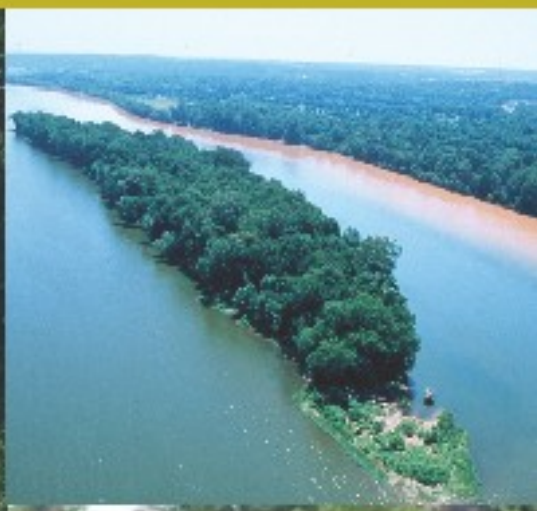
Promoting Low Impact Development in Virginia:
A Review and Assessment of Nontidal County Codes and Ordinances

June 2012



Friends of the Rappahannock
James River Association
Potomac Conservancy

Acknowledgements

In August 2010, Friends of the Rappahannock, James River Association, and Potomac Conservancy were awarded half of a million dollars by the Chesapeake Bay Stewardship Fund to support one of the largest stormwater assessments in the Commonwealth. Through a partnership with universities, state agencies the project completed a comprehensive assessment of stormwater runoff in nontidal portions of Virginia's rivers to see how local development policies can be improved to promote Low Impact Development (LID) practices.

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Partners:

University of Virginia

Virginia Commonwealth University

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Virginia Department of Conservation and Recreation

Center for Watershed Protection

Supporters:

The research on which this report is based was funded in part by the National Fish and Wildlife Foundation.

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Introduction

The Chesapeake Bay touches the lives of more Virginians than any other feature on the landscape; two-thirds of all Virginians make their homes in the 68 counties and 28 cities of its watershed. Virginia's Chesapeake Bay watershed encompasses 60% of the Commonwealth's land area. After centuries of nurturing Virginian's, the watershed now needs nurturing in return. The impact of future land development will largely determine the future health of the Chesapeake Bay and its continued role as a great asset to these communities.

In communities, it is local codes and ordinances that shape how development occurs. In turn, these codes and ordinances are among the most important tools for protecting local waters. It is imperative that obstacles to environmentally friendly development practices be removed and that incentives are established to reduce paved, or impervious, surfaces and the associated stormwater runoff.

In 2011, the James River Association, Potomac Conservancy and Friends of the Rappahannock (the Project Team) conducted an analysis of local development codes and ordinances in each of Virginia's nontidal Chesapeake Bay localities, to determine the level of incorporation of Low Impact Development (LID) principles. This report contains the Project Team's analysis. The Virginia Department of Conservation and Recreation, the University of Virginia, Virginia Commonwealth University, George Mason University and the Center for Watershed Protection assisted the Project Team.

This report identifies opportunities for ordinance change that increases flexibility for use, if not direct the use of LID principles. LID improves the character of development by taking advantage of the efficiency provided by natural landscapes in stormwater management through

- conservation of open space,
- reduction in impervious land cover ,
- protection of natural vegetation.

LID can also heighten the level at which land disturbing activities require water quality protection. As a result, localities benefit from increased protection of local stream health. Localities increase water quality protections by decreasing the size (area) of land-disturbing activities.

Why Use LID?

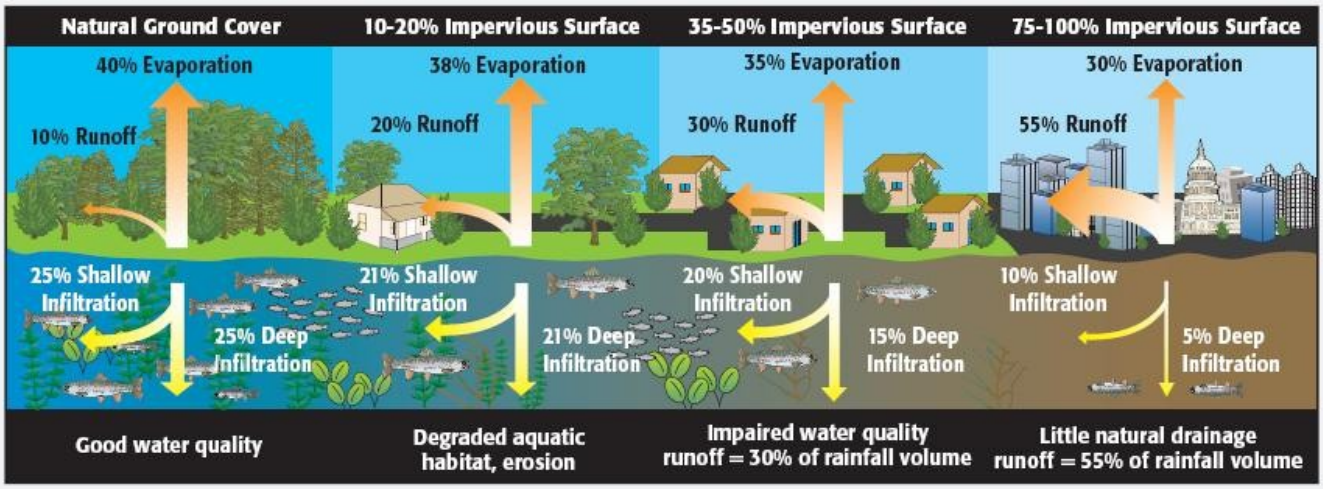
Low Impact Development, or LID, is one of the most cost-effective approaches to address stormwater pollution, and protect the natural landscape of our region.

The Problem: Stormwater Runoff

Development practices, both during and after construction, can have negative effects on local streams. If not managed appropriately during the construction process, severe erosion can allow tons of sediment to travel off site and into streams, smothering critical stream habitat and reducing capacity for flood control. After construction, runoff from developed land can lead to stream channel instability because of altered natural hydrology. The receiving stream must readjust to increased volume and velocity of runoff, causing tremendous stream bank erosion and streambed scour. Eventually failing stream systems send tons of sediment pollution further downstream. Storrmwater runoff also carries nutrients and other pollutants such as heavy metals, oils, and pesticides that can cause additional problems for our rivers.

The combination of stormwater and pavement/rooftop is often deadly for the integrity of stream channels and water quality. It is becoming apparent that when the total amount of land cover conversion from natural to impervious reaches 10% in an individual watershed stream, health is compromised (See Figure 1). With every new developed area, we increase the amount of hardened surfaces and decrease the amount of natural areas. With every small

Figure 1. Effects of Diminishing Natural Ground Cover on Water Quality



Source: EPA Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/), University of Maryland Center for Environmental Science.

As impermeable surfaces increase, natural ground cover and surfaces decrease, which causes more runoff and degraded stream health. Scientists estimate that when it rains, a natural surface absorbs about 90% of the precipitation; the remaining 10% is converted into runoff. However, when a surface contains 75-100% impervious cover about 55% of precipitation is converted into runoff.

percentage of impervious cover increase there is a small loss in quality and function that streams provide to our individual communities.

Recently, the Commonwealth of Virginia passed stormwater regulations to reduce pollution from runoff. With pollution reduction criteria for development, these state regulations are flexible, and include LID as a preferred method for addressing the stormwater issues.

In most areas, state regulations have served as the mitigating regulation to managing stormwater and associated impacts. The issue is that even though many developments have been constructed to meet the requirement of the time, it has not proven sufficient to protect the natural character of local streams and marine systems. Although the developed component of the overall pollution load that is delivered via Virginia rivers to the Chesapeake Bay is much smaller than other identified sectors (e.g., agriculture), pollution from stormwater is the only source sector that is growing (currently 10% of the overall pollution load for nitrogen).

