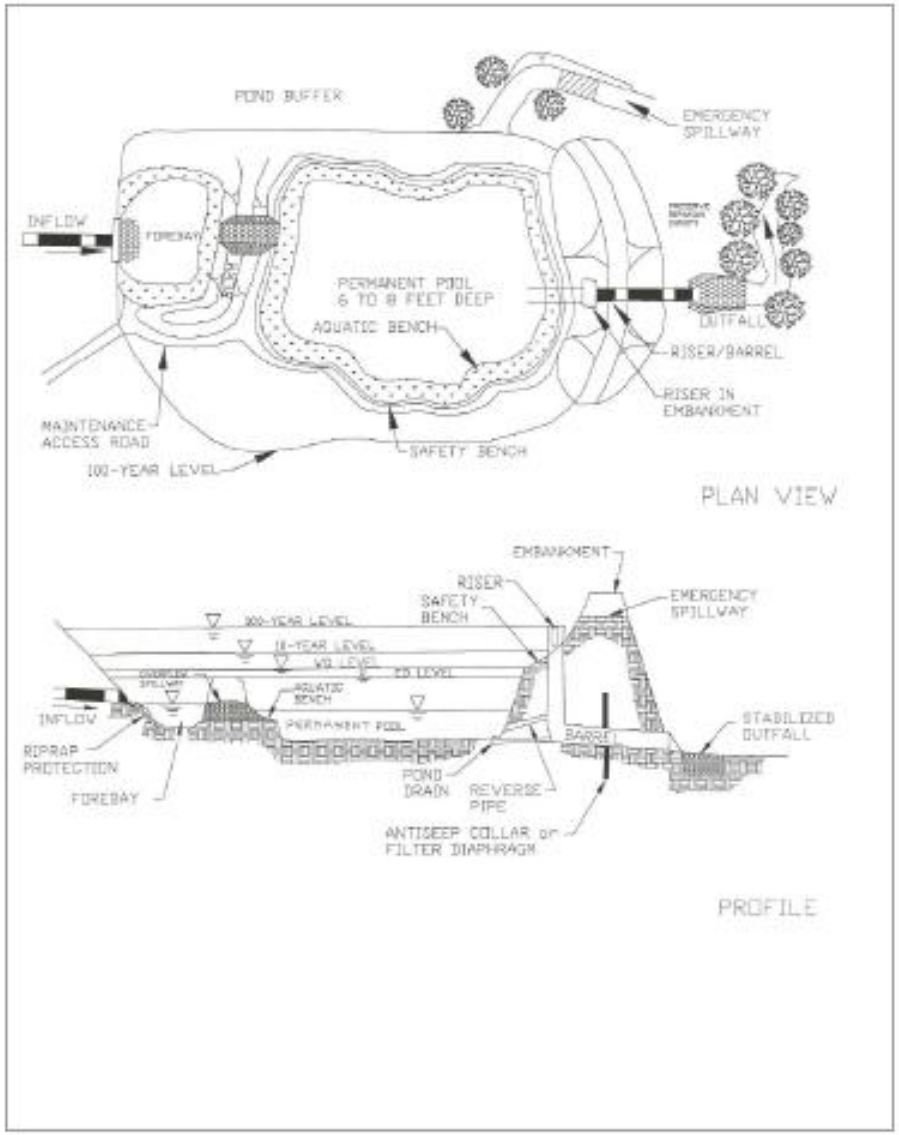


Figure 2 Wet Extended Pond

