RECOMMENDATIONS
FOR A MUNICIPAL CODE UPDATE
FOR WATER QUALITY, FLOOD CONTROL
AND REGULATORY COMPLIANCE
BASED ON GREEN INFRASTRUCTURE STANDARDS
FOR THE TOWN OF ORANGETOWN, NY

November 9, 2014

Prepared for the Town of Orangetown
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This project has been administered by the Hudson River Watershed Alliance with funding from the New York State Environmental Protection Fund through the Hudson River Estuary Program of the NYS DEC.

Acknowledgements

Reviewers and Contributors
The recommendations in this report were developed with input from the staff of the Orangetown Building and Highway Departments, land use board and Tree Commission members and other community stakeholders. This report does not represent consensus of all contributors, but it aims to include the key insights that they brought to it.

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Introduction

This report presents recommendations to support the Town of Orangetown's efforts to reduce the flooding and water quality impacts of stormwater on local infrastructure and the lands throughout the town. The main purpose of the report is the show where the Orangetown's Code presents obstacles or gaps related to green infrastructure for stormwater management and recommend revisions to the Code. Some of the recommendations concern policies and initiatives rather than regulations.

The goals of this report are consistent with the Orangetown Comprehensive Plan 2003. Certain strategies for natural resource protection and stormwater management recommended here were included in the Comprehensive Plan and have yet to be implemented. Whereas the Comprehensive Plan recommends a thorough update of the zoning ordinance, this report lays out in more detail a set of options for a step by step approach focusing on addressing water quality and flooding issues through the use of green infrastructure.

FEDERAL, STATE AND LOCAL REQUIREMENTS FOR GREEN INFRASTRUCTURE

As a Municipal Separate Storm Sewer Community (MS4), Orangetown is required to adopt a variety of measures to achieve national clean water standards. Green infrastructure methods are among the techniques to achieve these standards, and MS4s are required to consider green infrastructure in updating plans, programs and codes.

The *New York State Stormwater Management Design Manual 2010* mandates the use of Green Infrastructure on projects that disturb an acre or more of land and recommends its use more widely not only for stormwater management but because it provides many other community benefits. The Environmental Protection Agency advocates using green infrastructure to "protect public health and the environment, and enhance community livability."

Recognizing the important benefits of green infrastructure in protecting water quality and as a component of comprehensive flood management plans, many communities have updated their codes and continue to look for other strategies and initiatives to promote green infrastructure. These strategies include supporting and strengthening the education, expertise and effectiveness of all parties involved in the design, planning, and permitting of green infrastructure projects as well as committees, organizations and individuals who can play a role in protecting and enhancing these resources.

WHAT IS GREEN INFRASTRUCTURE?

Green infrastructure is a conservation, planning, and design approach that aims to protect, maximize or mimic the services that natural areas provide in managing rainfall and reducing runoff. When the construction of buildings and paving increases the amount of impervious surface, rain quickly leaves the site and becomes runoff, instead of flowing slowly and being absorbed naturally. Untreated runoff from construction sites and developed areas carries a host of pollutants that can harm fish, wildlife and vegetation and taint drinking water. Stormwater runoff also increases the volume and flow rate of water into lakes and streams, leading to erosion, sedimentation and flooding.

A green infrastructure approach to planning and design aims to minimize site imperviousness and its harmful impacts. At the planning scale the green infrastructure approach to stormwater management protects the existing natural landscape because trees, topography, soils, and waterbodies manage rain and runoff through infiltration, evapotransporation, and filtration. At this larger scale, green infrastructure includes reforestation, wetland protection and construction, and the protection and enhancement of riparian buffers and floodplains.

At the site scale green infrastructure comprises a set of best management practices that can be incorporated into new construction, redevelopment projects, and small property improvements. Instead of conventional, engineered collection, conveyance and storage structures, these techniques use soils and vegetation to manage stormwater. The list of accepted green infrastructure in *the New York State Stormwater Management Design Manual 2010* includes trees, rain gardens, bioretention areas, vegetated swales, pocket wetlands, infiltration planters, vegetated median strips, green roofs.

The benefits of green infrastructure go beyond stormwater management. With proper design and maintenance these practices can beautify properties and increase property values, reduce temperatures, lower energy costs, and provide wildlife habitat.

THE CODE REVIEW PROCESS

Various tools have been developed to help communities to analyze their codes for obstacles or gaps related to green infrastructure and consider ways to plan changes to policies, programs, and regulations over time. To start the process in Orangetown, a code review worksheet (based on the Code and Ordinance Worksheet for Development Rules in New York State) was distributed to a small team of key personnel from the Office of Building, Zoning, Planning, Administration & Enforcement, the Town Highway Department, and the Department of Environmental Management & Engineering. The team completed the worksheet and indicated priority issues. Next, they provided comments to a draft report that incorporated recommendations from the Orangetown Comprehensive Plan and model language from code reviews conducted in other communities. After several cycles of review, land use boards and local committee members were invited to comment.The final report includes recommendations for policy and regulatory changes and outlines specific topics for further analysis and discussion.

ORGANIZATION OF THIS REPORT

This report presents the relevant existing provisions of the Code, discusses gaps and makes recommendations. The recommendations are based on the specific conditions in the town and the experience of the Reviewers. In some cases, the recommendation is to address a question through further analysis; in others, specific code changes are proposed.

The report has three chapters*. Chapter One: Natural Resources Protection* discusses ways to address many of the recommendations in the Comprehensive Plan for developing maps and inventories of natural resources with staff and volunteer support, and adding new sections to the code to protect these valuable resources, including as steep slopes, wetland and trees. *Chapter Two: Impervious Surfaces* deals with the regulations and standards for streets, sidewalks, roofs and other constructed impervious areas. *Chapter Three: Requirements for Runoff Reduction* discusses regulations that communities commonly use to directly limit increases in impervious surface and runoff from development projects of various kinds and sizes.

MODEL LANGUAGE

Model language from the municipal codes from nearby communities of the Towns of Clarkstown and Greenburgh and the Villages of Tarrytown and Nyack were useful in developing this report as were the following Green Infrastructure and Low Impact Development reports from other New York State communities:

Green Infrastructure Model Local Law Project Summary Report (November 2013)
The report organizes the language into three Actions Levels —Minimum, Best Management, and Model Community.

Bronx River Watershed Management Plan: Recommendations for Municipal Ordinances to Improve Water Quality for the Bronx River Watershed, Westchester County, NY (August 2007)

Nyack Green Infrastructure Report (June 2013)

Town of Clinton Recommended Model Development Principles for Protection of Natural Resources in the Hudson River Estuary Watershed (June 2006)

Town of Wappinger Recommended Model Development Principles for Conservation of Natural Resources in the Hudson River Estuary Watershed (June 2006)

These and other resources used in developing this report can be found at this project's Google Site—*Orangetown Green Infrastructure* https://sites.google.com/site/orangetowngreeninfrastructure/

Implementation Outline and Next Steps

After reviewing this report and becoming familiar with the rationale offered for code revisions or other strategies, The Town should enlist the continued support of all of the stakeholders to move forward. The Implementation Outline condenses the recommendations from the report to help in setting priorities and planning actions.

Many of the recommendations can be assembled into a set of standards and guidelines that can be used during the first stages of project review. As the guidelines are refined, they can be adopted and codified. The recently published *Watershed Design Guide: Best Practices for the Hudson Valley* may be useful alongside this report in developing the guidelines for Orangetown.