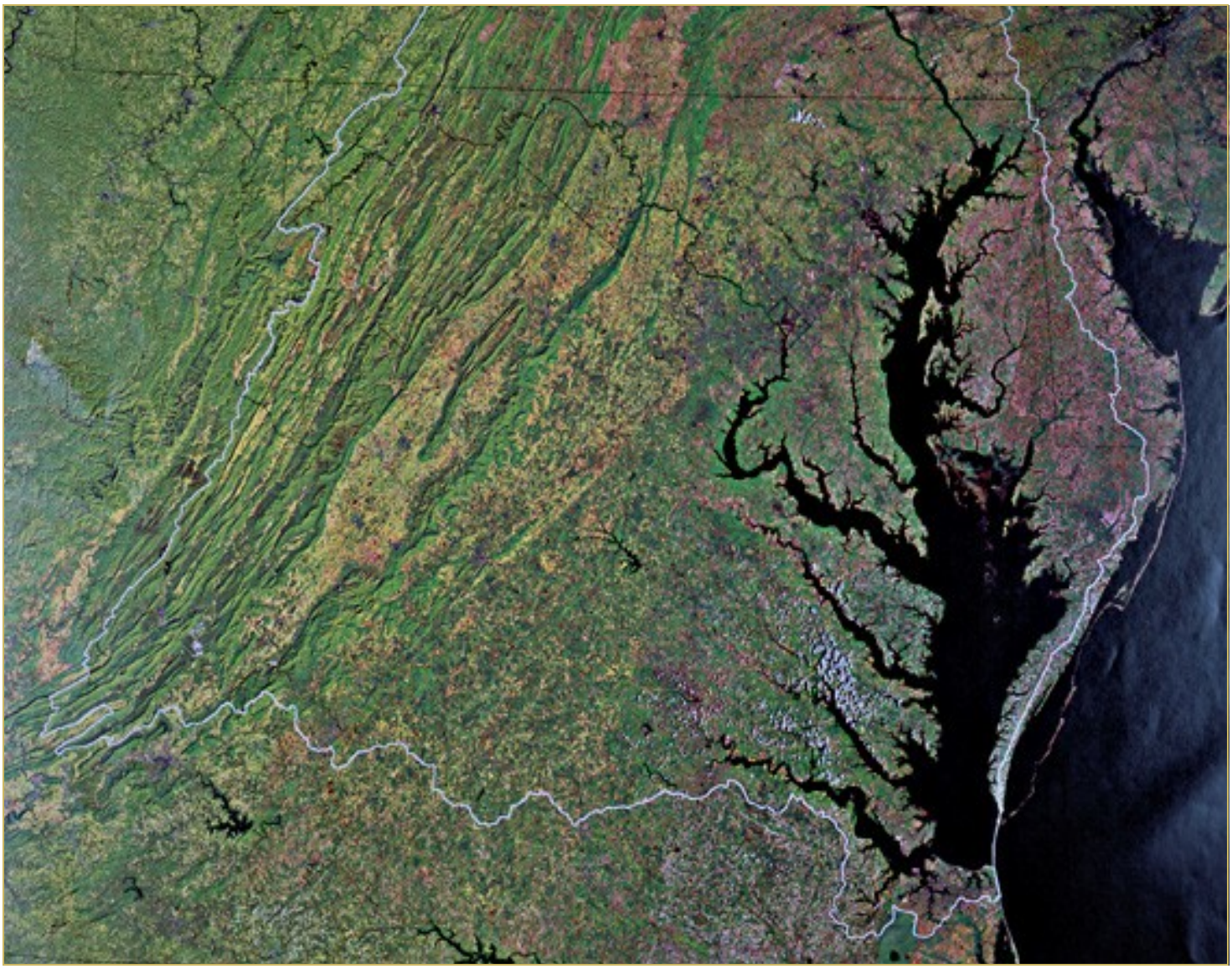
Because of changes at the state level, local codes and ordinances are, in most cases, not adequate to address the impact of development and stormwater pollution. This report confirms that many localities do not have LID integrated into their codes. If development occurs without guidance to shape its character, streams are placed in jeopardy. This report recommends code changes that will allow Virginia localities to take advantage of the cost savings earned by putting in place codes and ordinances that decrease stormwater pollution (and thus save the inherent high cost of stream rehabilitation and cleanup).

The Solution: Low Impact Development

In cities and suburbs, water quality protection hinges on the development planning process and execution of that plan. Many of these local development codes that direct the planning process were not initially drafted as environmental regulations at all, but have a tremendous influence on the impact that development has on water quality.

Low Impact Development (LID) practices emulate the natural hydrology of an area. By establishing codes and ordinances that remove barriers to and encourage the use of LID, and fostering greater implementation of LID techniques, substantial amounts of nutrient and sediment polluted runoff can be prevented from entering local Virginia streams and rivers.

Now is the time for action. The new stormwater regulations must be fully implemented by localities by July 2012. These revisions were established in state code in September 2011 and will be fully implemented by July 2014. The new regulations offer developers choices and more flexibility to determine which LID practices best abate stormwater on their development projects. Virginia success then, relies on how well local governments weild the tools to deal with decreasing stormwater pollution. Though this report identifies deficiency in inclusion of LID principles in many local development codes, it also highlights what localities have already done to do just this and identifies opportunities within each locality that improvements can be made. All local streams reap the benefits of new regulations that better protect and improve water quality.



Scientific studies show that the Chesapeake Bay and its ecosystem have been fundamentally altered by human activity. The Chesapeake Bay and its tributaries are listed on the EPA's "dirty waters" list.[1] The impaired watershed recently scored 45%—a failing grade—on the Chesapeake Bay Program's Bay Barometer.[2] Pollution in the form of nitrogen, phosphorus, and sediment causes the most harm to the watershed and to ecological integrity and ecosystem services to the region. These pollutants cloud the water, blocking sunlight from vital underwater grasses, fouling critical aquatic habitat for fish, and fueling harmful algae growth that can be toxic to aquatic life and even humans. As algae blooms die, the resulting decomposition consumes vast amounts of oxygen from the water, leaving little to support aquatic life.

Project Approach

This report identifies opportunities for ordinance changes to protect water quality from impacts caused by land development. Local LID policies and ordinances are not required for the nontidal Bay watershed localities. The results outlined in this report will help position these localities and provide tools to more efficiently implement new state stormwater regulations as well as position themselves to perform better in the face of unknown outcomes with the Chesapeake Bay TMDL (total maximum daily load), local TMDLs, and MS4 permits. The Bay TMDL has the potential to drive how stormwater will be managed from point sources and non-point sources, thereby necessitating localities to take action, such as revising land development ordinances.

This project was built on the past work of the partners to create a more consistent and effective means for promoting LID practices and policies. James River Association conducted score card assessments of localities in the James River basin in 2006 and Friend of the Rappahannock has conducted similar assessments in localities in the Rappahannock River basin over the last decade. Additionally, Potomac Conservancy has sponsored local policy initiatives in targeted localities in the Potomac.

The population of Virginia is predicted to increase dramatically in the next 40 years. New development, homes, roads, and infrastructure are unavoidable with population growth. Incorporating the actions recommended in this report is critical as these rules will shape the character of that development having impacts that will last for decades in not centuries.

To assess the degree to which LID principles are allowed or encouraged in localities, the Project Team coordinated an analysis of the codes and ordinances for the 41 cities and counties in the non-tidal portion of Virginia's Chesapeake Bay watershed. This analysis, performed in conjunction with the Virginia Department of Conservation and Recreation's (DCR) analysis of the tidal localities within the Chesapeake Bay watershed, is a significant first step in increasing awareness and understanding of these techniques as well as increasing their use.

To guide the locality ordinance review for 41 non-tidal Bay jurisdictions in Virginia, the partners modified DCR's *Checklist for Advisory Review of Local Ordinances* (see Appendix). Given the scale of this undertaking, the project team developed an innovative and productive partnership with three universities to conduct graduate level courses during the spring 2011 college semester. Approximately 50 graduate students in urban planning and environmental policy fields at the University of Virginia, George Mason University and Virginia Commonwealth University participated. Working with a professor with expertise in watershed management and land use planning, each student or team of students analyzed a particular locality. To assist them in the analysis, students contacted local planning officials to ensure the applicable codes and ordinances were identified.

The project team and the professors of the partnering universities provided oversight and guidance to the students throughout the semester to ensure quality control. Before conducting the ordinance assessment, the students first researched their selected locality to understand its character, development patterns, growth pressures and goals for future land use. Students also reviewed the locality comprehensive plans and interviewed their local planning contacts to identify the goals and priorities for the locality related to development, land use and water quality.

