

Recommended Model Development Principles for Lower Paxton Township and Susquehanna Township: Paxton Creek Watershed

A CONSENSUS OF THE LOCAL SITE PLANNING ROUNDTABLE

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Center for Watershed Protection
Alliance for the Chesapeake Bay
Home Builders Association of Metropolitan Harrisburg

Paxton Creek Watershed

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Team members include Ken Brown, Heather Holland and Hye Yeong Kwon from the Center for Watershed Protection and Pat Devlin, Brook Lenker and Deborah Rudy from the Alliance for the Chesapeake Bay.

Copies of this document are available from the Alliance for the Chesapeake Bay, 3310 Market Street, Suite A, Camp Hill, PA 17011/ phone 717/737-8622, or the Lower Paxton Township Municipal Building at 75 S. Houcks Road, Harrisburg, PA 17109/phone 717-657-5600, or the Susquehanna Township Municipal Building at 1900 Linglestown Road, Harrisburg, PA 17110/ phone 717-909-9223. Copies can also be downloaded from the website: www.buildersforthebay.net.

**The views expressed herein are those of the authors and do not necessarily reflect the views of the Pennsylvania Department of Environmental Protection.*

*This document prepared by the
Alliance for the Chesapeake Bay
and
Center for Watershed Protection*

Executive Summary

This document is a product of the Paxton Creek Watershed Site Planning Roundtable, a year-long consensus process initiated by the *Builders for the Bay* to review existing development codes and identify regulatory barriers to environmentally-sensitive residential and commercial development at the site level. A diverse cross-section of local government, non-profit, environmental, homebuilding, business, development and other community professionals made up the membership of the Paxton Creek Roundtable. Through a consensus process, members of the Roundtable adapted the National Model Development Principles to specific local conditions. Roundtable recommendations include specific code and ordinance revisions that would increase flexibility in site design standards and promote the use of open space and flexible design development in Paxton Creek Watershed.



The National Model Development Principles adapted by the Paxton Creek Watershed Site Planning Roundtable are designed to collectively meet the objectives of Better Site Design (BSD): (1) reduce overall site impervious cover, (2) preserve and enhance existing natural areas, (3) integrate stormwater management, and (4) retain a marketable product. Code modifications and other Roundtable recommendations were crafted to remove regulatory hurdles and provide incentives, flexibility, and guidance for developers implementing BSD. The Roundtable process focused on development at the site level and did not include discussions of zoning or land use. Highlights of the Roundtable recommendations include the following:

Design of Residential Streets and Parking Lots

- Eliminate requirements for curb and gutters.
- Reduce required pavement widths for minor streets.
- Reduce minimum right-of-way widths for minor streets where on-street parking is not required.
- Encourage use of landscaped islands in cul-de-sacs, particularly those that incorporate bioretention or infiltration practices to treat stormwater runoff.
- Encourage use of vegetated swales for managing stormwater from streets.
- Reduce required parking ratios for warehousing.
- Adopt shared parking ordinances.
- Require pervious materials for parking spaces for half those spaces that exceed the minimum requirement.
- Encourage and allow for alternative stormwater practices, which can be uniquely combined to fit specific site conditions.

Lot Design

- Adopt a pre-planning process for development sites to address the incorporation of better site design principles up front in the planning stage.
- Make conservation/open space design a by-right development option in designated zoning districts.
- Offer density bonuses when proposing open space developments for the purpose of increasing or connecting open spaces, preserving forests, and maintaining natural areas.
- Reduce minimum front and side yard setbacks and lot frontage requirements for single family detached residences in certain zoning districts.
- Reduce driveway width and pavement requirements.
- Encourage downspout disconnection, rain gardens, rain barrels and other techniques to reduce and infiltrate runoff.

Natural Areas Protection

- Adopt a riparian buffer ordinance.
- Adopt an open space management plan.
- Consider incentives to encourage the preservation of large contiguous land parcels, such as greenways.
- Provide education and stormwater incentives to help preserve and enhance a site's soil conditions for the purpose of improved infiltration and groundwater recharge.

Introduction

The impacts of watershed urbanization on the water quality, biology, and physical condition of aquatic systems have been well documented (CWP, 2003). Every year, hundreds of thousands of acres of land are altered as a part of the development process. The development radius around many cities and smaller municipalities continues to widen at a rapid rate, far outpacing population growth (Leinberger, 1995). In the Chesapeake Bay Region, it is estimated that more than 90,000 acres of open land are converted annually by development, at a rate four to five times greater per person than that seen 40 years ago (Chesapeake Bay Foundation, 2002).

If we hope to protect the quality of our water resources and the character of our landscape under a continued growth scenario, local governments, developers, and site designers alike must fundamentally change the way land is developed. Deciding where to allow or encourage development, promote redevelopment, or protect natural resources are difficult issues jurisdictions will have to balance. While effective zoning and comprehensive planning are critical, communities should also be exploring ways to minimize the impact of impervious cover, maintain natural hydrology, and preserve contiguous open space on development sites.

Towards this end, the Center for Watershed Protection convened a National Site Planning Roundtable in 1996 to develop a set of model development principals that encourage better design at new residential subdivisions and commercial sites. A roundtable membership consisting of planners, engineers, developers, attorneys, fire officials, environmentalists, transportation, and public works officials from nationally recognized organizations developed and endorsed a set of site planning techniques collectively referred to as Better Site Design (BSD). Products of the National Roundtable include *Consensus Agreement on Model Development Principles to Protect Our Streams, Lakes and Wetlands* (CWP, 1998b), a supporting technical document entitled *Better Site Design: A Handbook for Changing Development Rules in Your Community* (CWP, 1998a), a Codes and Ordinances Worksheet (COW), and a local site planning roundtable process for adapting these techniques at the local level.

The national model development principles upon which BSD is based are merely benchmarks; each community should adapt relevant principles and refine recommendations appropriate to local circumstance. Almost every community can alter some part of its subdivision and development codes to foster development that better protects environmental resources and is economically advantageous for the development community. To promote the local adoption of the model development principles within the Chesapeake Bay region, the Center for Watershed Protection (CWP), the Alliance for the Chesapeake Bay (ACB) and the National Association of Home Builders (NAHB) have formed a coalition called the *Builders for the Bay*. More specifically, the goal of this partnership is to implement local site planning roundtables in 12 communities throughout the Bay region over the next three years.