The list of recommended regulations to protect natural resources should be considered, and various approaches to including them in the Code should be evaluated with the assistance of a consulting planner and the Town Attorney. Similarly, recommended regulations for runoff reduction should be evaluated and acted upon.

Implementation Outline

ESTABLISH AN APPROACH TO CODE REVISIONS AND DESIGN GUIDELINES

- Create a forum and framework for stakeholders to use this report and establish next steps.

MAPPING

- Create a clear and well-supported process to utilize staff and volunteer resources to carry out necessary inventories and mapping of community natural resource assets and conditions.
- Review, revise and update existing maps of sensitive areas.
- Assess watershed and stormwater infrastructure mapping needs.
- Develop a Natural Resource Inventory of Rockland Psychiatric Center site and other key sites.
- Update the Open Space Inventory.
- Conduct street tree and canopy cover assessments.

STEEP SLOPES, WETLANDS AND WATERBODIES, AND NATURAL BUFFERS

- Revise the code to limit construction on steep slopes.
- Revise the Code to include site plan requirements for erosion and sediment control that prioritize green infrastructure.
- Require additional wetland mapping on a case by case basis.
- Study the use of an overlay zone to protect and enhance the sensitive waterway corridors to reduce flooding and improve water quality.
- Add natural resource buffer protection to the code in order to shape the design of development projects to avoid impacts to wetlands, waterbodies and sensitive plant species.
- Develop a plan to identify and enhance existing and potential buffer zones.

TREES AND VEGETATION

- Revise the code related to site plan submission requirements for mapping and assessing trees and vegetation.

- Require a risk assessment by a certified arborist to determine whether any tree proposed for removal in a Critical Environmental Area (CEA) or on public property should be removed.
- Require protections for tree or vegetation removal based on compliance with erosion and sediment control regulations and practices.
- Update the list of preferred tree species by referencing current lists from Cornell Horticulture Institute or other reliable sources.
- Develop comprehensive up-to-date standards for tree planting, maintenance and protection.
- Establish a tree fund for fines collected for violations to be used for tree planting and maintenance.

OPEN SPACE CONSERVATION AND FLEXIBLE DESIGN

- Revise the code so that all traditional lot and bulk controls, other than density, can be freely disposed of on sites where environmental constraints need to be addressed.
- Streamline review to incentivize the use of cluster layouts.

STREETS, DRIVEWAYS, SIDEWALKS

- Add green infrastructure practices to street design specifications and implement them where site conditions allow, in accordance with the NYS Stormwater Management Design Manual.
- Encourage property owners to capture run off from their properties before it reaches the sidewalk.
- Revise site plan requirements to require site designers to look for opportunities to 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, setback variations, and clustering on smaller lots.
- Ensure that all subdivisions include storm water treatment for new roads according to NYS requirements. (Zero net increase for new roads is required.)
- Revise the Code to refer specifically to alternative sidewalk design standards to promote permeable paving and the use of structural soil or structural cells in order to support tree health.
- Revise the Code to 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.
- Fully investigate the green infrastructure alternatives to paved gutters to assess their track records and maintenance requirements with the ultimate aim of developing a requirement for the use of bioretention, permeable paving and/or vegetated swales instead of paved gutters for new development and redevelopment projects unless there are no practicable alternatives.
- Develop requirements for urbanized areas to direct sidewalk runoff (along with street runoff) into below grade drainage practices.
- Reduce runoff from sidewalks by grading them to drain onto landscaped areas rather than to the street wherever possible and appropriate (for example on public property, and within the street right-of-way).

PARKING

- Assess rules for computing minimum parking requirements and make sure they reflect true demand.
- Establish land banking rules for computing minimum parking requirements to allow development of a fewer number of required parking spaces when appropriate and to reserve land for future parking if needed.
- Require parking lot layouts to include a percentage of all parking stalls dedicated for compact cars wherever possible.
- Promote the use of shared parking.
- Promote the of use one way/angle parking to reduce paved area and increase area available for planting and infiltration practices.

- Recommend the use of permeable paving where feasible and appropriate and include a reference to "Design specifications as per NYS Stormwater Management Design Manual in the design specifications in the Code."
- Require the use of permeable paving for overflow parking and snow removal areas
- Develop a new section to the Code regulating the design and planting of parking lots to maximize the benefits of trees, bioretention and other green infrastructure as public amenities and for stormwater management.
- Encourage parking lot retrofits throughout the Town through outreach and education and modeling green infrastructure techniques in parking areas on municipal and school properties.

ROOFTOP RUNOFF

- Revise the Code to include provisions in the appropriate sections to direct rooftop runoff into landscaped areas and other infiltration devices and avoiding direct discharge into watercourses or areas that can cause erosion.
- Continue/expand outreach and education about downspout disconnection
- Incentivize green roofs through density bonuses or other provisions.

REQUIREMENTS FOR RUNOFF REDUCTION

- Revise the definition of Land Development Activity in the Code to apply to projects of 10,000 sf (or .25 acres) of impact to address the cumulative stormwater impacts on Town lands and infrastructure from development projects between 10,000 square feet and an acre by requiring the preparation of a Stormwater Pollution Prevention Plan.
- Revise the code to include a net zero runoff provision mandating that the runoff from additional impervious area must be managed on site.
- Consider alternative requirements for green infrastructure and runoff reduction for projects disturbing less than 10,000 square feet.
- Consider setting impervious coverage limits so that a portion of the overall allowed land coverage is permeable and ensure that the permeable areas are maintained as such.
- Consider allowing some increase in coverage where a significant amount of green infrastructure is included in the site design.

Chapter One. NATURAL RESOURCES PROTECTION

Overview

Appropriate local regulation for low impact design is based on knowledge of a community's natural resources, how landscape features function, and the services that they provide. Local laws, site plan review and approval procedures should be developed to support the protection of these essential services.

The New York State Stormwater Management Design Manual 2010 describes the role of conservation and natural resource protection this way:

> The first step in planning for stormwater management using green infrastructure is to avoid or minimize land disturbance by preserving natural areas. Development should be strategically located based on the location of resource areas and physical conditions at a site. Also, in finalizing construction, soils must be restored to the original properties and according to the intended function of the proposed practices. Preservation of natural features includes techniques to foster the identification and preservation of natural areas that can be used in the protection of water, habitat and vegetative resources. Conservation design includes laying out the elements of a development project in such a way that the site design takes advantage of a site's natural features, preserves the more sensitive areas and identifies any site constraints and opportunities to prevent or reduce negative effects of development.

The first part of this chapter discusses the mapping and inventories of natural resources that form the basis of good land use regulation and design, and describes how much of this work might be accomplished using existing volunteer capacity, with strong support from the Town. The second part addresses code provisions for protecting steep slopes, wetlands and waterbodies, natural buffers, and trees and vegetation. The final part deals with open space planning and acquisition.

SUMMARY OF NATURAL RESOURCE PROTECTIONS IN THE CODE

The Orangetown Code requirements for protecting sensitive sites and natural resources are inadequate. The Code fails to provide the kind of detailed and precise tools necessary to protect natural areas from impacts that can cause both acute and longer term stormwater management problems and maximize the community benefits of green infrastructure. The Comprehensive Plan recommends a set of strategies and goals for natural resource protection that the Town has yet to implement, and the Code review process identified protection of natural resources and open space as top priorities.