Because it is difficult for one person, such as a student, to ensure he/she conducted a thorough review of a locality's codes and ordinances, which are typically voluminous, the partners conducted a quality control review of the student results. First, we provided the students' reports to all localities and requested that locality staff review and

revise the results as needed. Several localities submitted revisions to the students' reports. For localities that did not submit revisions, partner staff reviewed the students' reports and corrected misinterpretations and omissions. Although the partners took great strides to produce credible checklist results, it is feasible that a small number of ordinances may have been omitted from the final checklist results.

The Checklist

In recognition of the critical role that local ordinances play in cleanup of the Chesapeake Bay, The Virginia Department of Conservation and Recreation (DCR) developed an advisory checklist for local ordinances (see Appendices). This checklist was originally intended for the 84 localities in Virginia covered under the Chesapeake Bay Preservation Act. DCR currently is completing the initial advisory assessments for Chesapeake Bay Act jurisdictions. This report extends the checklist review to localities not subject to the Chesapeake Bay Preservation Act. (i.e., nontidal localities).

The data collected using the checklist is divided into five categories. Each section is focused on a LID principle and determines whether a locality has established ordinance provisions that can accomplish the stated objective.

- *Minimization of Land Disturbance* – The manner in which sites are designed can help preserve the natural features of the landscape and reduce stormwater pollution. Clustering homes and buildings or reducing setbacks and frontages can minimize land disturbance.
- *Preserving Vegetation* – Retaining forests and meadows, particularly along streams and other water bodies, can significantly reduce stormwater runoff and help filter out pollutants before they enter water bodies.
- *Minimizing Impervious Cover* – The transportation network associated with development creates large amounts of paved, impervious surfaces that contribute to stormwater runoff and pollution. The impact of roads and parking lots on water quality can be reduced by minimizing their width and length, reducing the number of parking spaces required, avoiding curbs and gutters, and encouraging stormwater infiltration and treatment areas.
- *General Water Quality Protection* – In addition to guiding how specific sites are developed, localities also have the ability to guide where development occurs within their jurisdiction. This section of the checklist reviews how a locality manages its land through agricultural or forestal districts, purchase/transfer of development rights programs and other mechanisms which have the ability to protect local waters.
- *Nontidal Locality Supplement* – In Virginia, local governments play an important role in preventing pollution through stormwater management programs, erosion and sediment control, and septic regulation. Virginia's Chesapeake Bay Preservation Act acknowledges this fact, but the Act only applies to localities that touch tidal waters. This section was developed by the Project Team for non-tidal localities, to address the elements of Virginia's Chesapeake Bay Preservation Act.

Locality Classification

This analysis follows the 2005 classification of the James River by the Center for Watershed Protection (CWP). Classifications were provided for counties and a number of cities due to their local control of land areas in the watershed. The goal of the classification, referred to as a vulnerability analysis, is to categorize each municipality using factors such as level of urbanization and growth pressure to identify watershed goals and strategies that are most appropriate for communities falling within each category. After evaluating the data, CWP ranked each county or city according to the indicators of urbanization and growth shown below.

Table 1 summarizes the results of the categorization process. For each management category, generic watershed planning goals and tools are suggested based on current land use and anticipated watershed concerns related to growth pressure. For instance, a county with high development pressure but relatively low existing development may want to focus on watershed based planning to direct development to appropriate or designated areas, while identifying important resource or conservation areas. Other tools to protect streams and receiving waters in these counties may include enacting strong buffer ordinances, improving stormwater and erosion control programs (including enforcement), and code revisions to promote better site design.

Table 1. Locality Classification. By grouping the localities within their land use classifications, we can better compare what works in one place that might have benefit to a similar site with a lower score in that practice area.

URBAN

Urban Highly Vulnerable localities have a significant amount of existing development combined with projections for continued development.

SUBURBAN

Suburban Highly Vulnerable localities were the top population gainers between 2000 and 2010, with significant development pressures likely continuing into the future.

Suburban Vulnerable localities exhibit a moderate level of existing development and a moderate level of current development pressure. Population projections often indicate future growth.

RURAL

Rural Highly Vulnerable localities have limited existing development and have experienced moderate to high development pressure to date. Population projections indicate significant future growth.

Rural Vulnerable localities have limited existing development and have experienced moderate development pressure to date. Population growth projections often indicate future growth.

Rural Low Growth localities have limited development with relatively low development pressure. Population growth is projected to be minimal and in several localities, a significant amount of acreage is already under some form of local, state, or federal protection.

Results

The scores ranged from a low of 3% to a high of 72% out of a possible 100%. The average score was 27%.

The results for the localities are presented in the Appendices. Key findings include the following:

- Scores ranged from 3% to 72%.
- Average watershed score was 27%.

Each locality did well in at least one area and each had room for improvement. Interestingly, 75 of the 76 principles were met by at least one of the localities.

- Incorporating the best codes from all of the localities would achieve a score of 98.6%.
- Rural localities generally scored lower because they have not had the need to address many of the principles; thus, they do not have certain codes in place.
- Flexibility with Virginia Department of Transportation standards can improve the scores of a vast majority of localities.

Staff from each of the localities was provided with the results, which spurred a lot of discussion among and between local government officials as well as state, federal, and non-government organizations.

Each principle was scored and points were awarded on the checklist. The overall score provides a general indication of the locality's ability to support LID. The overall score is based on 76 possible points. The final score for each locality is generally based on the total points earned divided by the total points possible and multiplied by 100 to obtain a percentage.

Because the watershed localities are so varied in terms of need and capacity building, the Project Team separated the localities into categories to help with the analysis. These categories take into consideration levels of urbanization, population growth, and development pressure. The five classifications derived from various data sources include Urban Highly Vulnerable, Suburban Highly Vulnerable, Suburban Vulnerable, Rural Highly Vulnerable, Rural Vulnerable and Rural Low Growth.

Local Snapshots

Minimizing Land Disturbance

Madison County, a rural locality in the Blue Ridge Mountains, has established conservation districts that protect fragile natural resources from intensive residential/urban development and also limits the rate of future, less intensive development (no parcel can be subdivided into more than 4 lots within any 10 year period). These districts were established to "facilitate the conservation of water, timber, and other natural resources, reduce soil erosion, protect upland watersheds, lessen the hazards of flood and fire, and enhance existing and future farming operations." The district covers steep slopes (defined as >15%), hardwood forests, areas of erosive soils, and elevations of greater than 800 feet above sea level. Madison additionally protects 50-foot buffers along streams from land disturbance activities.

Hanover County also minimizes land disturbance through ordinance provisions for:

- Prohibiting land disturbance on steep slopes, floodplains and wetlands;
- Requiring documentation of RPAs, wetlands, ponds, streams, soil types, woodlands, and vegetation described by type, age and condition;
- Allowing design flexibility to provide an incentive to develop cluster residential development with open space.

Locality Scores and Recommendations

RURAL LOW GROWTH

Locality	Score	Classification Characteristics and Recommendations
Madison County	38%	Characteristics: Limited development with relatively low development pressure. Population growth is projected to be minimal and in several localities, a significant amount of acreage is already under some form of local, state, or federal protection. Recommendations: · Local conservation easement program or partnership · Natural resource protection in open space · Septic pump-out requirements
Rappahannock County	25%	
Appomattox County	21%	
Buckingham County	5%	
Highland County	3%	
Rockbridge County	20%	
Botetourt County	14%	
Amherst County	22%	
Craig County	5%	
Alleghany County	9%	
Bath County	18%	
Page County	7%	
Nelson County	18%	

RURAL VULNERABLE

Locality	Score	Classification Characteristics and Recommendations
Orange County	18%	Characteristics: Limited existing development and have experienced moderate development pressure to date. Population growth projections often indicate future growth. Recommendations: · Cluster ordinance including resource protection · Conservation corridors · Adoption of maximum road width standards
Shenandoah County	30%	
Fauquier County	67%	
Fluvanna County	25%	
Prince Edward County	13%	
Cumberland County	21%	
Amelia County	13%	
Albemarle County	46%	
Augusta County	30%	
Rockingham County	37%	