Benefits of Applying the Model Development Principles

The model land development principles have documented benefits for both the natural environment and the community. Communities implementing the model principles have realized the following benefits:

- Protected the quality of local streams, lakes, and estuaries
- Generated smaller loads of stormwater pollutants
- Helped to reduce soil erosion during construction
- Reduced development costs
- Increased property values
- Created more pedestrian friendly neighborhoods
- Provided open space for recreation
- Protected sensitive forests, wetlands, and habitats from clearing
- Resulted in a more attractive landscape
- Reduced car speed on residential streets
- Allowed for more sensible locations for stormwater facilities
- Increased local property tax revenues
- Facilitated compliance with wetlands and other regulations
- Promoted neighborhood designs that provide a sense of community
- Preserved urban wildlife habitat

Why Paxton Creek?

The purpose of a local site planning roundtable is to adapt the national model development principles for local application, which is accomplished through a consensus-building process that identifies and modifies local codes and ordinances that act to prohibit or impede better site design. Paxton Creek Watershed was selected as the second *Builders for the Bay* roundtable for several reasons:

- Paxton Creek is within the Chesapeake Bay watershed, draining 27 square miles and extending 62 miles in length. Paxton Creek flows through parts of Lower Paxton and Susquehanna townships, Penbrook Borough, and the City of Harrisburg.
- The Paxton Creek Watershed & Education Association and Lower Paxton and Susquehanna townships expressed interest and were willing to commit staff and volunteer time to the roundtable process. (Because the City of Harrisburg and Penbrook Borough are fully built out, efforts were focused on Lower Paxton and Susquehanna township development regulations.) The Pennsylvania Builders Association also generated support for the project from its local member, the Home Builders Association of Metropolitan Harrisburg.
- In recent decades, extensive development in the townships converted farm, forest, and open lands into residential and commercial properties. Unintended consequences include alterations in water levels and flow patterns, significant erosion and sedimentation, declining open space, and aggravated flooding downstream.
- Paxton Creek has twice the nutrients and 15 times the suspended solids than that found in typical forested landscapes. Sediment deposits have changed Wildwood Lake into a wetland.
- Completion of the Codes and Ordinance Worksheets (COW) indicated that the current development rules of both Susquehanna and Lower Paxton townships are insufficient to protect the watershed's water resources and aquatic communities.
- The timing was appropriate in both townships. Susquehanna Township recently updated its Comprehensive Plan, amended its zoning ordinance during the roundtable process, and plans to update its subdivision and land development ordinance. Lower Paxton Township is currently updating its Comprehensive Plan and is planning to update its zoning and subdivision & land development ordinances in the near future.
- Pennsylvania's Department of Environmental Protection recently adopted a new stormwater management policy that encourages infiltration of stormwater flows. This policy integrates new requirements under the federal NPDES Phase II discharge program, which now mandates small municipalities to implement stormwater management programs.
- The Paxton Creek Stormwater Management Plan is currently being updated to reflect these new stormwater standards. Municipalities within Paxton Creek watershed will be expected to update their stormwater ordinances accordingly.





Goals of the Paxton Creek Roundtable

Roundtable members expressed a high level of commitment to the roundtable process and outlined the following goals and expectations for the project:

- Improved stormwater management
 - Improved groundwater recharge
 - Recommendations should be applicable to sites for retrofitting as well as to new development sites
 - Flexibility in street designs to promote groundwater recharge
 - Stronger education of better site design principles
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- Stronger sense of community in new developments
 - Stronger sense of community between municipalities
 - Cost effective site design
 - More incentives and encouragement of Better Site Design within and beyond local codes and ordinances

The Roundtable Process

Roundtable members convened over an eight-month period to become familiar with the BSD principles, review existing codes and regulations, work in subcommittees, and reach group consensus on a final set of recommendations. The Roundtable consisted of over 40 dedicated members with a wide range of professional backgrounds and experience related to local development issues. Members were divided into three subcommittees, which focused on principles related to streets and parking, lot geometry, and natural areas. The full group met four times over the course of the project period, and each subcommittee had two to three additional separate meetings. The process included the following steps:

1. In **February 2003**, a *Builders for the Bay* Local Site Planning Roundtable kick-off meeting was held to introduce the National Model Development Principles, review the Codes and Ordinance Worksheet (COW) for the Lower Paxton, Susquehanna, and Harrisburg townships, and redesign a local subdivision.
2. In **April 2003**, a more detailed codes analysis was completed. Based on results from the COW, feedback from the September kickoff, and excerpts from existing codes and ordinances, this analysis provided a concise summary of the regulatory barriers to implementing environmentally-sensitive site design in Paxton Creek and served as the foundation for subcommittee discussions.
3. From **April 2003** through **September 2003**, the full Roundtable split up into three subcommittees with diverse interests and expertise represented in each: Residential Streets and Parking Lots, Lot Development, and Natural Areas. Subcommittees met two to three times during this period to develop a set of recommended code changes to present back to the full Roundtable.
4. In **June 2003**, subcommittees presented draft recommendations to the full roundtable to begin achieving consensus on final recommendations. Suggestions on unresolved issues were recorded and incorporated into second draft following the meeting.
5. From **June 2003** through **September 2003**, subcommittee members provided comments on draft recommendations and a final draft was prepared and distributed for review.
6. In **September 2003**, the fourth and final Roundtable meeting was held and final consensus was reached on all recommendations. Suggestions for promoting the consensus document were compiled as an “aftercare strategy.”



Membership Statement of Support

This document of recommended development principles was crafted in conjunction with the diverse cross-section of development, local government, non-profit, environmental, and other community professionals who participated in the *Builders for the Bay* Paxton Creek Watershed Site Planning Roundtable.

Members of the Roundtable provided the technical experience needed to craft and refine the model development principles for the Paxton Creek watershed. These recommendations reflect our professional and personal experience with land development and do not necessarily carry the endorsement of the organizations and agencies represented by their members. Endorsement implies support of the principles and recommendations as a package and does not necessarily imply an equal level of support among individual recommendations by all Roundtable members.