Key provisions for protecting natural resources

Currently major trees and all watercourses on site plans are required to be delineated on site plans (§21-7 (A)) , and the Planning Board is required to "take into consideration all streams, ponds, wetlands, steep slopes, major trees, rock outcrops and other elements of scenic, ecological and historic value are preserved insofar as possible. (§21A-7 A. (8)). The Code also provides for the protection of certain sensitive sites by authorizing the requirement of a conservation easement (§21-7.1)

APPROACHES TO REVISIONS FOR NATURAL RESOURCE PROTECTION

All of the recommendations in this chapter and Orangetown's goals for protecting natural resources should be considered in order to determine the best approach for refining or revising the Code. One approach is to provide a new comprehensive *Natural Resource Protection Chapter* that would include sections on the various kinds of resources and sensitive sites. This approach would be the most direct way to amend it and make the goals and purposes of the provisions clear. Protection of trees and vegetation, stream buffers, steeps slopes, erodible soils, and other sensitive areas would be addressed all in one place. Alternatively, new sections can be added to existing chapters and existing sections can be revised. Relevant sections of the existing Section 27-A 7 Planning Board Review would then refer to these more detailed standards.

Example Language:

Two examples of model language for Natural Resource Protection chapters

> The Albany County Green Infrastructure Model Local Law Project, Appendix N
> Gap 4 Model Law Locating Sites in Less Sensitive Areas/Clearing & Grading (pdf page 18)
> https://sites.google.com/site/orangetowngreeninfrastructure/resources
>
> The Village of Nyack's Natural Resource Protection Chapter (added to its Code in 2010)
> http://www.ecode360.com/14877676?highlight=natural,scenic

Inventories and Mapping of Natural Resources

MAPPING AND THE ROLE OF THE ORANGETOWN ENVIRONMENTAL COMMITTEE

Mapping and inventories that are necessary for measuring and evaluating resource protection issues and land development decisions are available from various sources including Rockland County Soil Survey maps for wetland hydric soils, topographic maps from the Rockland County Planning Department's GIS mapping system; stream and wetland information from Rockland County Drainage Agency, and Cornell Cooperative Extension. The Orangetown Environmental Committee and its precursor, the Open Space Committee have conducted a Natural Resource Inventory for parts of the town and an Open Space Inventory. These resources should be assessed and additional mapping, inventories or updates should be provided using staff and volunteer efforts.

In identifying the need for inventorying and mapping natural resources the Comprehensive Plan recommends creating a Conservation Advisory Council (CAC) to "act as an advisory group to both the Planning Board and the Town Board on a variety of environmental issues" including helping to develop some of the inventories and providing relevant information to complement work of Building and Highway Departments staff."[1] The enabling legislation in NYS outlines this role for CACs in mapping open space and natural resources and reviewing applications for development within the open space index to evaluate its alignment with the municipality's planning objectives.[2]

For this report the Staff Reviewers and the Environmental Committee Reviewers considered the pros and cons of establishing a CAC and identified two potential problems: 1) that the CAC could add a new layer of

[1] Objective 11, page II-2)
[2] http://www.nysaccny.org/content/cacinfo/article12f.pdf

requirements to the application and review process that would make it more cumbersome, and 2) that the council could find its efforts ignored, since it would be an advisory body without authority.

However, CACs in the region have found that the key to success is to become a helpful addition to the process by keeping in touch with the permitting agencies and providing information in a timely manner. CACs can provide information that can make a positive addition to applications. The OEC could take on the task of updating the town's open space inventory or other tasks in its current form but joining the regional network of CACs could enhance its effectiveness as long as the council also had the support of the Town Board. The council could also take on the important role of keeping the Town focused on implementing the recommendations of this report over time.

For more information on CACs see http://www.nysaccny.org/content/cacinfo/CACsandCBs.pdf

TREE INVENTORIES AND THE ROLE OF THE SHADE TREE COMMISSION

The New York State Urban and Community Forestry Council encourages municipalities to inventory trees and planting sites in order to understand the makeup of their community forests and develop intelligent plans for planting and maintenance. Inventory data can also inform provisions of the code (for example recommended genus and species lists or priority sites for plantings to satisfy mitigation requirements).

The Orangetown Shade Tree Commission can take on the role of researching ways to approach tree inventories in the town and applying for grant funding, which is available from the NYS Urban Forestry Council. The Village of Nyack recently received grant funding for an inventory of all trees in the street right of way and village parks to be conducted by a certified arborist. The results the inventory will be downloaded into iTree Streets, a user-friendly computer-based program developed by the US Forest Service for inventory and assessment of street trees. The program is uses tree inventory data to quantify the dollar value of annual environmental and aesthetic benefits from trees in terms of energy conservation, air quality, CO2 reduction, stormwater control, and property values. The Shade Tree Commission has been invited to learn from Nyack's experience in applying for the grant and conducting the inventory. The Commission may also wish to estimate tree cover and tree benefits for a given area with a random sampling process using iTree Canopy http://www.itreetools.org/canopy/ .

RECOMMENDATIONS

The following work should be carried out with staff resources and volunteer resources with support from the Town.

1. Review, revise and update existing maps of sensitive areas especially to support standards and regulations recommended in this report.
2. Update the Open Space Inventory.
3. Develop Natural Resource Inventory of Rockland Psychiatric Center site and other key sites.
4. Assess watershed and stormwater infrastructure mapping needs.
5. Conduct tree inventories.
6. Conduct a tree canopy cover assessment.
7. Continue to review code to ensure alignment with the inventories and maps to protect natural resources and open space.

STEEP SLOPES

Steep slope protection regulations should preserve steep slopes to the greatest extent practicable and protect the public interest by minimizing the detrimental effects of disturbance and development including erosion, siltation, pollution of water supplies, slope failure, increase in downstream run-off, alteration of scenic views, and destruction of potentially significant habitat.

Provisions for steep slope protection may be a component of a natural resource protection chapter, as previously described, part of the Land Development Regulations, or a separate provision in the zoning code. Steep slope regulations can also easily be included as part of the Erosion and Sediment Control Requirements.

Existing Code

The Code limits residential development on properties with slopes over 25% by reducing the amount of land that counts as developable on the site overall. "As part of any minimum lot area requirement for residential uses, not more than fifty percent (50%) of any land …with slopes (unexcavated) of over twenty-five percent (25%) shall be counted and within the designated street line of a road." For commercial properties there are no requirements related to steep slopes.

Recommendation

1. Revise the code to limit construction on steep slopes on both commercial and residential sites. Base the regulation on understanding potential impacts on property owners as well as environmental impacts to determine the appropriate language.

   See the Village of Nyack Steep Slopes regulations included in the Natural and Scenic Resource Chapter (§360-4.4 D).

   and Bronx River Management Plan Recommendations for Municipal Ordinances pages 19-21 (included in the Erosion and Sediment Control Chapter).
   http://www.westchestergov.com/planning/environmental/BronxRiver/Ordinance%20Review/Model%20Ordinances/Ordinance%20Review%20Chapter.pdf

The Pennsylvania Land Trust has a website resource that gives extensive guidance on the various approaches and components of steep slopes protection in municipal codes. It focuses on using the zoning code for this and describes the complementary role of the subdivision and land development regulations.
http://conservationtools.org/guides/show/59-Steep-Slope-Ordinance

EROSION AND SEDIMENT CONTROL

Erosion and sediment control plans are required in NYS for development projects, but the principle of controlling erosion and sedimentation through best land management practice can also be included in other parts of the code relating to natural resource protection including the steeps slopes ordinance just mentioned. A green infrastructure approach to site design can be specified in site plan approval requirements. These would focus on protecting natural drainage patterns and vegetation, limiting impervious surface and maintenance according to the standard requirements in the erosion and sediment control plan.