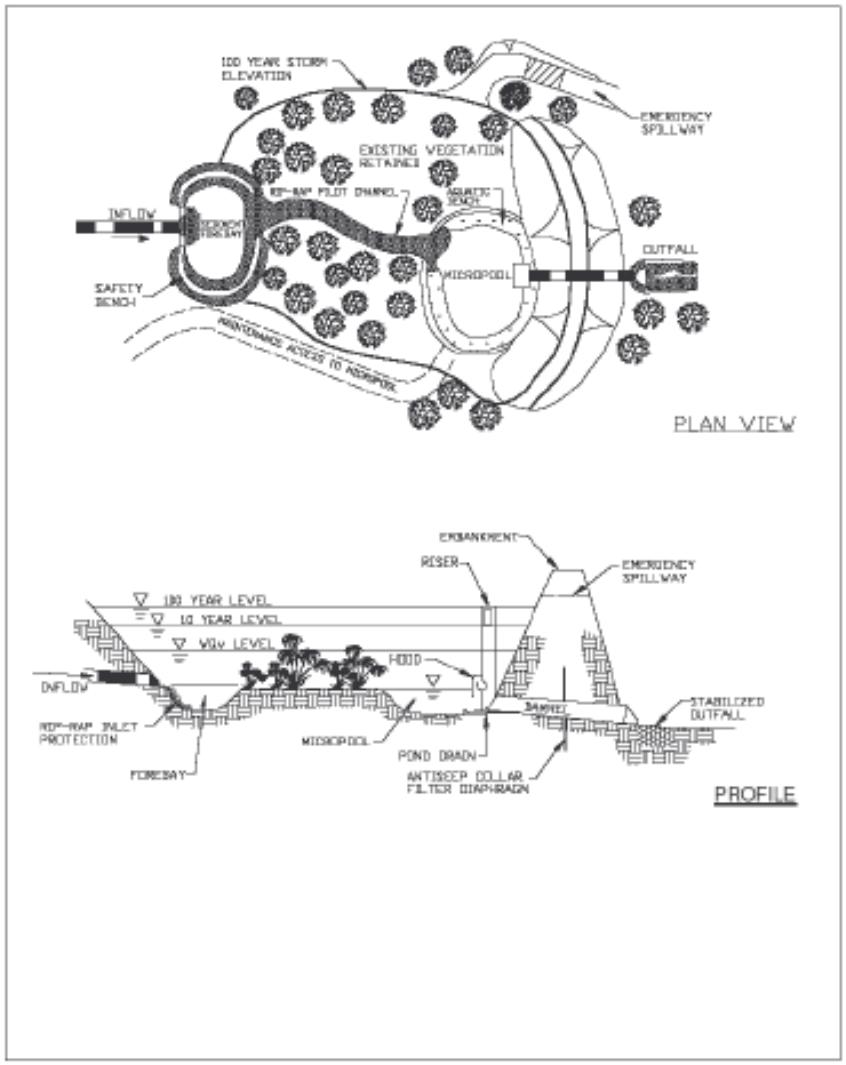
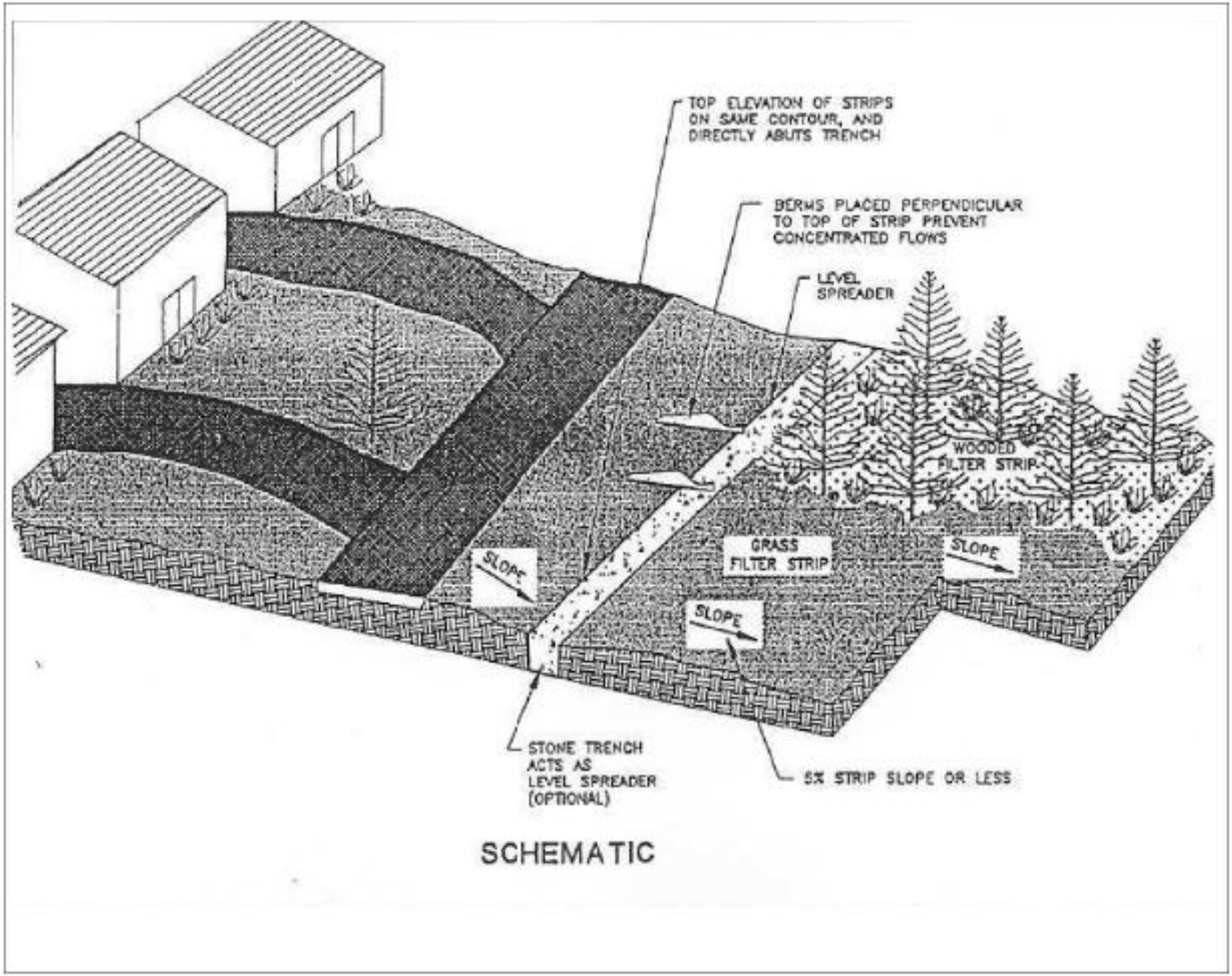