The members of the Paxton Creek Site Planning Roundtable endorse the model development principles presented in the document: ***Recommended Model Development Principles for Paxton Creek Watershed***, Dauphin County, Pennsylvania.

Liz Baker <i>Pennsylvania Environmental Council</i>	Robert Grubic <i>HRG, Inc./Susquehanna Township</i>	Todd Moses <i>Skelly & Loy</i>
Drannon Buskirk <i>Paxton Creek Watershed & Education Association</i>	Jeffrey Henning <i>Paxton Creek Watershed & Education Association</i>	Roy Newsome <i>Lower Paxton Township Planning Commission</i>
Frank Chlebnikow <i>Susquehanna Township Planning Commission</i>	Karen Johnston <i>Skelly & Loy</i>	Susan Parry <i>Capital Resource Conservation & Development Council</i>
Bob Christoff <i>Dauphin County Conservation District</i>	John Kerschner <i>Fine Line Homes, Inc.</i>	Cindy Stine <i>Paxton Creek Watershed & Education Association</i>
Melanie Cook <i>Pennsylvania Builders Association</i>	Frank Kessler <i>Susquehanna Township</i>	Jeremy Trexel <i>Dauphin County Conservation District</i>
Jack Detweiler <i>Howard-Hanna Detweiler Realty</i>	Daniel Leppo <i>City of Harrisburg</i>	Luis Villegas <i>Pennsylvania Department of Transportation</i>
Charles Farrell <i>Benegfield & Farrell</i>	Andy McAllister <i>Dauphin County Conservation District</i>	Kerry Wilson <i>Governor's Center for Local Government Services</i>
Robert Fisher <i>R.J. Fisher & Associates</i>	Mazhar Malik <i>Pennsylvania Department of Transportation</i>	Thomas Wilson <i>HRG, Inc./Susquehanna Township</i>
Ernest Gingrich <i>Lower Paxton Township Planning Commission</i>	Russ Martin <i>Paxton Creek Watershed & Education Association</i>	Lori Wissler <i>Lower Paxton Township</i>
Meg Gleason <i>Paxton Creek Watershed & Education Association</i>	Douglas Meshaw <i>Pennsylvania Builders Association</i>	Richard Yingst <i>Yingst Homes</i>
Amanda Gourley-Mitchell <i>Lower Paxton Township</i>	Dianne Moran <i>Lower Paxton Township</i>	

MODEL DEVELOPMENT PRINCIPLES

FINAL RECOMMENDATIONS OF THE

PAXTON CREEK WATERSHED

SITE PLANNING ROUNDTABLE

Residential Street and Parking Lot Principles

Principle #1

Design residential streets for the minimum required pavement width needed to support travel lanes; on-street parking; and emergency, maintenance, and service vehicle access. These widths should be based on traffic volume.

Residential streets are often unnecessarily wide and the excessive widths contribute to making them the largest single component of impervious cover in a subdivision. Wide streets result from blanket application of high volume and high-speed highway design criteria, as well as a perceived need to supply both on-street parking and unobstructed access for fire trucks. US Fire Administration recommends an 18-20' wide street to accommodate a fire vehicle. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendations:

- 1) Although Lower Paxton Township's street width ordinance is based on traffic volume, the ordinance should be revised to a) eliminate requirements for parking lanes on both sides of the street, b) eliminate the requirement for curb and gutters and allow for open section roads with stone shoulders, and c) allow for narrower street widths as proposed in Table 1. The Roundtable also recommends that the Township re-examine the development intensity hierarchy currently in its ordinance as a true indicator of actual traffic volume.
- 2) Susquehanna Township should revise its street width ordinance to reflect traffic volume needs as proposed in Table 1.

Table 1. Recommended Minimum Widths for Minor and Collector Roads and ROW Widths

Street	Max ADT	Develop. Intensity*	Design Width	ROW	Notes
Minor w/curbs	< 1,000	Low	26 24 ft. (2 - 12)	50 40	no parking lanes required
		Medium	30 26 ft. (2 - 13)	50 42	
		High	36 30 ft. (2- 15)	60 44	
Minor w/out curbs	< 1,000	Low	24 ft. (20 paved + 2 stone shoulders)	40	no parking lanes required
		Medium	26 ft. (22 paved + 2 stone shoulders)	42	
		High	28 ft. (24 paved + 2 stone shoulders)	44	
Collector	1,000 - 5,000	n/a	28 feet	50	no parking lanes required
* Development Intensity (based on average lot frontage): - Low: > 200 feet - Medium: 100 to 200 feet - High: < 100 feet					

Principle #2

Reduce total length of residential streets by examining alternative street layouts to determine the best option for increasing the number of homes per unit length.

The roundtable endorses this principle.

Principle #3

Whenever possible, residential street right-of-way widths should reflect the minimum required to accommodate the travel-way, sidewalk, and vegetated open channels. Storm and sanitary utilities should be located within the pavement section of the right-of-way (ROW) wherever feasible.

In many communities, a single right-of-way width of 50 - 60 feet is applied to all residential street categories. A wide ROW is only needed when utilities and sidewalks are located some distance from the paved section of the roadway. ROW widths can be reduced 10 to 25 feet when applying design techniques, such as reducing street width (Principle #1), reduced sidewalk requirements (Principle #13), and relaxing the border width, which separates the street from the sidewalk. Utilities can also be installed beneath street pavement at the time of construction. (*Source: Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendation:

- 1) For minor streets (with curb and without curb), reduce the minimum right-of-way widths as proposed in Table 1, provided that adequate off-street parking is provided. Only when on-street parking is needed should the ROWs remain at 50 or 60 feet minimum widths.

Principle #4

Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.

Many communities require the large “bulb” at the end of a cul-de-sac to be 50 to 60 feet or more in radius, which creates a large circle of impervious cover that is never fully utilized for turning movements. Turn-around options include the t-shaped or hammerhead turn-around, which generates 75% less impervious cover than a 40-foot radius circular turnaround. The residential access loop road is another option. (*Source: Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendations:

- 1) Encourage the use of landscaped islands in the middle of cul-de-sacs to reduce impervious cover.
- 2) Reduce Lower Paxton Township’s minimum radius requirement from 50 feet to 40 feet.
- 3) Encourage alternative turnarounds.
- 4) Where an elongated cul-de-sac is used, encourage the incorporation of a landscaped island or consider using the middle road area as alternative parking provided that pervious pavement is used.
- 5) Encourage the incorporation of bioretention or infiltration practices into cul-de-sac islands to treat stormwater runoff.