Existing Code
The Code includes basic regulations for erosion and sediment control that satisfy NYS requirements (30D-17).

Recommendation
1. Revise the Code to include site plan requirements for erosion and sediment control. See Village of Nyack Code (§360-4.4 E).

WETLANDS AND WATERCOURSES

According to the Orangetown Comprehensive Plan:

> Wetlands and waterbodies need protection given their ecological and hydrological values. These features should be protected through local regulations that limit development within these areas generally with a 100-foot buffer area adjacent to wetlands and waterbodies. Regulations should address Sparkill Creek, other streams, and locally defined wetland areas, which would be identified on a site-specific basis. Wetlands should be mapped for each site at the time an application is submitted to the Town. The wetland mapping should be accompanied by analysis of wetland functions, which would help define ecological importance of each wetland, particularly if a permit is requested for wetland disturbance. The permits for disturbance of wetlands, waterbodies, or buffer areas would be possible, provided proper mitigation measures were proposed. Mitigation measures could include wetland replacement, restoration, or enhancement, depending on site-specific conditions. Filling of wetlands could be permitted, if detailed analysis determines that no suitable alternative exists...In order to assist in this process, additional staffing would be needed (i.e., a wetlands biologist or similar personnel), or a consultant could be hired on retainer in order to assist the Town in enforcing the environmental regulations.

Existing Code:
Orangetown does not have a stream buffer ordinance or local law, an ordinance regulating intermittent streams, or a local wetland ordinance or local law.

Recommendation
1. If there is potential for wetland conditions, require the applicant to hire a wetlands delineator and have the surveyor show the wetland areas on the survey. The Staff Reviewers noted that the added expense of hiring a consultant for this may be considered a barrier to implementing this recommendation of the Comprehensive Plan. However, because this is standard practice in other communities, this option should be considered further. The application of this approach may be fairly limited and could be designed to protect certain undeveloped areas that contain particularly sensitive and valuable resources including wetlands that would not be adequately protected by an overlay zone, which is discussed below.

2. Study the use of an overlay zone to develop more specific regulations to protect and enhance the sensitive waterway corridors to reduce flooding and improve water quality. The Reviewers generally agreed that an overlay zone could be a valuable tool that should be analyzed further.

NATURAL BUFFERS

The goal of regulations and other policies or initiatives related to natural buffers is to protect, establish, maintain and enhance their important ecological benefits, as well as their significant social and economic benefits. As noted in Westchester County's *A Guide to Aquatic Buffers*, "healthy buffers should be thought of as natural capital that add vitality, complexity and resiliency to our communities."[3]

Existing Code:

The Orangetown Code includes requirements for natural buffers that are mostly for visual screening and not for protecting sensitive wetlands, watercourses or wildlife, except as required in State and Federal wetland regulations.

Recommendations:

1. Add natural resource buffer protection to the code in order to shape the design of development projects to avoid impacts to wetlands, waterbodies and sensitive plant species. The ordinance should require maintaining buffers in their natural state, set appropriate minimum widths, address the conditions for altering the requirements and creating average buffer widths.

   See the Green Infrastructure Model Local Law Project, Appendix N, Natural Resource Buffers (pdf page 21). https://sites.google.com/site/orangetowngreeninfrastructure/resources

2. Develop a plan to identify and enhance existing and potential buffer zones.

   See the example of the Town of Wappinger, which developed a strategy for creating buffers and requirements for protecting them. (*Town of Wappinger Recommended Model Development Principles for Conservation of Natural Resources in the Hudson River Estuary Watershed*, pages 22-24). http://www.dec.ny.gov/docs/remediation_hudson_pdf/hrewbsdwap.pdf

TREES AND VEGETATION

Trees and other vegetation help manage stormwater by capturing rain in their canopies and through evapotranspiration, and they help prevent erosion. In addition trees cool and clean the air, provide wildlife habitat and beautify properties and neighborhoods. A carefully-crafted ordinance directs appropriate protection, selection, planting, and maintenance of trees and vegetation in order to reap their benefits and avoid unnecessary costs.

The following section recommends revisions and strategies for protecting trees and vegetation on public lands along streets and in parks and open space, on private land, and in the site plan approval process. Revisions could be made over time to the existing tree protection chapter provisions. Ideally the Town will develop comprehensive standards to protect trees and vegetation on all properties to include either as a revision to the existing section in the Code or as part of a new Natural Resources Chapter. Other recommendations for tree planting are included in the discussion of parking lot design.

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3 http://www.westchestergov.com/planning/environmental/BronxRiver/Westchester%20County%20Water%20Resource%20Buffer%20Brochure%20FINAL%20for%20e-mail1.pdf

Existing Management of Public Trees

Public trees in Orangetown are managed by the Parks Department and a consulting arborist as needed. The Parks Department handles requests for removal of trees from private property, which are approved when tree pose a risk. The penalty for illegal removals of trees on public land is typically a reprimand. The Parks Department budget for tree planting was reduced from $25,000 to $6,000 since the recession of 2008. This amount is used for high priority replacements.

Existing Code: Site Plan Requirements and Permitting

Currently the Code (§21-25) requires that specimen and major trees be shown on site plans and that they be protected during construction. The Code requires that any such trees that are damaged be replaced. The existing Code requires a permit before the removal of trees on proposed development or redevelopment sites, however the process of inspections needs improvement. These requirements appear to be inconsistently enforced, and there is no requirement for a tree preservation plan.

Recommendations

1. Revise the code to require that the limit of disturbance shown on construction plans is adequate for preventing clearing of trees and natural vegetative cover during construction and preventing damage during construction.
2. Require submission of a Tree Preservation Plan prepared by a landscape architect or certified arborist that shows not only the major trees but "all existing trees and proposed tree removals" and specifies tree protection methods.
3. Where necessary request the applicant to have an arborist perform a tree inspection on the entire lot tree survey or individual trees on a lot.
4. Require an escrow account for replacement of trees damaged during construction
5. Require on-site inspections of tree protection measures.

Existing Code: Guidelines

The Code (§21-25 C) requires the Town Board to set forth guidelines" for a program for protecting and preserving trees, shrubs and other natural vegetation within the Town." These guidelines include the list of recommended species that is outdated and illustrated brochures on procedures of selection, planting and care of trees that are posted on the Town website.

Recommendations

1. Plan with the Orangetown Tree Commission and the Town's consulting arborist to develop comprehensive up-to-date standards using resources from the Urban Horticulture Institute, NYS Urban and Community Forestry Council, the Arbor Day Foundation and others to promote understanding of the importance of trees and best selection, planting, and maintenance practices.
2. Revise the Code to refer to these standards so that development projects can align with the goals and standards of the Town.
3. Support the Tree Commission in efforts in public education and outreach about the benefits of trees, tree selection, placement, and care.