RURAL HIGHLY VULNERABLE

Locality	Score	Classification Characteristics and Recommendations
Louisa County	29%	Characteristics: Limited existing development and have experienced moderate to high development pressure to date. Population projections indicate significant future growth. Recommendations: · Strong erosion and sediment control requirements, such as a lower threshold for compliance · Stream buffer requirements · Integration of natural drainage patterns in site design
Powhatan County	30%	
Greene County	12%	
Goochland County	36%	
Frederick County	24%	
Culpeper County	72%	
Warren County	30%	

SUBURBAN VULNERABLE

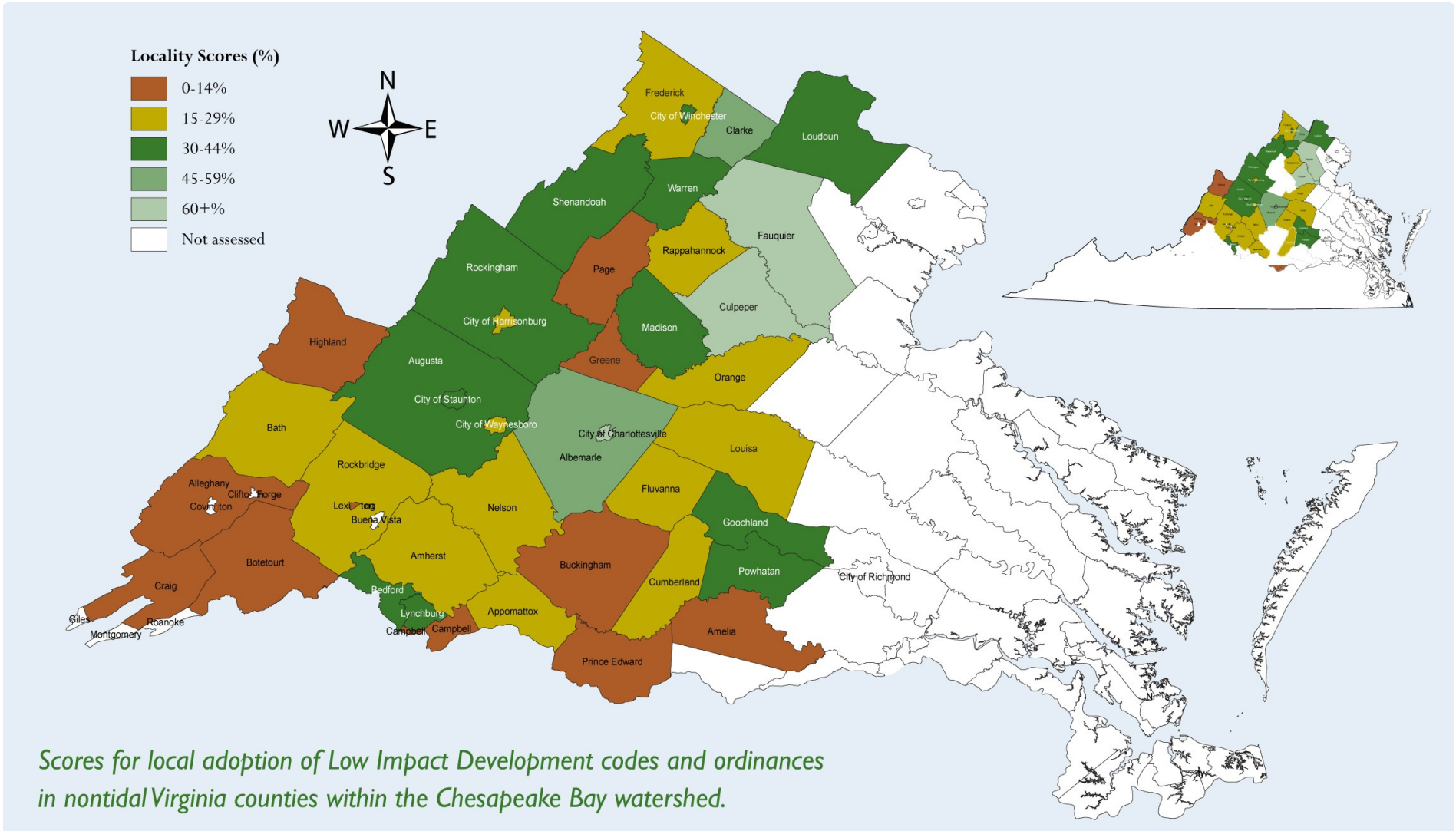
Locality	Score	Classification Characteristics and Recommendations
City of Waynesboro	24%	Characteristics: Exhibit a moderate level of existing development and a moderate level of current development pressure. Population projections often indicate future growth. Recommendations: · Purchase or Transfer of Development Rights programs · Maximum parking requirements · Construction footprint requirements
Campbell County	13%	
City of Staunton	33%	
Clarke County	51%	
City of Charlottesville	67%	
Bedford County	36%	
City of Lexington	14%	

SUBURBAN HIGHLY VULNERABLE

Locality	Score	Classification Characteristics and Recommendations
City of Lynchburg	37%	Characteristics: Top population gainers between 2000 and 2010, with significant development pressures likely continuing into the future. Recommendations: · Tree protection ordinance and/or tree canopy goal · Natural resource assessment as a part of development pre-application process · Shared parking requirements
Loudoun County	42%	

URBAN HIGHLY VULNERABLE

Locality	Score	Classification Characteristics and Recommendations
City of Winchester	30%	Characteristics: Significant amount of existing development combined with projections for continued development. Recommendations: · Redevelopment incentives · Impervious surface reduction with redevelopment · Rainwater harvesting
City of Harrisonburg	21%	



Scores for local adoption of Low Impact Development codes and ordinances in nontidal Virginia counties within the Chesapeake Bay watershed.

Preserving Indigenous Vegetation

Tree preservation ordinances can be a key tool for preserving indigenous vegetation. The City of Charlottesville has established minimum tree canopy cover percentages per district that varies from 10-20%. Additionally, many localities adopt ordinance provisions that allow indigenous or existing trees to be used as credit towards landscaping requirements.

Although not a locality regulated by the Chesapeake Bay Preservation Act, Charlottesville adopted a progressive ordinance to protect 100-foot wide riparian buffers of indigenous vegetation from future development along the City's main tributaries to retard runoff, prevent erosion, and filter nonpoint source pollution.

Minimizing Impervious Cover

Fauquier has adopted a progressive ordinance to reduce impervious cover associated with redevelopment projects:

> "All redevelopment projects not served by an existing water quality BMP shall either reduce existing site impervious areas by 20% or implement water quality BMP's to reduce pre-redevelopment pollution loads of the existing site by 10%."

In the standard language in the Chesapeake Bay Preservation Ordinance adopted by Bay Act localities, impervious cover is limited to:

> "… 60 percent of the site, unless it can be demonstrated that the project will have the same impact on water quality as the project would have if it were 60 percent impervious [James City County]."

To reduce impervious cover on a site, some localities have adopted ordinances or design manuals allowing the use of bioretention areas, a low impact development practice using native plants and soil conditioning to manage stormwater runoff.