Cul-de-sac with vegetated island in White Oak, MD.



Vegetated open channel in Springhill, VA.

Principle #5

Where density, topography, soils, and slope permit, vegetated open channels should be used in the street right-of-way to convey and treat stormwater.

Open vegetated channels remove pollutants by allowing infiltration and filtering to occur. Open channels encourage groundwater recharge and can reduce the volume of stormwater runoff leaving a site. The use of engineered swales should be encouraged where soils, slope and housing density permit. The cost of curb and gutter/storm drain systems can be two to three times more expensive than an engineered swale system. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendation:

- 1) Lower Paxton and Susquehanna Townships should encourage the use of vegetated channels for stormwater management and follow the best management practices supported by county conservation districts, including their recommended swale designs.

Principle #6

In order to curb excess parking space construction, existing parking ratios should be reviewed for conformance taking into account local and national experience to see if lower ratios are warranted and feasible.

Parking ratios usually represent the minimum number of spaces needed to accommodate the highest hourly parking at the site. In many cases, these ratios are “cut and paste” recommendations and can result in far more spaces than are actually needed. To avoid any risk of future complaints from residents, customers, and employees, builders build excess parking. Loans may also require more parking spaces than established by local code. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable supports this principle with the following recommendation:

- 1) Lower Paxton and Susquehanna Township should examine their required parking ratios for warehousing and adjust the minimum requirement to reflect actual parking demands. The requirement for warehouses should be based on the maximum number of employees per shift rather than total gross floor area.



Example of excess parking construction.

Principle #7

Parking codes should be revised to lower parking requirements where mass transit is available or enforceable, shared parking arrangements are made.

Only a handful of communities take advantage of available mass transit as a justification to cap the number of parking spaces, but where they have, transit ridership has risen. Site conditions and access to quality mass transit are important considerations. Shared parking works successfully when facilities are in close proximity and have different peak operating times. Shared parking should have a corresponding decrease in required parking ratios in order to reduce total impervious cover. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendation:

- 1) Lower Paxton Township should adopt a shared/joint parking ordinance similar to the draft Susquehanna Township ordinance on Joint Parking Facilities (see text that follows).
- 2) Shared parking ordinances should clearly explain the incentives and benefits of joint parking arrangements. Benefits include reduced construction and maintenance costs, reduced impervious cover, increased land available for tax revenue-generating purposes, increased attractiveness of city-scape, and increased ability for developers to complete projects that otherwise would have been denied due to insufficient parking.

Joint Parking Facilities (Susquehanna proposed ordinance)

1. Joint parking facilities shall be allowed in the BOR, CN, CH, IG, MU1, MU2, COL and TND districts.
2. Joint parking facilities shall be allowed subject to the following requirements.
 - A. The nearest point of the parking lot shall be no further distance to the nearest point of the property served as provided below:
 - (1) Residential use: 100 feet
 - (2) Commercial use: 200 feet
 - (3) Industrial use: 300 feet
 - B. The required parking shall be not less than the total required separately for each use with the following exceptions:
 - (1) It shall be demonstrated that the uses jointly utilizing the parking facility are utilizing the same at different periods of the day or different days of the week. A reduction may be granted for the total number of parking spaces needed, requiring only the number of spaces needed based on the one use of the facility requiring the most spaces.
 - (2) If subsection 2.B(1) does not apply, then to encourage joint use of facilities in areas of contiguous commercial development fronting on an arterial, a parking reduction of 10% may be granted in those areas, which demonstrate safe and convenient walking distance between uses and meet the criteria in 1 above.
 - (3) The parking area must remain under the control of the owner or operator of the use to which the parking area is appurtenant and shall be recorded as a deed restriction filed in Dauphin County Courthouse to maintain the required number of spaces available throughout the life of the use.



Example of a shared driveway.

Principle #8

Reduce the overall imperviousness associated with parking lots by minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spill over parking areas.

A commonly mentioned argument against smaller parking spaces is the trend toward more SUVs, mini-vans and 4x4s; however, most SUVs are less than seven feet wide; most of them stand taller, not wider. There are also a significant number of compact cars still on the roads today (40 to 50% as of 1994 although that number has most likely decreased since then). Pervious pavement has been successfully applied in cold climates but is only recommended for spillover areas and where the infiltration rate is at least 0.5 inches per hour. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable supports this principle with the following recommendations:

- 1) Lower Paxton and Susquehanna Townships should require that 50% of parking over the minimum number of spaces required for that use be constructed with pervious material.
- 2) Lower Paxton and Susquehanna Townships should encourage the use of pervious materials in all parking areas, particularly where travel is lightest.
- 3) Susquehanna Township should retain its existing parking space requirement of 9 x 18 feet rather than adopt the proposed dimensions of 10 x 20 feet.

Principle #9

Provide meaningful incentives to encourage structured and shared parking to make it more economically viable.

Given the economics of parking lots (above-ground garages may be four times the cost per space in a surface lot), incentives can be provided that would encourage vertical parking structures, which can significantly reduce impervious cover. Examples of incentives include tax credits, stormwater waivers or credits, or bonuses for density, floor area, or building heights. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable supports this principle with the following recommendation:

- 1) Lower Paxton and Susquehanna Townships should allow for additional height and/or additional building square footage in commercial development if structured parking is provided.

Principle #10

Wherever possible, provide stormwater treatment for parking lot runoff using bioretention areas, filter strips, and/or other practices that can be integrated into required landscaping areas and traffic islands.

Typically, landscaping requirements are used to enhance the appearance of a parking lot or to visually separate land uses or development. These areas often account for 10 to 15% of the total parking lot area. These same areas can be used for stormwater management if properly designed. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable supports this principle with the following recommendations:

- 1) Lower Paxton and Susquehanna Townships should encourage the incorporation of treatment Best Management Practices (BMPs) into landscaped areas to help manage and treat stormwater runoff.
- 2) Township codes should be written so as to allow for alternative stormwater BMPs. For example, codes should discourage the use of curbing (or at least allow for drainage into a landscaped area using curb cuts) and allow for a wider variety of vegetation. Every site is unique and requires a different combination of BMPs to properly convey and treat stormwater.