Existing Code: Removal of Trees in CEA

Currently there is no clear, well-defined process for tree removal permitting in a CEA where no development or redevelopment is proposed.

Recommendation

1. Revise the code to require a risk assessment by a certified arborist to determine whether any tree proposed for removal in a CEA should be removed. If all trees in CEA except risk trees or dead trees

are to be protected, revise the Code to state the standard. Otherwise set standards for allowable removals according to tree size, species and or other forestry goals.

Existing Code: Removals of Trees not in CEA

The Code does not require approval for removal of any trees from private property not in a CEA.

Recommendation

1. Set up a process for evaluating language in other codes that restrict removal of some trees on private property. Many nearby communities have adopted this type of provision recognizing the need to protect tree resources, which benefit the whole community and support environmental health.

Existing Code: Reference to Erosion and Sediment Control and Stormwater Regulations

The Code provisions for tree protection do not refer to erosion and sediment control regulations.

Recommendations

1. Require that tree or vegetation removal should be granted only when compliance with erosion and sediment control regulations and practices, especially those concerning erosion control practices, i.e., re-vegetation, is required. An erosion and sediment control plan should be required for vegetation removal, especially those adjacent to water resources or on steep slopes.
2. Require that the Town's designated inspector must review the site to determine whether the cutting, removal or destruction of trees will impair the drainage conditions, create soil erosion or otherwise affect the physical, environmental and/or the aesthetic value of the land.

Existing Code: Performance Bonding and Maintenance

The Code does not require performance bonding for trees.

Recommendations

1. Require developers to post performance bonds for tree planting on development projects,
2. Require performance bonding on trees that are to be retained because damage to tree roots during construction may not be apparent, and symptoms may appear years later. A relatively long bonding period, preferably 5 years or more, should be used so that the impacts of construction on tree health can be adequately evaluated.[4]
3. Review other model tree ordinances that require a long bonding period and clearly define the responsibilities of the developer.
4. Include clear, ongoing maintenance requirements

Existing Code: Fines and Tree Fund

The Code establishes fines for damaging trees on public property § (35-6) and for unauthorized clearing and grading in Critical Environmental Areas (§21-7 B).

Recommendations

1. Review methods of evaluating tree value and the fines used in nearby communities and consider revisions if needed.
2. Establish a tree fund for fines collected for violations to be used for tree planting and maintenance.

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[4] *Guidelines for Developing and Evaluating Tree Ordinances* http://www.isa-arbor.com/tree-ord/, page79. PDF version Oct 31, 2001

Existing Code: Species List
The Code includes a list of recommended trees, which Is out of date.

Recommendation:

1. The Town should regularly update its list of preferred tree species based on reliable current recommendations from NYS Urban Forestry Council, the Urban Horticulture Institute of Cornell University.

Open Space Conservation and Flexible Design

Open space preservation, conservation, enhancement and management are all important components of stormwater management planning using green infrastructure. But the definition of open space varies according to the setting. Undeveloped open space areas generally provide green infrastructure services as they are. Parks, playgrounds, and schoolyards on the other hand, often have large areas of paving and compacted lawn that contribute more to stormwater problems rather than solutions.

Both types of open space should be included in an inventory of the Town's open space assets, but they should be considered in terms of their functions. The more developed open space areas should be considered candidates for green infrastructure retrofits, whereas the undeveloped or sparsely developed areas should generally be protected as they are.

To protect the relatively undeveloped areas of open space in the town, the Comprehensive Plan recommends modifying cluster regulations. It states: "The Town's current cluster regulations limit the amount of flexibility that the Planning Board can utilize to generate quality environmental design. These regulations should be modified so that all traditional lot and bulk controls, other than density, can be freely disposed of on sites where environmental constraints need to be addressed."

Opportunities for cluster development are mostly on the larger parcels addressed in the Comprehensive Plan Update 2011, which includes alternative cluster layouts for these. But the use of open space development tools should also focus on smaller parcels that have sensitive areas to protect.

Existing Code
The Code allows conservation subdivision or cluster development, but it is not required and no incentives are in place to encourage it.

Recommendations

1. Revise the code so that all traditional lot and bulk controls, other than density, can be freely disposed of on sites where environmental constraints need to be addressed.
2. Streamline review requirements in order to incentivize the use of cluster layouts.

See the Green Infrastructure Model Local Law Project, Appendix N, Open Space Management. Cluster Subdivision (pdf page 24). https://sites.google.com/site/orangetowngreeninfrastructure/resources

Chapter Two: IMPERVIOUS SURFACES

Runoff from pavement, rooftops and other impervious surfaces carries a host of pollutants including hydrocarbons, pesticides, heavy metals, and sediment into local waterways. Impervious surfaces increase runoff volume and peak flow rates, resulting in increased flooding and overflows of storm sewer systems and even sanitary sewers when and excessive amount of stormwater infiltrates sanitary sewer pipes. Municipal codes should reflect the need to design and build to minimize the use of impervious surfaces and increase the use of permeable surfaces to protect surface water quality and groundwater resources.

Streets, Cul-de-Sacs, Sidewalks, and Driveways

A review of design requirements for streets, sidewalks and other paved areas aims to reduce the environmental impacts of roadway development, operation and maintenance, and promote innovative techniques for stormwater management. Additional benefits of a green infrastructure approach to street design, especially in residential developments, is that is can reduce the maintenance costs of roadways and stormwater systems and enhance the aesthetic appeal of neighborhoods.

Existing Code: Street Width

The Orangetown Code provisions on street width do not currently promote minimizing impervious surface. The required minimum width for a local street is 30 feet, but the Board may reduce this to 24' under certain conditions (§21-15 (H.).

Recommendation

1. The Reviewers agreed with the principle that residential streets should be designed for the minimum required pavement width needed to support travel lanes; on-street parking; and emergency, maintenance and service vehicle access. They acknowledged that several national engineering organizations have recommended that residential streets can be as narrow as 22 feet in width (AASHTO, 1994; ASCE, 1990) if they serve neighborhoods that produce low traffic volumes (less than 500 daily trips, or 50 homes), and some communities have set lower maximums. However, the Highway Superintendent and other staff considered that it was likely that people would park on these narrower streets even if prohibited, and would create an unsafe condition and recommended leaving the requirements as they are.

Existing Code: Street Length

The Town currently considers shorter street lengths when site conditions permit.

Recommendations

1. Revise Site Plan requirements to require site designers to look for opportunities to 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, setback variations, and clustering on smaller lots.

Existing Code: Street Design Specifications

Chapter 50 Part I Street Specifications for Subdivisions of the Code includes detailed specifications for streets, curbs, and sidewalks that do not include alternative designs for incorporating infiltration.

Recommendation

1. Add green infrastructure practices to street design specifications and implement them where site conditions allow, in accordance with the NYS Stormwater Management Design Manual

Existing Code: Cul-de-Sac Design

In its requirements for cul-de-sacs, the Town does allow landscaping and alternatives like hammerheads, but they are not generally preferred. The minimum required radius is 70 feet ROW and 60 feet pavement, however this varies depending on the type of street proposed.

Recommendations

1. Keep the dimensional requirements as they are for cul-de-sacs. The Reviewers considered reducing the *radius of cul-de-sacs to the minimum required to accommodate emergency and maintenance vehicles*. However, they rejected this recommendation due to concerns related to safety, parking and snow removal.