Figure 3 Micropool Extended Wet Detention

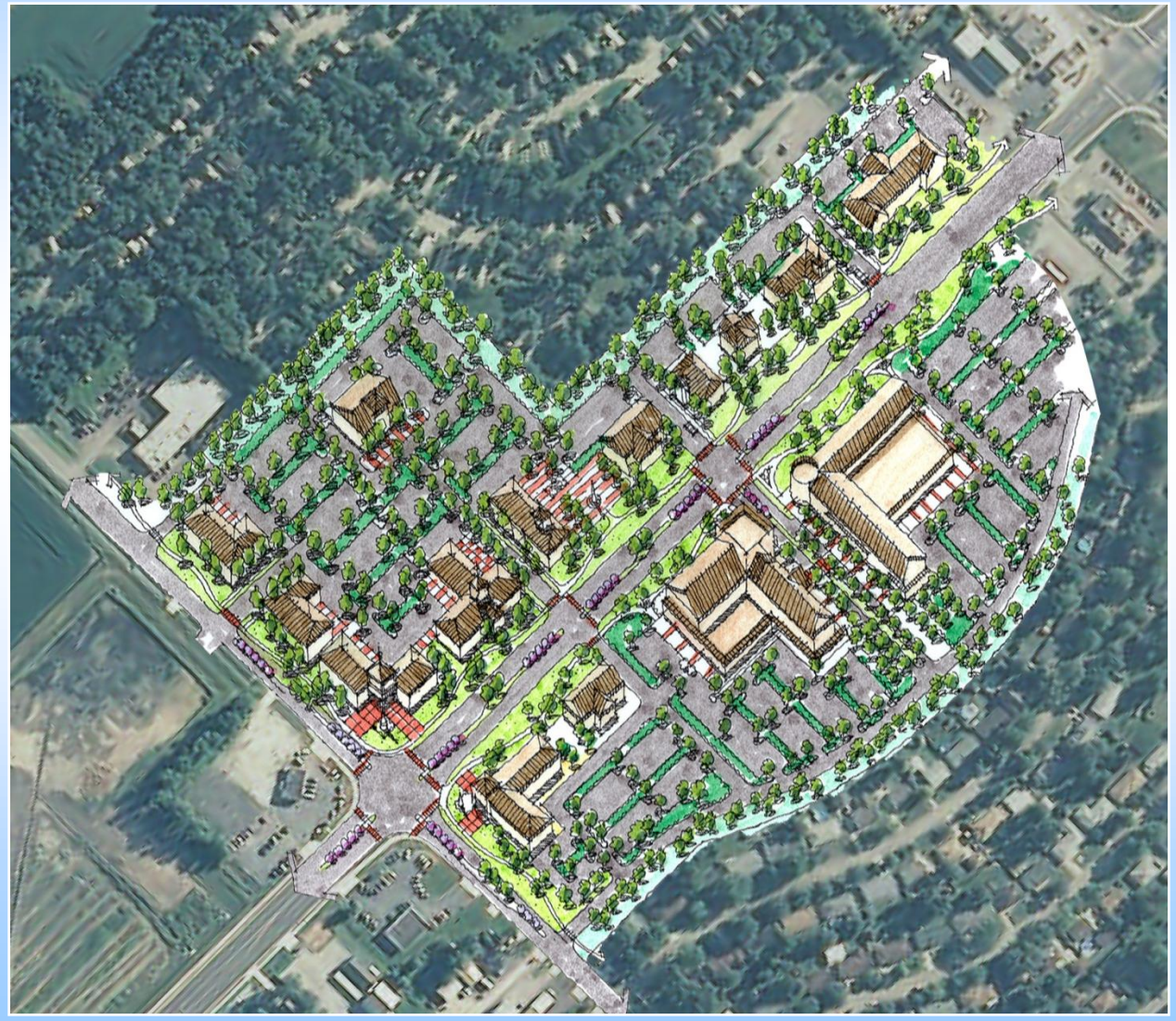

TOP ELEVATION OF STRIPS ON SAME CONTOUR, AND DIRECTLY ABUTS TRENCH
BERMS PLACED PERPENDICULAR TO TOP OF STRIP PREVENT CONCENTRATED FLOWS
LEVEL SPREADER
WOODED FILTER STRIP
GRASS FILTER STRIP
SLOPE
SLOPE
SLOPE
STONE TRENCH ACTS AS LEVEL SPREADER (OPTIONAL)
5% STRIP SLOPE OR LESS

SCHEMATIC

Other Development Scenarios

Suburban Commercial (Re)Development

Proposed Scenario



3. Parking Lot Landscaping

Intent: Landscape parking lots to screen unsightly views, add beauty and seasonal interest to these otherwise unattractive areas, provide shade and mitigate the “urban heat island” effect, and introduce landscape areas to assist in stormwater management.

GENERAL
- Sizes: 2 ½” caliper
- Species: Provide diversity and follow recommended plant lists
- Quality

PERIMETER PLANTING
- Spacing: 1 per 30 linear feet of perimeter
- Planted setback: 7’ – 15’, as function of parking lot size
- Decorative fences or walls: 4’ – 6’ height

INTERIOR PLANTING
- Areas: 5% - 10% of total parking lot area, as function of parking lot size
- Tree planting island size and location: 9’ x 18’, 9’ x 36’, or 18’ x 18’
- Tree quantities and spacing: 1 per 125 square feet of required interior planting

14. Stormwater Best Management Practices (BMPs)

Intent: Implement stormwater Best Management Practices (BMPs) in future developments to balance growth, preservation of a site's character and natural resources, and off-site / downstream impacts. Indicate and protect areas of special concern, such as wetland complexes, groundwater recharge areas, and areas important to recreation.