General Water Quality Protection

For allowable development within the Southern Watersheds boundaries, the following provisions also apply:

Locality Trends – Rural

Rural Low Growth

Example Localities: Craig, Rappahannock

Criteria	Average Local Scores
Minimize Land Disturbance	23%
Preserve Indigenous Vegetation	14%
Minimize Impervious Cover	13%
General Water Quality Protection	15%
Low-Impact-Development	16%

Recommendations:

- **Conservation easements**
- **Land acquisition – Conservation easements and land acquisition can protect land that provide substantial environmental services including the infiltration of stormwater and the protection of streamside areas**
- **Cluster ordinance – Can allow for the same level of density as conventional development protect maintain natural landscapes**
- **LID Stormwater Provisions**

Rural Vulnerable

Example Localities: Fluvanna, Shenandoah

Criteria	Average Local Scores
Minimize Land Disturbance	36%
Preserve Indigenous Vegetation	33%
Minimize Impervious Cover	26%
General Water Quality Protection	20%
Low-Impact-Development	33%

Recommendations:

- **Strengthened Erosion & Sediment Control – critical in protecting the environment during construction and development**
- **Identify and protect sensitive areas – prior to planning, identifying critical areas is a part of the better site design process.**
- **Better Site Design Criteria implementation**

Locality Trends –Suburban

Suburban Vulnerable

Example Localities: Waynesboro, Clarke

Criteria	Average Local Scores
Minimize Land Disturbance	37%
Preserve Indigenous Vegetation	39%
Minimize Impervious Cover	29%
General Water Quality Protection	33%
Low-Impact Development	58%

Recommendations:

- **Purchase/Transfer of Development Rights – Allows a land owner to continue to use their land and protect from future development**
- **Special Stormwater Criteria**
- **Watershed Stewardship Programs**
- **Stream Restoration Program**
- **Stormwater Retrofits**

Suburban Highly Vulnerable

Example Localities: Loudoun, Lynchburg

Criteria	Average Local Scores
Minimize Land Disturbance	47%
Preserve Indigenous Vegetation	25%
Minimize Impervious Cover	25%
General Water Quality Protection	42%
Low-Impact-Development	82%

Recommendations:

- **Redevelopment Incentives**
- **Stormwater Source Controls**
- **Green Streets Requirement**
- **Stream Restoration Program**

Locality Trends – Urban

Urban Highly Vulnerable

Example Localities: Winchester, Harrisonburg

Criteria	Average Local Scores
Minimize Land Disturbance	26%
Preserve Indigenous Vegetation	19%
Minimize Impervious Cover	21%
General Water Quality Protection	17%
Low-Impact-Development	50%

Recommendations:

- **Redevelopment Incentives**
- **Stormwater Source Controls**
- **Green Streets Requirement**
- **Stream Restoration Program**

- Runoff shall approximate the rate of flow and timing that would have occurred under predevelopment conditions and, to the extent practicable, natural conditions;
- The natural hydrodynamic characteristics of the watershed shall be maintained to the greatest extent practicable;
- The quality of surface waters and groundwater (and its level) shall be protected;
- Injury to plant and animal communities and adverse impacts upon fish and wildlife habitat shall be minimized.

To ensure that the watersheds are protected as outlined by this ordinance, a developer must submit a Southern Watersheds Management Plan prior to any land-disturbing activity being approved.

Promoting Low Impact Development

Within Virginia, many localities allow the use of LID practices, at least operationally, for stormwater management on sites. A subset of localities has adopted ordinances specifically stating that LID or a particular LID practice is allowable, but most localities' ordinances do not promote LID.

An exception is Culpeper County. Recently, Culpeper adopted a strong and progressive Stormwater Management Ordinance that *promotes* LID:

> "LID shall be considered prior to conventional stormwater management… The use of low-impact development… shall be evaluated as the first option to control stormwater runoff at the source and more closely approximate predevelopment runoff conditions. LID site design is intended to maximize conservation of open space, minimize impervious area, and manage the increase in runoff volume…"

To ensure that LID is used to the maximum extent practicable, the County and/or the Culpeper Soil & Water Conservation District require a LID Natural Resource Assessment meeting with the developer. The objective of approximating the predevelopment conditions is cited as important for reducing flooding, siltation, stream bank erosion, and property damage.

Culpeper also provides a LID design manual outlining appropriate practices. And encouragingly, Culpeper further specifies that stream buffers should be "retained where present or established where absent." The buffer width varies with the waterway: no less than a 100 feet on rivers, no less than 50 feet on perennial streams, and no less than 25 feet on ephemeral/intermittent streams. Additionally, no indigenous vegetation shall be disturbed or removed in these buffers.

Although Albemarle County does not specifically name LID in their Water Protection Ordinance (*which "protects paramount public interests"*), they do allow non-structural measures to meet stormwater management requirements, including minimization of impervious surfaces, stream buffer reforestation, providing additional stream buffer areas, wetland restoration, waste reuse and recycling, and development design that reduces the rate and volume of runoff. Clearly, some of these measures follow the principles of low impact development. Similar to Culpeper County, Albemarle also has adopted provisions to protect stream riparian buffers anywhere from 25 feet (in agricultural lands) to 100 feet wide (in water supply protection zones), and 200 feet surrounding public water supply impoundments.

LID practices such as raingarden installations are an important part of any project.

Shown here is a raingarden at Belle Grove Historic Plantation near Middletown, Virginia.

Conclusion

Within Virginia, many localities allow the use of LID practices for stormwater management, but most local ordinances do not promote LID and many contain hurdles to its implementation. With the Commonwealth's adoption of new stormwater regulations which call for the implementation of LID, local ordinances need to be amended to incorporate LID in to site design. The results of this assessment provide the information necessary for localities to begin incorporating LID into their ordinances and helps prepare them for the implementation of the new stormwater regulations.

Local review results are presented on the previous page. Scores ranged from 3% to 72%, with an average score of 27%. Each locality did well in at least one area and each had room for improvement.

- All of the 76 LID principles were met by at least one locality, demonstrating that the incorporation of LID into local codes is achievable
- Open space provisions that protect sensitive lands were the most widely adopted standard
- The protection of vegetation is the largest gap in protecting local water quality
- Reducing street widths to Virginia Department of Transportation minimum standards can improve the scores of a vast majority of localities
- Low scoring localities are generally rural, which reflects current and historically low development pressure

By increasing awareness and understanding of LID principles at the local level, the results of the local assessment will hopefully assist localities in their preparedness for the new stormwater regulations and increase the adoption of LID into local codes and ordinances.

In recent years, many techniques and practices have been identified to reduce the impact of land development on streams and rivers while still meeting other social and economic goals. These environmentally sensitive development practices include minimizing impervious surfaces (pavement, rooftops, etc.) to reduce runoff, clustering development to preserve more open space, protecting riparian areas that act as natural filters, and directing stormwater to localized infiltration areas rather than channeling it directly to storm drains. Local codes and ordinances play a major role in determining the extent to which these techniques are applied; and it is the local codes and ordinances that have been identified as the greatest impediments to environmentally sensitive development.

Potential benefits to the natural environment, the economy, and the community at large include:

- Protection of water quality of local streams, lakes, and estuaries[1]
- Reduced pollutant loads in stormwater
- Reduced erosion during construction
- Reduced development costs[2]
- Increased property values[3]
- Creation of more pedestrian-friendly neighborhoods
- Provision of open space for recreation

- Allowance for more sensible locations for stormwater facilities
- Protection of sensitive forests, wetlands, and habitats from clearing
- Increased local property tax revenues
- Jobs[4]

To help localities that would like to improve their score and encourage conservation, the Project Team has assembled a database of LID ordinance provisions from across Virginia's Bay watershed, and developed recommendations, based on implemented ordinances from a reviewed locality, for each focus area of the checklist. The database is available online at www.potomac.org, www.friendsoftheriver.org, and www.thejamesriver.org.

1 http://www.ces.ncsu.edu/depts/agecon/WECO/transylvania/WECO_LID_econ_factsheet.pdf

2 see: http://www.stormh2o.com/SW/Articles/CostEffective_LID_in_Commercial_and_Residential_De_13839.aspx?cpsys_redirect=404)

3 see: MacMullan, Ed; Sarah Reich. The Economics of Low-Impact Development: A Literature Review. ECONorthwest. November 2007.www.econw.com

4 http://www.cbf.org/document.doc?id=1023

Resources

Center for Watershed Protection (1998). Better Site Design: A Handbook for Changing Development Rules in Your Community. Available online: http://www.cwp.org/Resource_Library/Better_Site_Design/#guidebooks. http://www.chesapeakebay.net/status_bayhealth.aspx

James River Association (2009). Low Impact Development Policy Manual. James River Association (2008). State of the James River 2007. Available online: http://www.jamesriverassociation.org/what-we-do/Publications/state-of-the-james.pdf

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Kloss, Christopher and C. Calarusse (2006). Rooftops to Rivers: Green Strategies for Controlling Stormwater and Combined Sewer Overflows. Natural Resource Defense Council. Available online: http://www.nrdc.org/water/pollution/rooftops/rooftops.pdf

Potomac Conservancy (2011) State of the Nation's River Report: One River, Two Worlds. Available online: http://www.potomac.org/site/wp-content/uploads/pdfs/ sonr11_finalreport.pdf