2. Revise the street design specifications in the Code so that where cul-de-sac streets are necessary to protect natural resources, accommodate infill development, or best serve the community, they should incorporate innovative designs, such as landscaped islands with bioretention, in lieu of a fully paved turnaround.

Existing Code: Sidewalks

The Orangetown Code *Chapter 50 Part I Street Specifications for Subdivisions* §19 addresses sidewalk design. Sidewalks are required on both sides of the street. The design specifications are for 4" concrete. Curbs are required (§50-16). The sidewalk width of 4' is required (§21-15). There are requirements based on increases in floor area: Structural alterations which increase the floor area of the principal building by more than 50% in a residential use shall be permitted only if the applicant provides for the installation of sidewalks and curbs to the extent that they are not provided for the street frontage involved. All new nonbuilding land uses nonresidential in character shall also require provisions for concrete sidewalks and curbs (43-4.0).

Recommendations

1. Revise the Code to 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.
2. Revise the Code to refer specifically to alternative sidewalk design standards to promote permeable paving and the use of structural soil or structural cells in order to support tree health.
3. Reduce runoff from sidewalks by grading them to drain onto landscaped areas rather than to the street wherever possible--on public property, and, where appropriate, within the street right-of-way.
4. Encourage property owners to capture run off from their properties before it reaches the sidewalk.
5. Develop requirements for urbanized areas to direct sidewalk runoff (along with street runoff) into below grade drainage practices linked to tree pits or bioretention cells. See guidelines from NYC green infrastructure projects.

Existing Code: Driveways

The Orangetown Code (Chapter 50) specifies the installation of "at least three inches of binder mix with a top wearing course of 1 1/2 inches of fine mix asphalt concrete" for driveways of single- or two-family residences. There is no provision related to sharing driveways. There is a maximum width of 18th feet (§43- 6.1 (c)).

Recommendations

1. Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.
2. Encourage installation of two track driveways or pervious materials that are appropriately constructed to support delivery and emergency vehicles, with a paved apron from road edge to Right of Way.
3. Revise the provision for maximum width to ensure that it applies only where side by side parking needs to be provided in a short driveway.
4. While shared driveways, where appropriate, are often encouraged for low impact development design, the Reviewers did not recommend this for Orangetown because of concerns about vehicle access and legal ramifications.

Existing Code: Vegetated Swales, Bioretention, and Permeable Paving Requirements in Street Design

The Code does not include provisions for vegetated swales, bioretention, or permeable paving as part of its street design standards, and the Town's experiences with non-paved gutters has engendered reluctance to allow these practices in street gutter design.

Recommendation

1. New streets are subject to the zero net increase standard. All subdivisions should include storm water treatment for new roads according to NYS requirements.

2. Fully investigate the green infrastructure alternatives to paved gutters to assess their track records and maintenance requirements with the aim of developing a requirement for the use of bioretention, permeable paving and/or vegetated swales instead of paved gutters for new development and redevelopment projects unless there are no practicable alternatives.

Parking

New and existing parking lots present important opportunities for reducing impervious area and providing a variety of green infrastructure benefits. The review of the Code sections related to parking lots resulted in recommendations for revising some provisions for parking ratios and dimensional design standards and adding a substantial new section on landscaping and managing runoff.

PARKING RATIOS, DIMENSIONS AND PLANNING REQUIREMENTS

Existing Code: Parking and Dimensional Requirements

The Orangetown Code currently sets the size of a space at nine feet wide and 18 feet long and aisle width at a minimum of 20 feet for 60° or 22 feet for 90° parking (§43-6.34). No provisions encourage smaller stalls or alternative layouts to reduce impervious surface.

Recommendations

1. Revise the Code to require parking lot layouts to include a percentage of all parking stalls (15%) dedicated for compact cars, with correspondingly smaller stall dimensions, wherever possible.
2. Revise the Code to promote the use of one way/angle parking to reduce paved area and increase area available for planting and infiltration practices.

Existing Code: Parking Ratios

The required parking ratio governing a particular land use or activity should be set in order to curb excess parking space construction. The current ratios in the Orangetown Code have not been reassessed in recent years. There is a minimum parking requirement, but no maximum.

Recommendations

1. Assess parking ratios to make sure they are in line New York metropolitan area averages. In addition, utilize local surveys of actual parking lot utilization rates for a mix of common land uses or activities. When combined with local experience, the data can often be used to modify, and hopefully lower, the parking demand ratios required.

Existing Code: Flexibility and Land Banking

Because parking ratios usually represent the minimum number of spaces needed to accommodate the highest hourly parking at a site and can sometimes result in far more spaces than are actually needed. The Planning Board currently does have the flexibility to permit reserve parking areas in connection with commercial establishments, but there is no language in the Code allowing it.

Recommendation

1. Establish rules for computing minimum parking requirements to allow development of a fewer number of required parking spaces where a smaller number can be shown to be adequate to meet the needs of a particular site and the use or uses associated with the site. The reserved area for the undeveloped spaces should be noted on the plan so that if needed in the future the Board has a basis to open up part or all of the spaces depending upon changed conditions on-site.

Existing Code: Shared Parking

The Code currently contains a provisions for combined uses that allows a 50% reduction in the total spaces required for the use with the least requirement where demand for parking spaces is primarily during periods when the other use or uses is not or are not in operation.

Recommendation

1. Promote the use of shared parking
2. Ensure that maintenance responsibilities are carried out (through the Town Attorney's Office).

Existing Code: Mass Transit and Bicycles

The parking requirements do not encourage the use of mass transit and bicycles***.***

Recommendation

1. Include requirements to provide for bicycle parking spaces and allow reductions in parking requirements based on proximity to mass transit.

See other planning strategies for parking including credit for on-street parking, reduction of minimum off-street parking for certain residential uses, and special requirements for the use of porous materials, and detailed requirements for trees and landscaped areas in the Model Local Law Project, Appendix N, Gap 1, Parking Lot Design (pdf page 2). https://sites.google.com/site/orangetowngreeninfrastructure/resources
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Existing Code: Parking Lot Paving

The Code (§43-6.36.) requires that all parking areas be paved with asphaltic concrete "or equivalent as approved by the Town Engineer or consulting engineer and except, further, that grassed areas may be used for an athletic field, stadium or agricultural use."

Recommendations

1. Revise the Code to recommend the use of permeable paving where feasible and appropriate.
2. Revise the design specifications section to include a reference to "Design specifications as per NYS Stormwater Management Design Manual."
3. Promote the use of permeable paving for overflow parking and snow removal areas.

Existing Code: Parking Structures

There are no specific provisions regarding parking structures in the Code, but often in traditional suburban setting, there is resistance to the use of parking structures as inconsistent with local character.

Recommendation:

1. In certain settings, where the site and district character allows the design is well integrated and appropriate, the use of parking structures to reduce impervious surface devoted to parking should be promoted through incentives in the form of tax credits; stormwater waivers; or density, floor area, or height bonuses.

PARKING LOT DESIGN AND LANDSCAPING FOR STORMWATER AND OTHER BENEFITS

Landscape design for parking lots is an underutilized area of opportunity for improving quality of life and environment through the use of green infrastructure practices. Well designed and maintained parking lots traditionally have provided ample landscaping, safe and clear circulation for pedestrians and drivers, pedestrian refuge/oasis areas and visual buffers from adjacent properties. New high performance parking lots add stormwater management criteria to the list of goals.