Lot Design Principles

Principle #11

Advocate open space development that incorporates smaller lots sizes to minimize total impervious area, reduce total construction costs, conserve natural areas, provide community recreational space, and promote watershed protection.

Open space development, also known as cluster design or conservation design, is a compact form of development that concentrates density on one portion of the site for reduced density elsewhere. Minimum lot sizes, setbacks and frontage distances are relaxed to provide common open space. Making open space development “by-right” will further protect natural lands in the townships, protect water resources, and give developers the flexibility to create more marketable, aesthetically pleasing neighborhoods. By-right means that cluster developments and traditional neighborhood developments should not require a re-zone or any other additional review process. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)



Example of an open space development.

The roundtable endorses this principle with the following recommendations:

- 1) Susquehanna Township should adopt the Draft Zoning Ordinance (1/10/03), Conservation Design Overlay District (CDO), part 18, which is currently under public review, with the following modification: Make conservation design “by-right” in all lands within the R-1, R-2, and R-4 districts, not just those lands that overlap with designated greenway areas as shown on the zoning map in accordance with the township’s Comprehensive Plan.
- 2) Lower Paxton Township should make the Residential-Cluster District (R-C) and the Traditional Residential Neighborhood District (TRND) “by-right” in A-1, P-1, R-1, and R-2 zones.
- 3) In Lower Paxton Township, within cluster/open space developments, density bonuses may be granted for the purpose of increasing open space, connecting adjacent open spaces, preserving forests, and maintaining natural features. The Roundtable recommends that density bonuses be further studied to quantify and qualify bonus allotments for open space developments.
- 4) Lower Paxton and Susquehanna Townships should consider language in the “statement of purpose” section of the cluster/conservation design zoning district that emphasizes the preservation of natural lands as major intent of the district.

Principle #12

To reduce overall lot imperviousness and reduce stormwater runoff, relax side yard setbacks and allow narrower frontages to reduce total road length in the community. Relax front setback requirements to minimize driveway lengths while maintaining adequate on-street parking.

Minimum yard setbacks and lot frontages are often larger than they need to be to serve community needs. These excessive minimum standards can constrain, and in some cases, prevent site designers from designing open space or cluster developments that can ultimately reduce impervious cover by reducing street length and overall pavement. (*Source: Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendations (see tables that follow):

Front Yard Setback:

- 1) For Susquehanna Township, reduce the minimum required front yard setback in the R-1, R-2, and R-3 from 25 feet to 20 feet. In the Conservation District the setback should be reduced from 50 to 30 feet.
- 2) For Lower Paxton Township, reduce the minimum required front yard setback in R-1 and R-2 from 25 to 20 feet.
- 3) Assuming a front-loaded garage is set back at the 20 foot minimum, homes placed closer to the street should be permitted in order to soften the streetscape and increase the saleability of homes.

Lot Frontages (width):

- 1) For Susquehanna Township, reduce the minimum required frontage in the Conservation District and the R-1 zones from 100 to 90 feet.
- 2) For Lower Paxton Township, reduce the minimum required frontage in R-2 (on lots with public water and sewer) from 90 feet to 80 feet.

Side Yard Setbacks:

- 1) For Lower Paxton Township, reduce the minimum side yard setbacks in R-2 from 5’/20’ to 5’/16’.



Reduced front setbacks in Frederick, MD.

Planned Residential Developments

- 1) Lower Paxton and Susquehanna townships should consider the adoption of a Planned Residential Development ordinance as an alternative site design tool that allows for the greatest flexibility in design, including innovative stormwater management practices.

Table 2. Lower Paxton - Minimum Requirements for Single Family Detached Homes in Residential Districts

Zone	Zoning ID	Min. Lot Area	Min. Lot Frontage	Front Yard Setback	Side Yard setback**	Rear Yard Setback
Commercial Residential District	C-5	NA	NA	15	5/10	25
Residence/ Park District	P-1	1 ac.	200	50	35/90	50
Low Density Residential District	R-1	¼ ac./1 ac.*	90/125 *	25-20	10/30	30
Medium Density Res. District	R-2	¼ ac/1 ac.*	90/125 * 80	25 20	5/20- 5/16	25
Residential-Cluster District	R-C	40-50% of base zone lot size	Variable	Variable	Variable	Variable
Traditional Residential Neighborhood District	TRND	50-66% of base zone lot size	Variable	Variable	Variable	Variable
Agricultural District	A-1	1 ac.	150	50	35	50
Transitional District		Same as R-1	Same as R-1	Same as R-1	Same as R-1	Same as R-1

* with public water and sewer/with individual well and septic

** minimum for one side yard/ minimum total for both side yards

Note: R-C is a replacing zone to A-1, P-1, R-1, and R-2; TRND is a replacing zone to A-1, P-1, and R-1

Table 3. Susquehanna Township - Minimum Requirements for Residential Land Uses

Zone	Max. Resid. Density	Min. Lot Area	Min. Lot Frontage (at street) (75-80 ft. recom d)	Front Yard Setback (20-25 ft. recom d)	Side Yard Setback (8-10 ft. recom d)	Rear Yard Setback ≤ 25 ft. recom d)
Conservation District	.5 units per acre	1 ac.	400 90	50 30	40	50
R-1* Low Density Residential District	2/acre	20,000 ft. ²	400 90	30 20	15	30
R-2* Medium Density Residential District	4/acre	10,000 ft. ²	75	30 20	8	30
R-3 High Density Single-Family Residential District	8/acre	4,000 ft. ²	40	25 20	8	25

Principle #13

Promote more flexible design standards for residential subdivision sidewalks. Where practical, consider locating sidewalks on only one side of the street and providing common walkways linking pedestrian areas.

While sidewalk requirements protect pedestrians and improve community character, needless sidewalks can also increase the amount of site imperviousness, thereby preventing infiltration of stormwater runoff into the soil. In general, the placement and width of sidewalks can be modified without impairing travel access or minimizing pedestrian safety. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendations:

- 1) For Susquehanna and Lower Paxton Townships, do not require sidewalks on cul-de-sacs (minor streets) that serve less than nine units or are less than 300 feet long.