U.S. Environmental Protection Agency Office of Inspector General (2007). Development Growth Outpacing Progress in Watershed Efforts to Restore the Chesapeake Bay (Report No. 2007-P-00031). Available online: http://www.epa.gov/oig/reports/2007/20070910-2007-P-00031.pdf

Virginia Department of Environmental Quality (2008). Final 2008 305(b)/303(d) Water Quality Assessment Integrated Report. Available online: http://www.deq.state.va.us/wqa/ir2008.html

Appendices

I,

Locality Classification Indicators

Level of urbanization (based on Chesapeake Bay Program LULC data where urban land includes low, medium and high intensity urban land plus transportation land)

- Low = less than 5% urban land
- Moderate = 5 to 20% urban land
- High = greater than 20% urban land

Development pressure* (based on Chesapeake Bay Program development pressure data)

- Very low = the majority of cells in the municipality have a score of 1 (very low)
- Low = the majority of cells in the municipality have a score of 2 (low)
- Moderate = the majority of cells in the municipality have a score of 3 (moderate)
- High = the majority of cells in the municipality have a score of 4 (high)

Population growth rates (based on percent population growth for the period April 1, 2000-April 1, 2010 from the Weldon Cooper Center). Classification was based on the growth categories shown here: http://www.supportingevidence.com/Government/PopGrowthByCounty.html

- Losing = negative growth rate
- Low Growth = 0 to 10% growth rate
- Developing = 10 to 20% growth rate
- Developing Rapidly = greater than 20% growth rate

**Development pressure categories are taken directly from the Chesapeake Bay Program Vulnerability Model. The vulnerability layer evaluates the relative potential risk of future land conversion to urban uses. Vulnerability is defined as a function of suitability for development and proximity to growth "hot spots". The methods are based on factors such as travel time from hotspots of potential development. More information is found at: http://www.chesapeakebay.net/rla.htm*

II,

Virginia Department of Conservation & Recreation

State Parks • Soil & Water Conservation • Natural Heritage
Chesapeake Bay Local Assistance • Land Conservation
Outdoor Recreation Planning • Dam Safety & Floodplains

Checklist for Advisory Review of Local Ordinances In Non-Tidal Chesapeake Bay Localities

LOCALITY: ___

DATE OF REVIEW: ___
REVIEWER: ___

SUPPLEMENTAL REVIEW INFORMATION

LOCAL DOCUMENTS REVIEWED: ___

potomac conservancy

Friends of the RAPPAHANNOCK
Advocacy • Restoration • Education

JAMES RIVER ASSOCIATION

TRACKING SHEET:

Part 1 – Minimize Land Disturbance: **18 questions**

1A – Open Space Requirements: ___
1B – Clearing and Grading Requirements: ___
1C – Utility and Easement Requirements: ___
1D – LID/ Better Site Design Concepts: ___
1E – Other standards ___

Part 2 – Preserve Indigenous Vegetation: **18 questions**

2A – Sensitive Land Protection/Preservation: ___
2B – Vegetation and Tree Protection Requirements: ___
2C – LID/ Better Site Design Concepts: ___
2D – Other standards ___

Part 3 – Minimize Impervious Cover: **25 questions**

3A – Parking Requirements: ___
3B – LID/ Better Site Design Concepts: ___
3C – Redevelopment and Infill Development Concepts: ___
3D – Road Design Requirements: ___
3E – Pedestrian Pathways and Driveways: ___
3F – Other standards ___

Part 4 – General Water Quality Protection: 7 questions ___

Part 5 – Promoting Low-Impact-Development: 11 questions ___

CHECKLIST DESCRIPTION AND PURPOSE

This ordinance review tool was adapted from the Virginia Department of Conservation and Recreation (DCR) "Checklist for Advisory Review of Local Ordinances," which was developed as part of the implementation of the Chesapeake Bay Preservation Act (CBPA). DCR uses their checklist in the 84 jurisdictions within Virginia's Chesapeake Bay tidal areas. The non-tidal jurisdictions are not covered under the CBPA, and thus do not participate in the DCR review. This tool is intended to be used in all of the non-tidal Bay localities in Virginia.

The DCR Checklist was modified by staff at the James River Association, Friends of the Rappahannock, and Potomac Conservancy (the "Project Team") as part of a nutrient reduction project funded by the National Fish and Wildlife Foundation. This amended tool removes the emphasis on the CBPA, and instead focuses on the water quality principles and practices that non-tidal localities are implementing in their codes and ordinances. Some questions were modified to focus directly on the water quality intent; other questions were omitted if they only would apply in CBPA localities (omitted questions are shown with the text struck out, and should not be reviewed). Question numbering was maintained to allow for comparison with the DCR checklist. Additional questions are appended to capture issues not included in the CBPA.

HOW TO USE THIS CHECKLIST

This tool is organized into topic areas, as follows: 1) Minimizing land disturbance; 2) Preserving indigenous vegetation; 3) Minimizing impervious cover; 4) General water quality protection; and 5) Promoting Low-Impact-Development (LID). The questions in the first three parts are focused specifically on the section topic (i.e. land disturbance vs. indigenous vegetation vs. impervious cover), and similar questions in different sections should be answered with the target topic in mind. Part 4 includes prac-

tices and programs that may not fit neatly into one of the first three sections, but which can be important to protecting and improving water quality. Sections one through four have a catch-all question at the end to allow for responses that were not asked in detail in a prior question. Part 5 includes the questions added by the Project Team which focus on important low-impact development considerations not raised elsewhere. Questions in the different sections may appear similar, but will have a different emphasis in each section. Look to the *italicized terms* for some questions to determine the focal point.

Many questions ask about ordinances that "allow", "encourage", or "incentivize" a particular water quality practice. In all such questions, the intent is on practices that actually occur, not simply those that are theoretically possible but highly unlikely.

Graduate students from three universities (University of Virginia, Virginia Commonwealth University and George Mason University) will be trained in the use of this assessment tool, and will provide responses to the questions with the voluntary assistance of staff from each locality. The student(s) ideally will work closely with the locality staff since the staff's knowledge is key to ensuring the Checklist is completed with the best available information. The student(s) and staff can form an assessment team to review the local government ordinances, and other documents that have been adopted by the local governing body, to determine which of the measures within the Checklist are included in local ordinances. Ordinances typically can be located through the locality's website or other online services. If a locality chooses to not voluntarily assist with this assessment tool, the student(s) still can proceed with the ordinance review. Additionally, the student(s) should review all ordinance provisions even when directly provided by the locality staff to ensure accuracy.

Critical information needed for each question:

- The name and citation for the ordinance or other policy document. Follow the same notation that each locality uses.
- Provide the hyperlink to precisely where the ordinance citation is located on the web. (Most codes and ordinances are provided on the web; thus, it is possible to provide the hyperlink. This will allow the Project Team and DCR to quickly find the appropriate language.)
- Extensive notes when possible for each question regarding such factors as:
    - Paraphrasing of the relevant ordinance provision
    - If no ordinance exists, does the locality still conduct the practice operationally? (this can be assessed by interviewing the locality staff)
    - If no ordinance exists, are there related ordinances that partially address the question?

PART 1: MINIMIZE LAND DISTURBANCE – 18 QUESTIONS

The minimization of land disturbance can be accomplished through the application of four general techniques included below as four sections. Each of these general techniques is presented below, with examples of more specific requirements that minimize land disturbance. Additionally, space has been provided for the locality to include other options not currently listed.

Section 1A - Open Space Requirements – 3 questions

What is the definition of "open space" used by the locality and where is this definition located?

Definition: ___

Ordinance name and citation: ___

Is there an ordinance provision, or other adopted document that requires a certain portion or percentage of *undisturbed* (i.e. natural, vegetated) open space as part of zoning district requirements?

Yes No

Ordinance name and citation: ___

Other adopted document ___

Zoning Districts and required percentages: ___

Notes: ___

Is there a cluster ordinance, other ordinance provision, or other adopted document that allows flexibility for development intensity or density (through cluster developments, height flexibility, density bonus, etc.) *in exchange for* increased resource protec-

tion (open space, preservation of natural, undisturbed buffers, etc.)?

Yes No
Ordinance name and citation:___
Other adopted document:___
Notes: ___

3. Do open space or other requirements within an ordinance, or other adopted document, protect sensitive lands from disturbance?