Parking lot design requirements should promote safe and attractive spaces that maximize green infrastructure for stormwater management and provide the many other benefits that a well-integrated green infrastructure design can deliver. Alternative circulation layouts and reduced stall size requirements for compact cars reduce overall impervious surface and make more room for landscaping.
Landscaping requirements for screening and aesthetics, including visually buffering views of cars from adjacent streets and residences, enhance the overall appearance of development projects and can be used to organize pedestrian traffic while providing stormwater management and shade. Tree planting requirements for parking lots can be developed to support beautiful, robust trees with large canopies. Paving requirements can have dual aesthetic and stormwater management roles.

Existing Code: Parking Lot Design Requirements

As noted in the Comprehensive Plan, the Orangetown Code does not address parking lot design and landscaping. In addition, the 303 study requires placing stormwater management below ground which may preclude alternatives that can provide combined benefits.

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Recommendations

1. Add a new section to the Code regulating the design and planting of parking lots and consider the following:

- Provide flexibility as to the landscape plan within a set of design standards based on green infrastructure goals and performance. For example, trees might be prioritized for the shading and cooling they provide, even if they provide less stormwater management benefit than a bioswale. Shade provided by trees in parking lots reduces excessive heat buildup which can adversely affect the local microclimate and air quality. Recognizing this, many cities have adopted ordinances that require set amounts of tree planting or shading in parking lots. The best scenario is to have both infiltration and filtration practice along with the trees.
- Integrate green infrastructure practices (bioretention areas, swales, filter strips) into landscaped areas where appropriate to help manage and treat stormwater runoff;
- Promote the use of permeable paving.
- Set standards for tree planting based on goals for long term tree health.
- Set minimum area requirements for landscaping with reference to stormwater management, aesthetic, and cooling and shading.
- Align Tree Island/ Stall Ratios with Canopy Cover Goals. Standard ordinances require a certain number of trees per number of cars, and while the number of trees required can be increased without other requirements to ensure tree health and longevity, the additional trees may provide few ecosystem services or aesthetic benefits.
- Canopy cover goals can be established to help assess and shape the integrated design of high performance parking lots. Once there is a goal to provide a specified percentage of canopy cover within a certain period of time(for example, 30 % coverage in 15 years), a series of design decisions about soil quality, volume, site and species selection and maintenance must follow that will allow the trees to achieve the goal.

2. Encourage parking lot retrofits throughout the Town through outreach and education and modeling green infrastructure techniques in parking areas on municipal and school properties.

Rooftop Runoff

In order to avoid overburdening the storm sewer system, whenever possible rooftop runoff should be directed to green infrastructure practices rather than the sewer system.

Existing Code:
The Orangetown Code states "When required by the Building Department or the Town Engineer, all house roof drains shall be connected to the street storm sewer or to dry wells, at least 20 feet from structure on the lot." In practice roof runoff from new homes go to Detention Ponds or drywells and additions go to drywells if feasible or to a Town drainage system.

Recommendations

1. Revise the Code to include provisions in the appropriate sections to direct rooftop runoff into landscaped areas and other infiltration devices and avoiding direct discharge into watercourses or areas that can cause erosion. See Green Infrastructure Model Ordinance language for rooftop runoff on the project Google Site https://sites.google.com/site/orangetowngreeninfrastructure/resources .

2. Incentivize green roofs for the more urbanized areas of the town

See, the Village of Nyack's Code's Sustainability Chapter, which allows a density bonus where the developer installs a green roof. Orangetown could also consider a reduction in assessment as an incentive. http://www.ecode360.com/search/NY0087?query=Sustainability

3. Continue and expand Town-wide outreach and education about downspout disconnection.

Chapter Three: REQUIREMENTS FOR RUNOFF REDUCTION

For projects that disturb an acre or more of land, NYS law requires the use of green infrastructure practices for stormwater management on new development projects, and it is the preferred method on redevelopment projects. Considering the importance of limiting increases in site imperviousness where there are smaller properties and in urbanized settings, many municipalities have developed requirements that go beyond the State mandate and have incorporated other provisions and definitions to further reduce stormwater runoff. Several approaches should be considered to address the gaps in the current provisions of the Orangetown Code to protect existing pervious surface and increase infiltration, filtration and evapotranspiration of runoff as much as possible.

The Reviewers supported the principle of limiting impervious surface through stronger requirements than those established by NYS, but acknowledged that financial and environmental costs and benefits would need to be assessed thoroughly to determine what strategies should be used in Orangetown.

REDUCING THE LAND DISTURBANCE THRESHOLD

Existing Code:

In the Orangetown Code, the minimum amount of land disturbance activity that will require the preparation of a Stormwater Pollution Prevention Plan (SWPPP) and the full requirements under NYS law can be found in the definition of land development activity:

> LAND DEVELOPMENT ACTIVITY
> Activity including clearing, grading, excavating, soil disturbance or placement of fill that results in land disturbance of equal to or greater than one acre, or activities disturbing less than one acre of total land area that is part of a larger common plan of development or sale, even though multiple separate and distinct land development activities may take place at different times on different schedules.

Recommendations

1. Consider creating a local law to set this threshold lower because of the cumulative, adverse water quality and flooding likely to result from unmanaged sites of less than one acre. Nearby communities have set the threshold at 10,000 square feet (Clarkstown and Nyack), 5,000 square feet (Tarrytown) and even lower.[5]

2. Consider alternative requirements for smaller projects. Developers could be required to provide green infrastructure design practices without preparing a SWPPP. For example, disturbances involving between 5,000 and 20,000 square feet might require a permit process and incorporating infiltration practices and permeable surfaces according to NYS Stormwater Management Design Manual criteria.

   Additional engineering would be needed if the threshold is set lower. Typically these costs are the responsibility of the developer or property owner. In considering the lowering the threshold and developing additional stormwater management requirements for runoff reduction, concerns about additional costs for expanding the requirements should be weighed against the potential future

savings that could accrue to the Town as a result of addressing these cumulative stormwater impacts in a timely fashion.

LIMITS ON IMPERVIOUS COVER

The Orangetown Comprehensive Plan notes that the Floor Area Ratios (FARs) for certain districts "could be lowered, but it may be more important for the Town to consider additional zoning revisions relating to single-family development, specifically a requirement for maximum impervious surface (building coverage and paved area), which would ensure a minimum amount of green area per lot (v-10)."

Existing Code
Currently the Code requires maximum land coverage as follows:

Use Table. Note 14: Maximum land coverage shall not exceed seventy-five percent (75%), including buildings, parking, road and road widening. The open area shall be a minimum of twenty-five percent (25%). Parking area within a building will not be charged against the floor area ratio. In OP Districts, the percentages shall be sixty-five percent (65%) and thirty-five percent (35%), respectively. In LO Districts, W Groups, and MFR District, U Group, the percentages shall be fifty percent (50%) and fifty percent (50%), respectively. In LI Districts, the percentages shall be eighty percent (80%) and twenty percent (20%), respectively.