Principle #14

Reduce overall lot imperviousness by promoting alternative driveway and pedestrian surfaces and shared driveways that connect two or more homes together.

As much as 20% of the impervious surface in a residential subdivision consists of driveways. The total site impervious area can be reduced when driveway widths are not oversized, when more than one home is served by a single driveway, and when two-track designs are implemented. Impervious surfaces can be further reduced by using alternative paving surfaces for some or all driveway and pedestrian surfaces. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)



Example of a gravel driveway.

The roundtable endorses this principle with the following recommendations:

- 1) Susquehanna Township should allow shared driveways and two-track designs and should eliminate language in the Subdivision and Land Development Ordinance that discourages their use.
- 2) For Lower Paxton Township, the requirement that “all new driveways shall be paved for a minimum distance of 50 feet from the edge of the cartway” (Chapter 176) should be changed so that pavement is only required to the building set back line.
- 3) For Lower Paxton Township, the minimum residential driveway width (at curb cut) be changed from 12 to nine feet and the maximum should be changed from 24 to 20 feet.
- 4) For Susquehanna Township, the minimum residential driveway width (at curb cut) should be changed from 10 to nine feet.
- 5) While pervious pavement shows promise as technique to reduce stormwater runoff and increase infiltration, questions remain about its durability, maintenance, and cost, particularly in the northeastern U.S. Therefore, the committee recommends that the townships commission a study that investigates these issues.

Principle #15

Clearly specify how community open space will be managed and designate a sustainable legal entity responsible for managing both natural and recreational open space.

Making open space developments “by-right” is generally not enough to ensure that open space lands are managed, protected, and provide meaningful water quality benefits. The term “open space” can be interpreted in many ways, but in the context of protecting local resources, a minimum amount of open space should be protected in natural condition (forests, wetlands, meadows etc.). The community should institute regulations that specify what entity will manage the open space, how it will be managed, and how much will be protected as natural lands. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendations:

- 1) Both townships should complete an open space management plan. This effort is important to identify, prioritize, and increase connectivity of remaining open space areas in the townships.
- 2) A portion of open space in new residential developments should be maintained in a natural condition. It should be specified how it will be managed (public, private, park, etc.). Generally speaking, the lower density zoning district should be required to maintain a larger percentage of open space in natural condition than higher density zoning districts. In higher density zoning districts, open space should consist of a balance between natural areas and passive or active recreation areas.

Principle #16

Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas and avoid routing rooftop runoff to the roadway and the stormwater conveyance system.

Sending rooftop runoff over a pervious surface (i.e. yard, pocket forest) before it reaches the public drainage system can decrease runoff and increase groundwater recharge. Downspout disconnection can also reduce pollutant loads when stormwater is conveyed to filtering practices (i.e. raingardens, infiltration trenches). (*Source: Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendations:

- 1) While both townships allow downspout disconnection, the townships should create language in their stormwater regulations that encourage disconnection, rain gardens, rain barrels, and other techniques that reduce and infiltrate runoff.
- 2) The townships should adopt stormwater provisions that are based on an entire site and not limited to lot-by-lot measures, some of which may not be willingly adopted and maintained by individual homeowners.

Natural Area Principles

Principle #17

Create or preserve a variable-width, naturally vegetated stream buffer along all intermittent, perennial, and ephemeral streams.

Buffers create a natural “right of way” for streams that protect aquatic ecosystems and provide a safe conduit for potentially dangerous flood waters. Buffers can also be used to treat stormwater, provide space for linear greenways, and provide valuable wildlife habitat. (*Source: Better Site Design: A Handbook for Changing Development Rules in Your Community*)

The roundtable endorses this principle with the following recommendations:

- 1) Lower Paxton and Susquehanna townships should adopt a riparian buffer ordinance to protect critical environmental features of the watershed.
- 2) The Roundtable recommends that each township appoint an ad-hoc work group to develop a riparian buffer ordinance and that consideration be given to 1) the scientific research relating to width requirements as they relate to identified riparian functions and stream order (size), 2) the quality and maintenance of riparian buffers, 3) conformity with DEP stream encroachment permitting regulations, 4) coordination with local flood-plain regulations, and 5) accommodation of multiple uses, such as greenways, trails, and stormwater treatment.

Principle #18

The riparian buffer shall be preserved or restored with appropriate native vegetation.

Few communities specify mature riparian forest as a target for their buffer program. Vegetative goals are often absent from existing riparian buffer ordinances. Encroachment of buffers is the norm given the fact that few communities educate builders and property owners about the value of conserving vegetated buffers. Strong buffer ordinances outline the legal rights and responsibilities of local governments and organizations or landowners responsible for long-term management of the buffer. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)



Limited site clearing in VA.

The roundtable endorses this principle with the following recommendations:

- 1) The stream buffer shall be physically delineated throughout all phases of construction by temporary fencing or other means to preserve existing vegetation and soil conditions within the designated buffer zone.
- 2) The developer must include language in the covenant to protect the buffer into perpetuity.
- 3) Ordinances must also outline enforcement by the township and/or homeowners association.
- 4) A pre-construction meeting should be required for plan review.
- 5) Resources should be dedicated to education/outreach efforts that teach landowners and developers the importance of buffer maintenance and could include signs or other boundary markers.

Principle #19

Clearing and grading of forests and native vegetation at a site should be limited to the minimum amount needed to build lots, allow access, and provide fire protection. A fixed portion of any community open space should be preserved as protected green space, in the form of contiguous tracts where pre-development conditions allow.

Most communities allow clearing and grading of an entire site except for a few specially regulated areas such as jurisdictional wetlands, steep slopes, and floodplains. A handful of communities do encourage the preservation of some forests or specimen trees. However, very few communities clearly restrict clearing and grading of buffers, open space, and native vegetation during construction. Existing tools that might be adapted to limit clearing include erosion and sediment control ordinances, grading ordinances, forest conservation or tree protection ordinances, and open space development. (Source: *Better Site Design: A Handbook for Changing Development Rules in Your Community*)



Natural area preservation in Cottage Creek, OR.

The roundtable endorses this principle with the following recommendations:

- 1) Incentives should be offered to encourage preservation of large contiguous parcels, such as greenways.
- 2) Priority preservation consideration should be given to stream-adjacent areas, forest, and other natural features on the development site.
- 3) Developable land preserved as part of the riparian buffer can be counted towards preserved open space.
- 4) Consider incentives to promote homeowner preservation of trees and native vegetation.