- Wetlands Yes No
- Steep slopes Yes No
- Perennial stream banks Yes No
- Intermittent streams Yes No
- Highly erodible soils Yes No

Floodplains Yes No
Ordinance name and citation:___
Other adopted document:___
Notes: ___

Section 1B - Clearing and Grading Requirements – 8 questions

Is there an ordinance provision, or other adopted document, that requires that all clearing and grading plans or equivalent (including individual lots) specify limits of clearing *and* restricts clearing to the minimum necessary for the construction of the project?

Yes No
Ordinance name and citation:___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document, that authorizes staff to establish limits on clearing and grading?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that includes a definition of "construction footprint" and limits clearing and grading to the construction footprint?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Example definition: Construction footprint means the area of all impervious surfaces, including but not limited to buildings, roads and drives, parking areas, sidewalks and the area necessary for construction of such improvements.

Is there an ordinance provision, or other adopted document that requires sensitive features to be physically marked on-site prior to any clearing and/or grading and throughout the development process?

- Wetlands Yes No
- Steep slopes Yes No

- Perennial stream banks Yes No
- Intermittent streams Yes No
- Highly erodible soils Yes No

Floodplains Yes No

Ordinance name and citation:___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document that requires the limits of clearing and grading to be physically marked on-site?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

9. Is there an ordinance provision, or other adopted document, that requires documentation of the condition of sensitive features to be provided before and after development?

- Wetlands Yes No
- Steep slopes Yes No
- Perennial stream banks Yes No
- Intermittent streams Yes No
- Highly erodible soils Yes No

Floodplains Yes No

Ordinance name and citation:___
Other adopted document:___
Notes: ___

10. Is there an ordinance provision, or other adopted document, that prohibits clearing and grading on sensitive lands?

- Wetlands Yes No
- Steep slopes Yes No
- Perennial stream banks Yes No
- Intermittent streams Yes No
- Highly erodible soils Yes No

Floodplains Yes No

Ordinance name and citation:___
Other adopted document:____
Other lands:___
Notes: ___

11. *Question Removed*. Is there an ordinance provision that designates other sensitive lands, such as steep slopes, highly erodible soils, non-RPA nontidal wetlands, etc. as RPA features?

- Wetlands Yes No
- Steep slopes Yes No
- Intermittent streams Yes No
- Highly erodible soils Yes No
- Floodplains Yes No

Other lands_____ Yes No

Yes No

Ordinance name and citation:___

Other adopted document:___

Section 1C - Utility and Easement Requirements (Public and Private) – 3 questions

For the purposes of this checklist, public utilities mean those outlined under Section 9 VAC 10-20-150 B 2 of the Regulations: "Construction, installation and maintenance of water, sewer, natural gas, and underground telecommunications and cable television lines, owned, permitted or both by a local government or regional service authority…"

Is there an ordinance provision, or other adopted document, that requires approval of utility installation plans, including temporary construction areas, prior to land disturbance?

Yes No

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

Is there an ordinance provision, or other adopted document, that requires a replanting plan, other than stabilization required for erosion and sediment control, when vegetation is removed for temporary construction easements?

Yes No

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

Is there an ordinance provision, or other adopted document, that allows or requires the placement of public utilities within the right-of-way for public or private roads or alleys, when present?

Yes No

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

Section 1D - Low Impact Development /Better Site Design Concepts – 3 questions

For the purposes of this checklist, Low Impact Development (LID) includes those practices that combine hydrologically functional site designs with pollution prevention measures to compensate for land development impacts on hydrology and water quality.

Does the locality provide incentives for retaining natural, undisturbed open space on a site? These incentives may include intensity or density bonuses, stormwater credit, etc.

Wetlands	Yes	No
Perennial stream banks	Yes	No
Intermittent streams	Yes	No
Steep slopes	Yes	No
Highly erodible soils	Yes	No
Floodplains	Yes	No

Other lands: ___ Yes No

Types of incentives provided: ___

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

Do local ordinance provisions, or other adopted documents, encourage the implementation of LID practices *that limit land disturbance*?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Are there ordinance provisions or other adopted documents that require the incorporation of existing drainage ways and the integration of natural drainage patterns into site drainage plans?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Section 1E - Other Standards

Are there other ordinance provisions, or other specific standards in other adopted documents that effectively limit land disturbance?

Yes No
Ordinance names and citations:___
Other adopted document:___
Other standards: ___
Notes: ___

PART 2 - PRESERVE INDIGENOUS VEGETATION – 18 QUESTIONS

The preservation of indigenous vegetation can be accomplished through the application of three general techniques included below as three sections. Each of these general techniques is presented below, with examples of more specific requirements that minimize land disturbance. Additionally, space has been provided for the locality to include other options not currently listed.

Section 2A - Sensitive Land Protection/Preservation – 9 questions

Is there an ordinance provision, or other adopted document, that requires conservation areas or corridors (i.e. greenways, green infrastructure corridors, green belts, etc.)?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

20. Is there an ordinance provision, or other adopted document, that requires riparian vegetated buffers adjacent to water bodies or wetlands? If so, what is the minimum width of the buffer?

Wetlands Yes No
Perennial stream banks Yes No
Intermittent streams Yes No
Floodplains Yes No
Other lands: ____ Yes No
Ordinance name and citation: ___
Other adopted document: ___
Minimum buffer width:___
Notes: ___

Is there an ordinance provision, or other adopted document, that requires the permanent marking of the riparian vegetated buffer boundaries and if so, to which zoning districts does this apply?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Zoning Districts: ___
Notes: ___

Question Removed. Is there an ordinance provision, or other adopted document, that requires a portion of open space, other than RPAs, to be left in a natural, vegetated condition?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Percentage to be left natural:_____

23. Is there an ordinance provision, or other adopted document, that requires a building setback from sensitive area boundaries? Yes No

- Wetlands Yes No
- Perennial streams Yes No
- Intermittent streams Yes No
- Steep slopes Yes No
- Highly erodible soils Yes No
- Floodplains Yes No

Other lands: ___ Yes No
Ordinance name and citation: ___
Other adopted document: ___
Setback width: ___
Notes: ___

Question Removed. Is there an ordinance provision, or other adopted document, that requires a building setback from other sensitive lands such as intermittent streams and non-RPA nontidal wetlands?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Setback width: ___
Sensitive lands protected: ___

Is there an ordinance provision, or other adopted document, that requires the preservation of indigenous vegetation on sensitive lands?

Steep slopes	**Yes**	**No**
Highly erodible soils	**Yes**	**No**
Floodplains	**Yes**	**No**
Wetlands	**Yes**	**No**

Ordinance name and citation:___
Land types protected:- ___
Notes: ___

Is there an ordinance provision, or other adopted document, that limits removal of indigenous vegetation for temporary construction easements for utilities?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that limits removal of indigenous vegetation for maintenance of utility easements?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Section 2B - **Vegetation and Tree Protection Requirements – 7 questions**

Does the locality have a tree protection ordinance that protects existing trees (if permitted by state law)?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Are there ordinance provisions, or other adopted documents, that include more specific tree preservation requirements for the preservation of stands of trees or contiguous wooded areas?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that awards credit for maintaining indigenous vegetation when meeting landscaping requirements?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

31. Is there an ordinance provision, or other adopted document, that requires vegetated buffers adjacent to wetlands, streams or other water bodies be left undisturbed? If so, what is the minimum buffer width?

Wetlands Yes No
Perennial streams Yes No
Intermittent streams Yes No
Floodplains Yes No
Other lands_____ Yes No
Ordinance name and citation: ___
Other adopted document: ___
Minimum buffer width:___
Notes: ___

Is there an ordinance provision, or other adopted document, that includes clear language to protect woody vegetation outside of the construction footprint on individual lots or development sites?

Yes No
Ordinance name and citation: ___
Other adopted document: ___

Notes: ___

Is there an ordinance provision, or other adopted document, that requires a landscape maintenance agreement or similar mechanism to protect indigenous vegetation to be preserved on site throughout the construction process?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that requires the preservation of indigenous vegetation in open space as a component of cluster development?