Recommendation

1. Consider setting impervious coverage limits so that a portion of the overall allowed land coverage is permeable and ensure that the permeable areas are maintained as such. Impervious coverage should be defined clearly. The Tarrytown Code, for example, defines impervious coverage this way:

   > Impervious coverage is the sum of the area of coverage or footprint of all buildings, structures, paved areas, patios or other improved surfaces on a lot preventing natural runoff to percolate into the ground. Calculation of total impervious surface area on a site shall be based upon the gross lot area, not the net developable area on a site. Legal definitions of gross lot area, pervious surface and impervious surface are provided in § 305-5of this code.

2. Consider allowing some increase in coverage where a significant amount of green infrastructure is included in the site design.

NET ZERO RUNOFF

A net zero runoff provision can be included in the Code to affect projects of any size, and is meant to prevent increases in runoff from the addition of impervious surface.

Existing Code
The Code does not include a provision limiting increases in quantity of runoff from increases in impervious surface except according to NYS requirements stormwater, applying to projects an acre and larger.

Recommendation

1. Revise the code to include a net zero runoff provision mandating that the runoff from additional impervious area must be managed on site. The provision can apply to projects of any size or projects above a certain threshold. Some codes include specific requirements for sizing of the stormwater management practices used. For example, the City of Kingston has adopted a local law that requires

detention of runoff from increases in impervious surface, including affected adjacent areas, for a minimum of 24 hours. The Village of Nyack has included a simple provision as follows:

> The amount and velocity of runoff from a site after development shall approximate its predevelopment characteristics, such that the development shall result in zero net incremental discharge of runoff from the development site. However, if the site is adjacent to coastal waters, stormwater shall be contained on-site, to the maximum extent practicable, to prevent direct discharge of runoff to coastal waters.

A more detailed example ordinance can specifically state sources of increased runoff, such as

Driveways and reconstruction of driveways
Walkways and patios
Buildings, building additions, and roofs
Outbuildings or sheds
Pumped water

and mitigation measures, such as:

Replacement of impervious surfaces with pervious surfaces.
Detention and retention of stormwater on-site.
Underground infiltration vaults.
Bioretention swales and basins.
Pervious pavement.
Green roofs.

A provision for zero net runoff should include requirements for proper maintenance of these management practices and use NYS Stormwater Management Design Manual criteria (or qualified alternatives) for their design.

COMBINED APPROACHES

The following is an example of an ordinance that defines Land Development Activity such that a SWWP is required for disturbance of 5,000 square feet or greater as well as provision for increasing impervious cover by 1,000 square feet or more.

> Construction activity including clearing, grading, excavating, soil disturbance or placement of fill that results in land disturbance of equal to or greater than 5,000 square feet, or activities disturbing less than 5,000 square feet of total land area that is part of a larger common plan of development or sale that results in a land disturbance of equal to or greater than 5,000 square feet in the aggregate (even though multiple separate and distinct land development activities may take place at different times on different schedules), or activities that result in the creation of impervious (nonpermeable) cover equal to or greater than 1,000 square feet, whether those activities occur in association with new development, a modification or expansion of existing development, or redevelopment of a previously developed site. Any construction or reconstruction which meets the definition of substantial improvement or total reconstruction shall assume the entire area of the lot to be subject to disturbance (Village of Tarrytown Code §258-7).

References

The following key resources were used in preparing the report. These and other useful documents can be found on the **Orangetown Green Infrastructure Google Site** at https://sites.google.com/site/orangetowngreeninfrastructure/

CODE REVIEW WORKSHEETS AND SCORECARDS

This code review utilized a worksheet based on the *Code and Ordinance Worksheet for New York State* with revisions based on the EPA Water Quality Score Card and the Albany County Stormwater Coalition Scorecard.

Code and Ordinance Worksheet for New York State
http://www.dec.ny.gov/docs/remediation_hudson_pdf/cownys.pdf
EPA Water Quality Score Card *http://www.epa.gov/dced/water_scorecard.htm*
Albany County Stormwater Coalition Scorecard *http://www.stormwateralbanycounty.org/wp-content/uploads/2011/12/Stormwater-Coalition-Scorecard_2011_9-7_For-Distribution_FINAL1.pdf*

MODEL LANGUAGE

Stormwater Coalition of Albany County Green Infrastructure Model Local Law Project Summary Report: Process, Findings and Implementation http://www.stormwateralbanycounty.org/wp-content/uploads/2011/12/A_GrnInfModLocLawProj_SWCoalAlbCntyNY_2013_Nov_ForDistribution.pdf
Bronx River Watershed Management Plan: Recommendations for Municipal Ordinances
To Improve Water Quality for the Bronx River Watershed, Westchester County, NY August 2007
http://www.westchestergov.com/planning/environmental/BronxRiver/Ordinance%20Review/Model%20Ordinances/Ordinance%20Review%20Chapter.pdf
Nyack Green Infrastructure Report 2013
http://nyack-ny.gov/wp-content/uploads/2013/11/Roundtable-Report-FINAL7-1.pdf
New York State Stormwater Management Design Manual 2010
http://www.dec.ny.gov/chemical/29072.html
Pennsylvania Land Trust: Steep Slopes Ordinance
http://conservationtools.org/guides/show/59-Steep-Slope-Ordinance
Town of Clinton Recommended Model Development Principles for Protection of Natural Resources
in the Hudson River Estuary Watershed: Consensus of the Local Site Planning Roundtable
http://www.dec.ny.gov/docs/remediation_hudson_pdf/hrewbsdclin.pdf
Town of Wappinger Recommended Model Development Principles for Conservation of Natural Resources in the Hudson River Estuary Watershed. June 2006
http://www.dec.ny.gov/docs/remediation_hudson_pdf/hrewbsdwap.pdf

OTHER RESOURCES

EPA Sustainable Design and Green Building Toolkit for Local Governments
http://www.epa.gov/region4/recycle/green-building-toolkit.pdf
Town of Orangetown Comprehensive Plan May 2003
http://www.orangetown.com/orangetown/Comprehensive_Plan.pdf
Watershed Design Guide: Best Practices for the Hudson Valley
http://waterauthority.orangecountygov.com/PROJECTS/DESIGN_GUIDE/Watershed%20Design%20Guide%20%28final%20draft%2010-16-14%29.pdf

BUFFERS

Westchester County Guide to Aquatic Buffers.
http://www.westchestergov.com/planning/environme .
ntal/BronxRiver/Westchester%20County%20Water%20Resource%20Buffer%20Brochure%20FINAL%20for%20e-mail1.pdf

PARKING

Model Zoning Regulations for Parking for Northwestern Connecticut
Prepared Under Contract To: Northwestern Connecticut Council of Governments and Litchfield Hills Council of Elected Officials Funded By: Connecticut Department of Environmental Protection Prepared by: Fitzgerald & Halliday, Inc.72 Cedar Street Hartford, CT 06106. September 2003.

ROADS

Sustainable Neighborhood Road Design: A Guidebook for Massachusetts Cities and Towns
http://www.apa-ma.org/apa-ma_documents/Publications/NRB_Guidebook_2011.pdf

TREES

City Trees: Sustainability Guidelines and Best Practices
http://www.louisvilleky.gov/NR/rdonlyres/D7D629A4-B6DB-4C5F-8C78-F22834940329/0/CityTrees...
Guidelines for Developing and Evaluating Tree Ordinances. PDF version Oct 31, 2001
http://www.isa-arbor.com/tree-ord/

Recommended Urban Trees: ***Site Assessment and Tree Selection for Stress Tolerance***
http://www.hort.cornell.edu/uhi/outreach/recurbtree/index.html