Preserved trees in Bethesda, MD.

Principle #20

Conserve trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native plants. Wherever practical, manage community open space, street rights-of-way, parking lot islands, and other landscaped areas to promote natural vegetation and native species as defined by PA DCNR.

In many jurisdictions, local ordinances set standards for the maintenance of lawns and open areas. These laws often include restrictions on the height of “weeds” and have been used to prevent landowners from managing their yards with native vegetation. In communities that do have tree ordinances, the focus is on “specimen trees” or trees that are old or rare to the area. A few communities require that a fixed percentage of the natural vegetation at the site be retained or replaced with native specimens. (*Source:*

Better Site Design: A Handbook for Changing Development Rules in Your Community)

The roundtable endorses this principle with the following recommendations:

- 1) Encourage public education on why native plants are preferred.
- 2) Incorporate language that discourages or prohibits the use of invasive species and suggests alternatives.
- 3) To the greatest extent feasible, a site’s soil conditions should remain as close to pre-development condition as possible. Topsoil removed from building sites decreases the infiltration and water-holding capacity of the ground, thereby promoting surface runoff. Replacing topsoil, enhancing surface soils through the addition of amendments such as organic matter, and promoting the creation or preservation of microrelief in sloping areas (which enhances infiltration by providing depression storage) promotes infiltration. Infiltration credit should be given if topsoil is replaced or other infiltration enhancement measures are taken. Education and stormwater incentives should be considered by both townships to help preserve and enhance soil conditions for improved infiltration and ground-water recharge.

Principle #21

Incentives and flexibility in the form of density compensation, buffer averaging, property tax reduction, stormwater credits, and by-right open space development should be encouraged to promote the conservation of stream buffers, forests, meadows, and other areas of environmental value. In addition, off-site mitigation consistent with locally adopted watershed plans should be encouraged.

The roundtable endorses this principle with the following recommendations:

- 1) Conservation subdivisions should be a by-right form of development.
- 2) Additional incentives and flexibility should be offered to encourage open space conservation above and beyond requirements.
- 3) The membership endorses the review and incorporation of policies outlined in the townships’ comprehensive plans intended to promote the conservation of open space and natural features.

Principle #22

New stormwater outfalls should not discharge unmanaged stormwater into waters of the Commonwealth or sensitive areas.

The roundtable endorses this principle with the following recommendations:

- 1) Consider incentives for onsite stormwater best management practices, retrofits and restoration projects to further mitigate pollution from stormwater runoff.

Principle #23

To better promote effective resource utilization, the membership encourages the development of a collaborative pre-planning process to identify natural resources, delineate buffers, define sensitive areas and other natural features, and outline earth disturbance plans for a development site before a project begins. This pre-planning process should not be used to delay or impede the development process, but to facilitate and streamline the implementation of the better site design principles outlined here.

The roundtable supports this principle with the following recommendations:

- 1) It is encouraged that this pre-planning process include a site visit.



A pre-planning process is recommended.

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About the Builders for the Bay Organizations



Center for Watershed Protection

Founded in 1992, the Center for Watershed Protection is a non-profit 501(c)3 organization dedicated to protecting and restoring watersheds through effective land and water management. Joining forces with local watershed groups, federal and local governments, and nationally respected experts, the Center has developed a multi-disciplinary strategy to watershed protection that includes conducting research, developing watershed management practices, encouraging watershed planning and implementation, fostering watershed learning, and building the capacity of local watershed organizations.

Oversight of the Center is provided by a Board of Directors and a national watershed advisory council, whose members are leaders in the watershed protection arena. Since its inception, the Center has provided technical assistance to local governments in more than 30 states and the District of Columbia. For more information on the Center for Watershed Protection, visit <http://www.cwp.org>.



Alliance for the Chesapeake Bay

The Alliance is a regional non-profit organization that fosters partnerships for the restoration of the Bay and its rivers. The Alliance is known as the “Voice of the Bay” for its objective, unbiased information on Bay-related issues. Since 1971, the Alliance has been involved with the following efforts:

- Helping to build consensus on Bay policies
- Engaging volunteers in important hands-on restoration projects
- Educating citizens about the Watershed
- Strengthening the capacity of grassroots watershed organizations

Over the years, the Alliance has hosted and coordinated a variety of conferences and training events. Typically, the Alliance role is one of a convener and facilitator, bringing the experts in a particular field to the table for the benefit of information exchange. Most of the conferences and forums coordinated by the Alliance have required strong skills in negotiation, consensus-building and organization. This is due to the fact that these events involved representatives from both public and private stakeholder groups. More information on the Alliance for the Chesapeake Bay can be accessed at <http://www.alliancechesbay.org>.

Home Builders Association of Metropolitan Harrisburg

The Home Builders Association of Metropolitan Harrisburg is an association of people who gather together their experience, talents and skills to bring more than shelter to all of us; they help to create the comfort and pride derived from homes, neighborhoods and communities. Among its membership are homebuilders, remodelers and many associated industries. It is this association that defines a code of ethics, educates its members, offers a multitude of services such as insurance and advertising and provides a voice in complex, sometimes arduous legislative situations.



While the HBA has no legal authority to service consumer complaints, it takes an aggressive stand as a peer review board. Visit www.harrisburgbuilders.com for more information.

Pennsylvania Builders Association

The Pennsylvania Builders Association (PBA) is a nonprofit, statewide trade association chartered in 1952. Affiliated with the National Association of Home Builders (NAHB) and a network of 41 local associations throughout the state, the PBA is governed by a board of directors, consisting of representatives of its local affiliates.



As the voice of more than 528,000 members and employees, the association represents all facets of the building and shelter industry by assisting local associations in directly serving the membership. Member firms are diverse in size, activities and locale, and include developers, remodelers, apartment owners, residential and light commercial builders, as well as subcontractors, suppliers, professionals, manufacturers and others related to the industry.

The PBA is devoted to representing the needs of the building industry at the state level and to providing products and services which enhance the effectiveness and professionalism of its local associations and members. Through the PBA's efforts, the building industry is better able to serve the community and provide consumers optimum quality and value for the housing dollar.