Yes No
Ordinance name and citation:___
Other adopted document:___
Notes: ___

Section 2C - Low Impact Development/Better Site Design Concepts – 1 question

Is there an ordinance provision, or other adopted document, that requires a natural resources (or environmental) assessment as the initial part of the plan of development review process (i.e. pre-submission/ pre-application requirement for site plans, preliminary subdivision plats, etc.) and uses this information in the review of proposed projects to *limit the impacts on natural resources*?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Section 2D - Other Standards

Are there other ordinance provisions, or other specific standards in other adopted documents that effectively preserve indigenous vegetation?

Yes No
Ordinance names and citations:___
Other adopted document:___
Other standards: ___
Notes: ___

Part 3 - Minimize Impervious Cover – 25 questions

The minimization of impervious cover can be accomplished through the application of five general techniques included below as five sections. Each of these general techniques is presented below, with examples of more specific requirements that minimize land disturbance. Additionally, space has been provided for the locality to include other options not currently listed.

Section 3A - Parking Requirements – 11 questions

For the purposes of this evaluation, the Department considers gravel, asphalt, concrete, and other hard-packed surfaces to be impervious.

Is there an ordinance provision, or other adopted document, that sets *maximum* parking space requirements for some or all zoning districts?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Applicable zoning districts: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that encourages or requires the use of alternative pervious surfaces for required parking and/or overflow parking areas?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Are there ordinance provisions, or other adopted documents, that encourage shared and off-site parking in certain zoning districts, such as commercial and office districts?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Districts where allowed: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that encourages or requires a percentage of parking spaces for compact cars or motorcycles?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Percentage of total: ___
Size of compact car spaces: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that provides incentives for structural parking versus surface parking?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that limits the width of travel lanes in parking areas to the following chart of minimum widths:

Parking Angle	*1-way*	*2-way*
90 degree	*20 feet*	*24 feet*
60 degree	*16 feet*	*24 feet*
45 degree	*14 feet*	*24 feet*
30 degree	*12 feet*	*24 feet*
Parallel	*12 feet*	*24 feet*

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that facilitates single travel aisles versus double aisles in parking areas?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that limits the size of parking stalls to 9' by 18', for all passenger vehicle parking stalls (non parallel parking) except handicapped stalls?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that allows on-street parking to count towards required minimum parking spaces?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that sets parking space minimums for commercial and office uses to 4 spaces (or lower) per 1,000 net square feet?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that sets parking space minimums for churches, schools, theaters, etc. to 1 for every 4 fixed seats (or lower), or 10 spaces (or lower) per 1,000 net square feet?

Yes No
Ordinance name and citation: ___
Other adopted document: ___
Notes: ___

Section 3B - Low Impact Development/Better Site Design Concepts – 3 questions

For the purpose of this checklist, "lot coverage" means all impervious surfaces, such as buildings, structures, decks, driveways, patios, parking lots and sidewalks, etc.

Is there an ordinance provision, or other adopted document, that sets maximum impervious coverage or lot coverage for lots and/or parcels based on zoning districts?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Zoning districts and percentage of impervious coverage allowed: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that encourages increased building height, floor area ratio, density, etc. to limit impervious coverage?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document, that allows or encourages the use of vegetated bio-retention facilities to meet parking lot landscaping requirements?

Yes No
Ordinance name and citation: ___

Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document, that promotes LID practices (e.g. green roof, bio-retention, etc.) for new development projects?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Section 3C - Redevelopment or Infill Development Concepts – 3 questions

Are there ordinance provisions that promote infill or redevelopment through techniques such as tax and other local incentives, or through other methods?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Promotion methods: ___
Notes: ___

Is there an ordinance provision, or other adopted document, that promotes LID practices (e.g. green roof, bio-retention, etc.) in redevelopment projects in urban areas?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document that reduces existing impervious cover on redevelopment projects?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Section 3D - Road Design Requirements – 4 questions

Is there an ordinance provision, or other adopted document, that establishes the maximum radii of cul-de-sacs to be the same as, or lower than VDOT's minimum standards?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document, that permits the pavement width of private roads to be narrower than VDOT standards?

Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document, that limits turn lanes, road widths and other pavement requirements to the minimum VDOT standards?

Yes No

Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document that encourages permeable surfaces for required emergency vehicle access lanes (aside from the main roads)?
Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Section 3E - Pedestrian Pathways and Residential Driveways – 3 questions

Is there an ordinance provision, or other adopted document, that encourages shared driveways?
Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document, that limits sidewalks and other pedestrian pathways (in width and/or extent) to the minimum VDOT standards or other minimum required standards?
Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Is there an ordinance provision, or other adopted document, that encourages the use of alternative permeable materials for sidewalks and/or driveways?
Yes No
Ordinance name and citation: ___
Other adopted document:___
Notes: ___

Section 3F - Other Standards

Are there other ordinance provisions, or other specific standards in other adopted documents that effectively limit impervious cover?
Yes No
Ordinance names and citations:___
Other adopted document:___
Other standards: ___
Notes: ___

PART 4 - GENERAL WATER QUALITY PROTECTION PROVISIONS

These questions relate to general water quality protection or improvement provisions or program elements.

Question Removed. Does the locally designated CBPA or implementation of all performance criteria cover more than 50 percent of the locality's total land area or greater than 50 percent of the total land area in the Chesapeake Bay watershed?
Yes No
Ordinance name and citation: ___
Documentation: ___

Question Removed. Does the locally designated CBPA or implementation of all performance criteria include all land area within

a locality or all land area within the Chesapeake Bay watershed?

Yes No

Ordinance name and citation: ___

Is there an ordinance provision, or other adopted document, that provides incentives or requires low impact development (LID) techniques during the plan review process or mandated when technically feasible?

Yes No

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

Question Removed. Is there an ordinance provision, or other adopted document, that requires conservation design to be undertaken before land disturbance is approved?

Yes No

Ordinance name and citation: _____

Other adopted document: _____

Is there an ordinance provision, or other adopted document, that permits the Purchase or Transfer of Development Rights?

Yes No

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

Is there an ordinance provision, or other adopted document, that provides incentives for or requires the use of vegetated BMPs or additional vegetation as part of traditional BMPs to enhance their pollutant removal function?

Yes No

Ordinance name and citation: ___

Other adopted document: ___

69. Is there an ordinance provision, or other adopted document, that include other standards that provide for general water quality protection or improvement?

Urban Development Areas	Yes	No
Mixed-Use/Transit-Oriented Zoning Districts	Yes	No
Green Infrastructure Plans	Yes	No
Source Water Protection Districts	Yes	No
Other: ___	Yes	No

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

Is there an ordinance provision, or other adopted document, that includes standards to promote the re-vegetation of cleared areas for the purpose of general water quality protection or improvement?

Yes No

Ordinance name and citation: ___

Other adopted document: ___

Notes: ___

PART 5: PROMOTING LOW-IMPACT-DEVELOPMENT PROJECT PROVISIONS – 11 QUESTIONS

These questions were not part of the original DCR checklist and have been added by the Project Team as a part of the Promoting Low-Impact-Development Project.

Is there an ordinance provision, or other adopted document, that requires compliance with erosion and sediment control standards when the proposed development disturbs less than 10,000 square feet?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, that requires that all septic systems receive pump-outs once every five years?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, that requires that all newly proposed septic systems provide a reserve sewage disposal site at least equal in size to the primary sewage disposal site?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, that requires stormwater management for all new development and redevelopment?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance or provision, or other adopted document, that establishes *numeric* criteria or a calculation methodology for the replication of pre-development site hydrology? (For example, requiring infiltration, evaporation, or reuse of the first 1" of rainfall, or a reference to a site-specific methodology such as the EPA LID Hydrology Manual)

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, that requires that in the event that the stormwater criteria cannot be achieved onsite, requires compensatory *off-site* runoff reduction, or in-lieu contributions?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, that allows Low Impact Development practices on *all* types of development sites (residential, commercial, industrial)?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, that encourages rainwater harvesting techniques during the development of stormwater management plans?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, that requires maintenance agreements for all stormwater best management practices installed?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance or provision, or other adopted document, which encourages the use of vegetated water-quality swales in lieu of curb and gutter, where feasible?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___

Is there an ordinance provision, or other adopted document, requiring a *pre-application* review of site design and stormwater concepts, for the purpose of maximizing use of better site design and LID?

Yes No

Ordinance names and citations:___

Other adopted document:___

Notes: ___