NON-TRADITIONAL STORMWATER MANAGEMENT PRACTICES

- Rain gardens
- Bio-swales
- Green roofs
- Dry wells
- Underground retention systems
- Porous pavement
- Curb cuts
- Level spreaders
- Hydrodynamic separators
- Reduction of impervious surface
- Capture and reuse
- Water quality devices

12. Sustainability

Intent: Incorporate sustainable landscape and other development through use of native planting, enhanced biodiversity, low impact development, stormwater Best Management Practices (BMPs), and other measures.

- Reduced potable water consumption through use of native plants adapted to local climate conditions
- Mitigation of “urban heat island effect” through, for example, parking lot landscaping
- Naturalized landscaping for common open space
- Native seed mixes
- Stormwater BMPs addressed in subsequent section

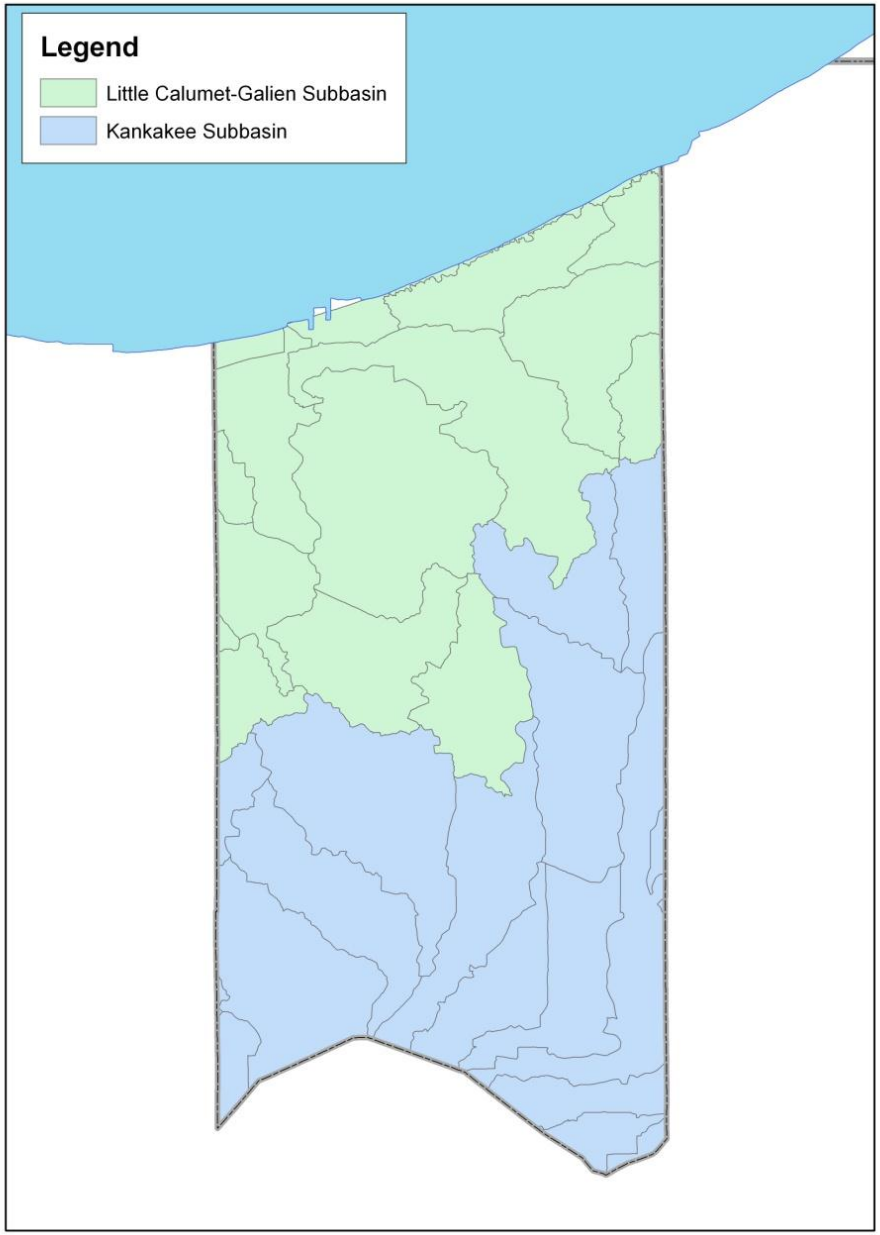
13. Natural Area Protection

Intent: **Preserve and protect intact natural areas by designating them as open space.**

- **Identification and improvement of open space parcels**
- **Maintenance of open space areas**
- **Plant species**
- **Ongoing monitoring and management of natural areas**

Comprehensive Drainage Study

- Engineering study of drainage areas
- Aerial photography with topography
- Regional solutions to drainage problems
- Management of drainage and watersheds
- Ordinances specific to watersheds
- Prioritization of drainage issues
- Working with communities (No corporate boundaries to problems)


Legend
Little Calumet-Galien Subbasin
Kankakee Subbasin

We need your help! Porter County is embarking on a County-wide comprehensive drainage plan to identify drainage issues throughout the entire unincorporated Porter County. The plan will result in identification of immediate action items to relieve flooding and a long term plan to reduce stormwater flooding in the County. As part of this planning effort, a series of four public forums are scheduled. These public forums will provide an opportunity for each resident to voice their concerns with respect to drainage and flooding in an informal, one-on-one setting. Please join us at any one of the following locations and times:

April 22, 2010 (5-8 PM)	April 28, 2010 (5-8 PM)	April 29, 2010 (5-8 PM)	May 3, 2010 (5-8 PM)
Porter County Expo Center Ballroom 1 215 East Division Road Valparaiso, IN 46383	Boone Grove High School Cafeteria 260 South 500 West Valparaiso, IN 46385	South Haven American Legion 429 West 750 North Valparaiso, IN 46385	Westchester Library Westchester Service Center 100 West Indiana Avenue Chesterton, IN 46304

**You may arrive at any time between 5:00 and 8:00 PM to speak one on one with a Porter County representative.*

Porter County Administration Center
155 Indiana Avenue, Suite 304
Valparaiso, IN 46383

Presorted Standard
U.S. Postage Paid
South Bend, IN
Permit No. 417

AN IMPORTANT NOTE: Your county and municipal stormwater coordinators would like to remind you to properly dispose of yard waste and leaves. Dumping yard waste and leaves in or on the banks of creeks, ditches, and rear yard swales can contribute to water pollution and flooding. The breakdown of these wastes contributes additional nutrients and residual chemicals to surface waters when improperly dumped.

When you continuously dump yard waste and leaves they build up over time and fail to fully decompose if the lower layers are not exposed to the air. This essentially creates a mass which over time can slow or stop the flow of stormwater runoff away from your property. Impeding the flow of stormwater runoff in conveyance systems, such as creeks, ditches, and rear yard swales, can contribute to flooding. So be sure to properly dispose of yard waste and leaves each season. For more information, please visit http://www.nirpc.org/environment/environment.htm *Thank You!*

Q -
For Office Use Only / Page 1

Stormwater Flooding Questionnaire

In order to identify as many stormwater flooding issues in Porter County, the following questionnaire has been mailed to all of its residents and businesses in unincorporated Porter County. Please complete the attached questionnaire and return it via one of the following methods: 1) by email at: pcstormwater@dlz.com 2) by fax at: 866-616-6242 3) by mail to: Porter County Plan Commission, Porter County Administration Center, 155 Indiana Avenue, Suite 304, Valparaiso, IN 46383, Attention: Stormwater 4) by hand delivery to the Stormwater Drop Box located in the Porter County Administration Building, or 5) bring it to any one of the public forums as advertised on the reverse side of this sheet.

Name: _____ Telephone (optional): _____

Address: _____ City / Town: _____

Subdivision Name (if applicable): _____ Do you rent or own the property? ___ own ___ rent

Please answer the following questions by placing a check mark next to the answer(s) that apply (you may check more than one):

1) Do you experience stormwater flooding on your property or street? ___ Yes ___ No

2) Can you identify the dates you experienced flooding?
_____, _____

3) What part of your property floods from stormwater?
___ Street in front ___ Roadside ditch
___ Front yard ___ Rear yard
___ Side yard ___ House/structure
___ Driveway ___ Field
___ Wooded area ___ Pond
___ Lowland/swamp/wetland ___ Other

4) What part of your house/structure floods from stormwater?
___ None ___ Basement
___ Crawlspace ___ First floor
___ Attached garage ___ Detached garage
___ Barn ___ Other structure

5) If your house/structure floods, how does stormwater enter?
___ Sump pit ___ Foundation cracks
___ Window ___ Doorway
___ Garage Door ___ Service Door

6) What type of damage have you sustained from stormwater flooding?
___ Building/structure ___ Vehicle damage in street
___ Soil erosion / loss ___ Crops
___ Sinkholes ___ Siltation
___ Lawn (standing water) ___ Septic system

7) What do you think the cause of flooding is?
__ Sump pump failure __ Leaking foundation
__ Lot is graded incorrectly __ Landscaping impedes flow
__ Fence impedes flow __ Shed/building impedes flow
__ Road ditch was filled in __ Other creek/ditch filled in
__ Pond does not drain __ Downspouts
__ Roadside ditch is full (water) __ Other creek/ditch full (water)
__ Culverts are blocked __ Street inlets are blocked
__ Yard drain is blocked __ Leaves / debris block drains

8) How would you describe your flooding?
___ Nuisance ___ Moderate ___ Severe

9) How long does flooding typically last?
___ Less than 1 hour ___ 2-6 hours
___ 6-24 hours ___ Several days
___ 1 Week ___ Several weeks

10) Flooding occurs:
___ more than 5 times per year
___ 2-4 times per year
___ once per year
___ once every five years
___ less than once every five years

11) If the street floods, how deep is the water?
___ 0-6 inches ___ 6-12 inches ___ 1-3 feet
___ greater than 3 feet

12) Mark the following other conditions that may exist.
___ Flooding causes roadway closures in my subdivision
___ Pond in my subdivision overtops its banks
___ Creek/ ditch in my subdivision overtops its banks

13) Identify other areas in the County that you know flood.
_____
_____
_____
_____

On a separate sheet, if desired, please provide additional information (e.g. description, sketches, photos, etc.) of any flooding you've experienced.

Mixed Sources
FSC

Porter County is committed to our green initiatives: the environment and our stewardship thereof. We use sustainable and recycled stocks whenever possible. Please recycle this when you are finished.