Glossary

Alternative turnaround: an end of street vehicle turnaround that replaces a cul-de-sac.

Bioretention area: a landscape feature, such as a parking lot island, adapted to treat stormwater runoff on site by directing it to a shallow, landscaped depression incorporating pollutant removal mechanisms.

Buffer: an area maintained in permanent vegetation and managed to reduce the impacts of adjacent land use.

By-right: a form of development that does not require special exceptions or additional reviews; prohibits denial of a development plan if it meets the provisions of the ordinance.

COW: acronym for the Codes and Ordinances Worksheet, which measures how a community's existing development rules stack up against the model development principles of better site design.

Ephemeral stream: flows only in direct response to precipitation with a channel always above the water table.

Filter Strip: a linear strip of land maintained to slow the velocity of runoff and filter sediment.

Impervious: non-porous; incapable of penetration by water.

Infiltration Trench: an excavated hole three to 12 feet deep, backfilled with stone, lined with filter fabric and used to remove suspended solids, pollutants, bacteria, organics and nutrients from stormwater runoff.

Intermittent stream: has a defined channel but flows only at certain times of the year when receiving water from springs or a surface source such as melting snow.

Mitigation: compensation for unavoidable habitat loss through the creation, restoration or enhancement of new area; reducing impacts of proposed development projects through redesign, relocation or compensation.

Perennial stream: flows continuously in a defined channel in an average rainfall year.

Pervious: porous; permitting penetration by water.

Raingarden: a functional, landscaped infiltration system used to catch and return stormwater runoff from parking areas, driveways or roofs to the groundwater system, allowing groundwater recharge and reducing levels of polluted runoff.

Riparian area: an area of land adjacent to a stream, river or other body of water that serves as a transition between land and water and directly affects and is affected by that water.

ROW (Right of Way): the width of a public roadway that includes pavement width plus adjacent land necessary for placement of utilities, sidewalks or drainage.

Runoff: the portion of precipitation that appears in surface streams.

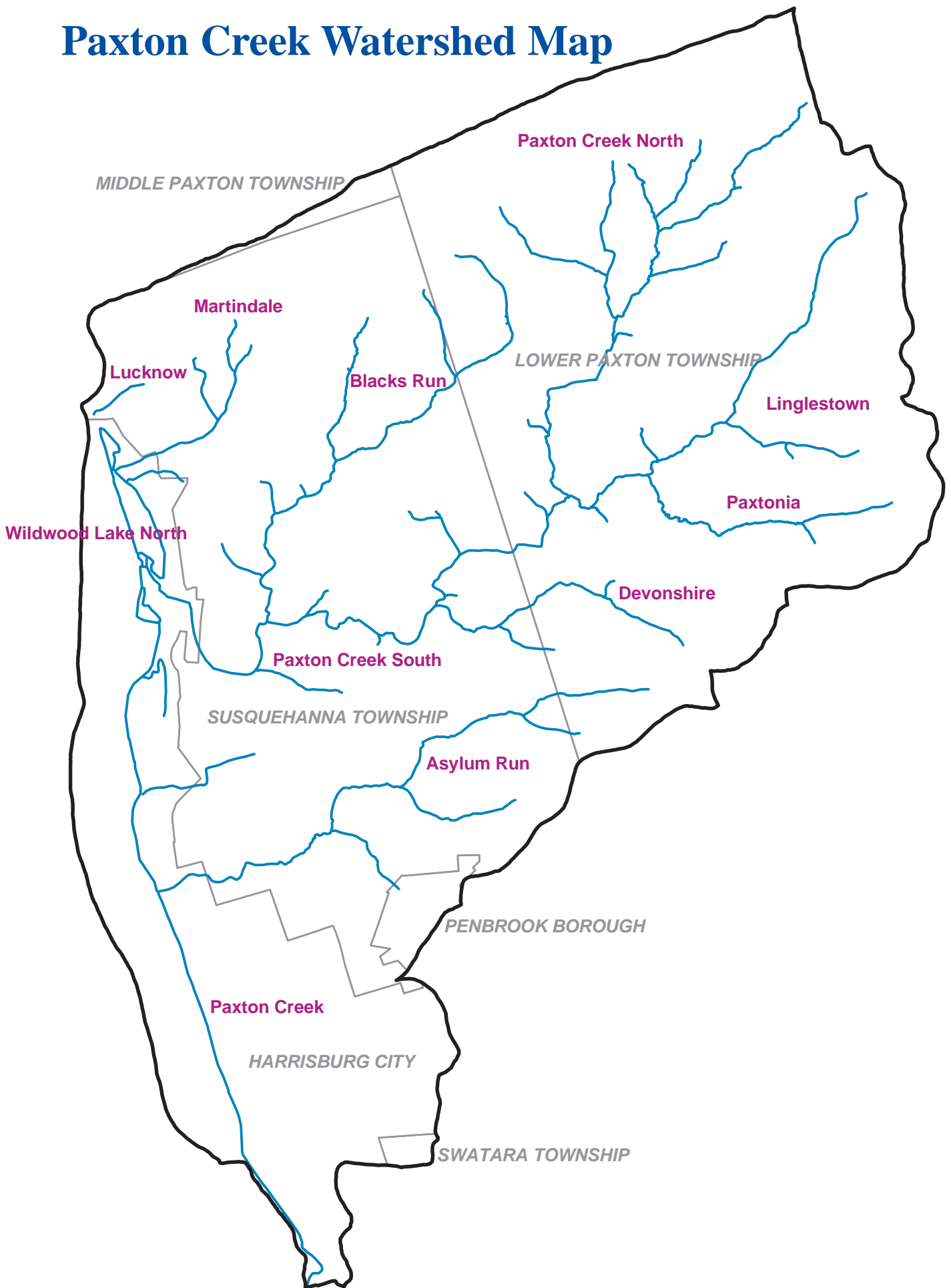
Shared/joint parking: joint use of a parking lot or area by more than one principal use.

Stormwater outfall: the place where a storm drain discharges to a receiving water body.

Swale: a natural depression or a wide shallow ditch use to temporarily store, route or filter runoff.

Vegetated filter strip: an area maintained in permanent vegetation designed to capture and filter runoff and sediment.

Paxton Creek Watershed Map





Builders for the Bay