FIGURE 2-2
WATERWAYS

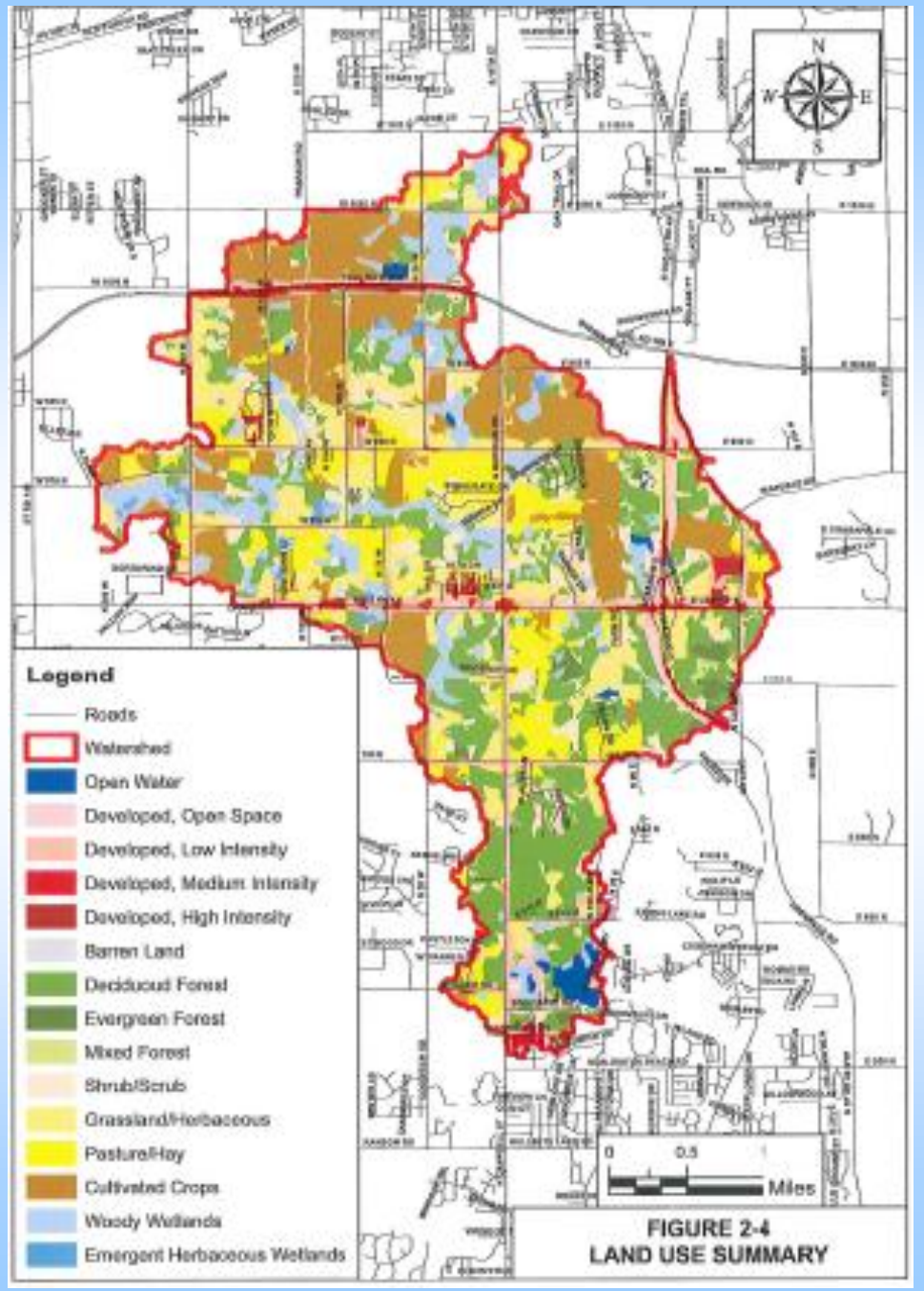


FIGURE 2-4
LAND USE SUMMARY

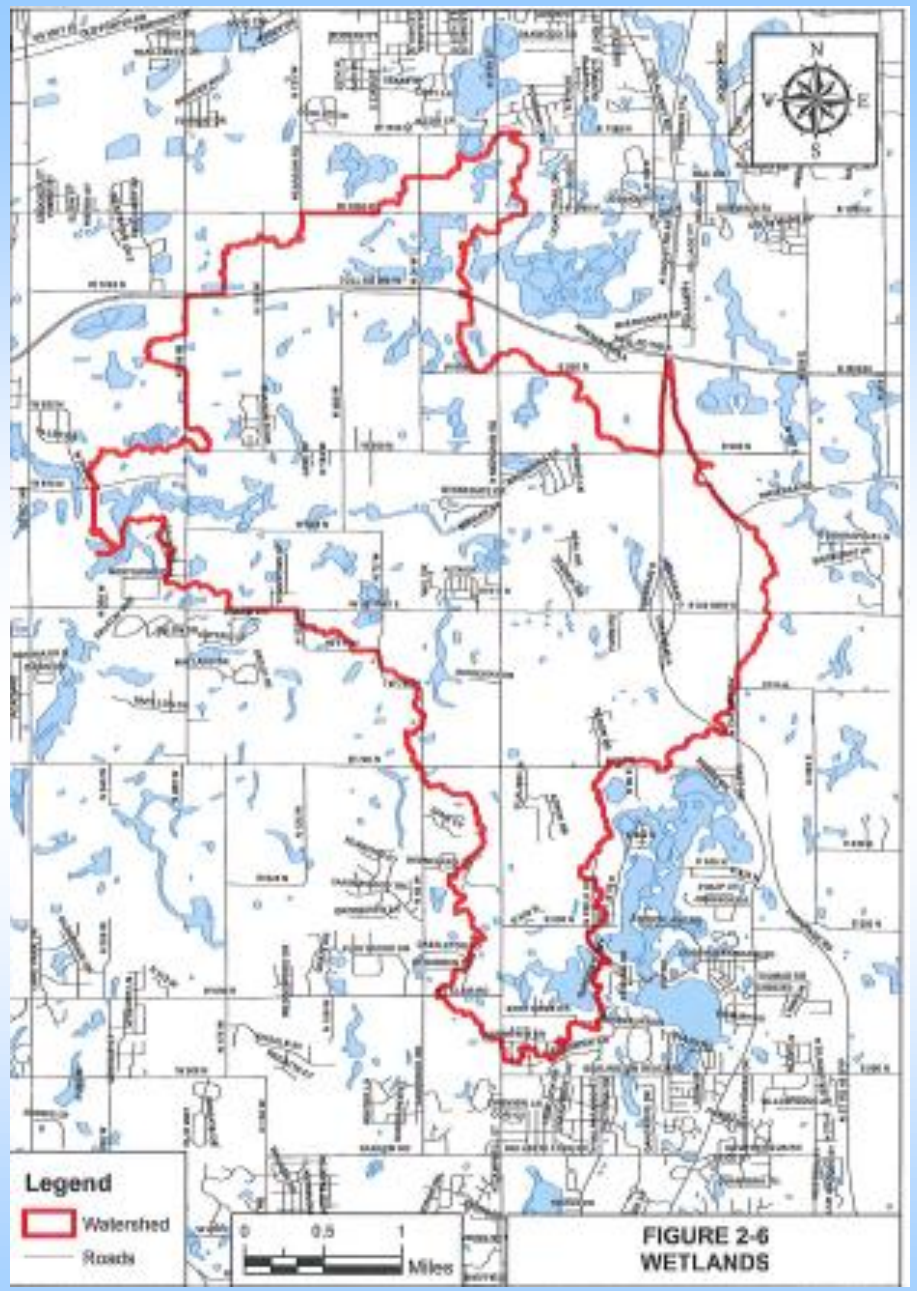


FIGURE 2-6
WETLANDS

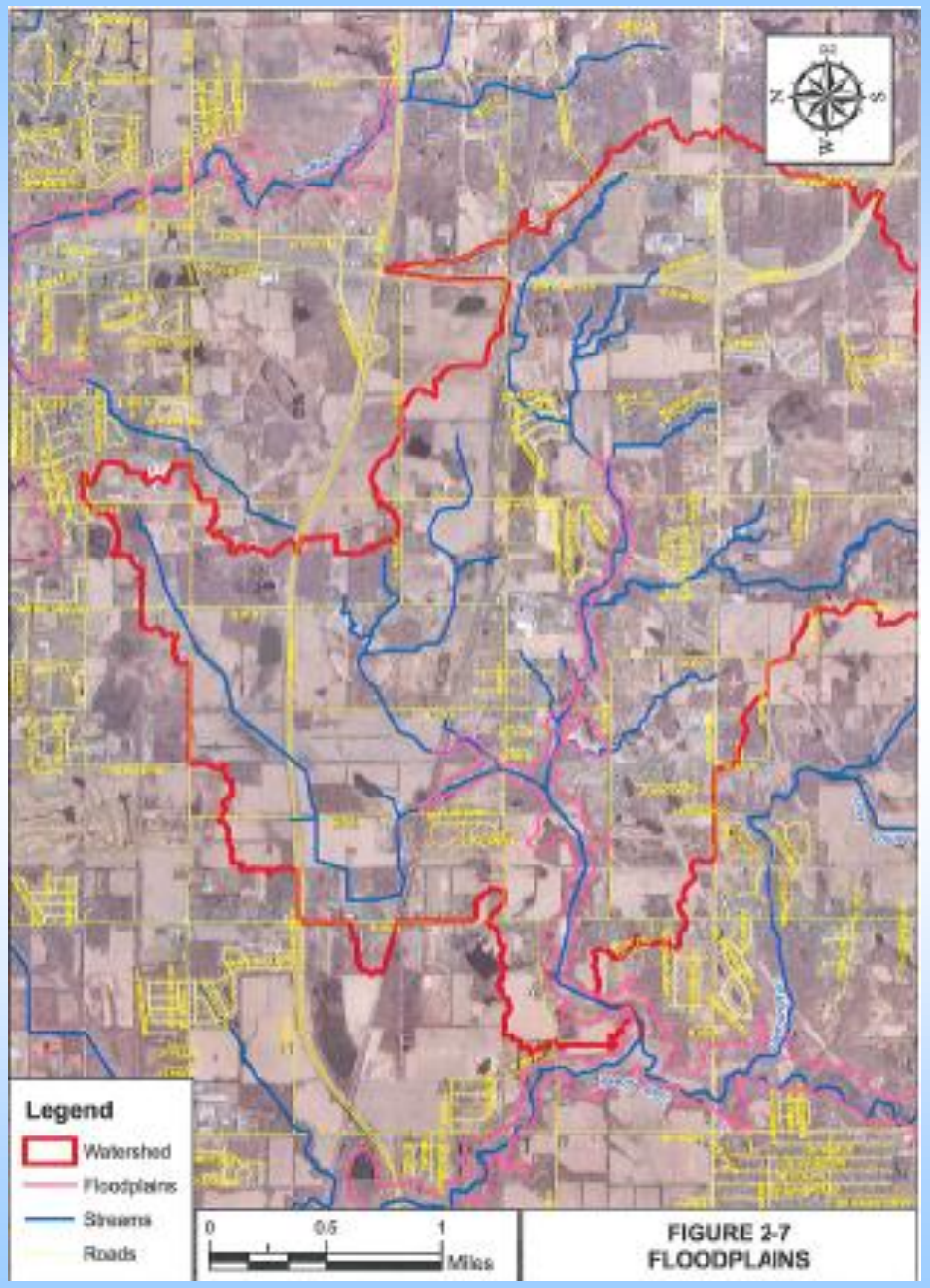


FIGURE 2-7
FLOODPLAINS

Photograph of Meridian Road Bridge at Damon Run

7.1.4 Area #4 – Dickens, London, and Tolstoy (Timberland Subdivision)

Dickens Lane, London Lane, and Tolstoy Trail are within the Timberland Subdivision. All three roadways cross the St. Andrews Tributary. Several homes within the subdivision have a history of flooding by the creek. Known occurrences and summaries of the complaints filed by the residents include:

- 881 London Lane (#557) – Street and rear yard floods. Water flowed into home and caused damage to furnace and hot water heater.
- 889 Dickens Lane (resident appeared at public forum) – Street and rear yard floods. Damage occurred to the basement. Water entered from the window and foundation cracks. Flooding occurs 2-4 times per year. Resident indicates the St. Andrews pond overflows into the back yard and Damon Run cannot carry stormwater off fast enough.

Obstruction Identification No. **20**

General Location of Obstruction: **Swanson-Lamporte Arm 1 (Reach 1)**

Approximate Northing: **2299080** / Approximate Easting: **2949170**

General Description of Obstruction: **Debris, Man Made Obstructions**

Severity of Obstruction (Low/Medium/High): **High**

Image File Name: **DSC00522.JPG**

Recommendation: **Remove**

10 Water Quality Considerations

The Damon Run watershed is characterized by gradually sloped waterways flanked by wetlands and depression areas. These natural features provide many important functions; however, the three main functions are:

- Water filtration – Water filtration occurs in a wetland by slowing down flow and allowing suspended sediment in the runoff to drop out and settle to the wetland floor. The sediment often contains excess nutrients from fertilizer, manure, and leaking septic tanks. The sediments increase turbidity of the water, increase its temperature, and decrease the oxygen levels which can all be harmful to stream habitat and aquatic life.
- Water storage – Water storage is provided in the wide flat areas of the wetlands. As evidence in the computer modeling performed as a result of this study, wetlands, particularly in the Swanson-Lamporte Arm 1 system have a dramatic effect on reducing peak flow rates. Without these wetland areas, flood levels, for example at 150W north of the CSX Railroad would be approximately 2 feet higher than they calculated.
- Water infiltration/evaporation – In addition to the storage function and ability to attenuate stormwater flows, the wetlands provide more opportunity for runoff to infiltrate and evaporate. Thus, downstream flows and flooding are reduced.

10.1 Historic Water Quality Information

Significant attention and efforts have been made toward water quality within the Salt Creek watershed, of which Damon Run is a part. The Save the Dunes Conservation Fund completed the Salt Creek Watershed Management Plan in 2008 which addressed nonpoint source pollution problems in Salt Creek. The plan addressed several goals including reduction in nutrient and pathogen levels, improved stakeholder and public involvement, and improvement of biotic communities. The plan outlined the

substrate, siltation, instream cover, lack of riffle and pool development, and low gradient.

10.3 Alternatives to Improve Water Quality

In addition to crop residue management, contour row crop management, manure management, and septic management, several attainable and on-going alternatives are available and recommended with respect to water quality within the Damon Run watershed. Many alternatives are required and currently being implemented with new developments. A summary of these alternatives are as follows:

- Alternative 16 - Enhanced enforcement of erosion and sediment control practices on construction sites.
- Alternative 17 - Implementation of BMPs in accordance with the County SWDM. Construction of BMPs are already required for most developments. Wet ponds, wet extended detention ponds, micropool extended ponds, interconnected pond systems, pocket ponds, bioretention, water quality swales, biofilters, and rain gardens are all components that need to be considered when developing in the watershed. With implementation of each of these types of facilities, maintenance and access is very important as they will not function as designed or intended if they are not maintained. Appendix H provides details of accepted BMP practices in the Damon Run watershed.
- Alternative 18 - Implementation of two staged ditches within developments where technically feasible. The two staged ditch will tend to increase the stability of the ditch and reduce potential for erosion and maintenance. The smaller bottom of the two staged ditch improves flow velocity through most storm events and allows for an improved ability of the channel to transport sediment. This reduces the potential for dredging. Potentially erosive larger flows can spread out into the second, or top stage. Velocities drop and erosive forces

Robert W. Thompson, Jr., AICP

Porter County Plan Commission

rthompson@porterco.org

www.porterco.org