

**MEMORANDUM**

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**TO:** District of Columbia Zoning Commission**FROM:** Travis Parker, Zoning Review Project Manager **DATE:** October 8, 2010**SUBJECT:** Setdown Report for portions of ZC #08-06 – Zoning Regulations Review  
▪ General Green Area Ratio Chapter

Green Area Ratio is an environmental site sustainability metric intended to set requirements for landscape and site design that meet goals for stormwater runoff, air quality and urban heat island. The Green Area Ratio is based on achieving environmental performance by allowing a user to pick among optional elements in order to meet an overall GAR score.

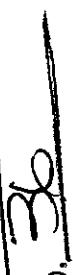
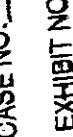
The proposed Green Area Ratio (GAR) chapter within Subtitle B is attached to this report as Appendix A. This report provides an overview and explanation of recommended updates to the zoning regulations. Additional explanatory documents are attached to this report in Appendix B, such as the interactive score sheet that can be used by an applicant to calculate their GAR.

This report consolidates information from previous Sustainability Working Group recommendations into proposed text regarding the proposed GAR regulations. Information pertaining to the Green Area Ratio will be found in two major organizational locations of the proposed code: Subtitle B (General Regulations) and Subtitles D through J (the land use subtitles). Subtitle B will contain an explanation of the system of the green area ratio, calculation details, and procedures and administration of the GAR. The individual land use subtitles will each contain zone specific permissions, conditions, and requirements that relate to the GAR. The basis for these proposed changes arose from the detailed sustainability recommendations issued as a part of the Sustainability Working Group. These recommendations were given conceptual approval by the Zoning Commission at public hearings in 2009. Informal guidance sessions with the Zoning Commission in 2009 provided additional impetus to pursue more extensive research into the application of the GAR.

**What is the Problem?**

In recent years, there has been a growing understanding that past plans have placed the human environs out of balance with nature. With the growing prominence of true urbanism, low impact development, and sustainable buildings planners, architects, and developers are finding ways to integrate sustainability into their work. While many plans have more nimbly shifted towards sustainable objectives, regulatory tools have been slower to follow. As one of the main regulatory guiding forces for development, building and zoning codes around the nation have been tweaked and in some cases drastically overhauled to achieve greater efficiency both

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within and outside buildings. Zoning in particular has at times impeded the ability of citizens who wished to make sustainable improvements to their buildings and developments. As a part of a comprehensive review of their Zoning Regulations, for the first time since 1958, Washington DC has studied methods to incorporate sustainability into their zoning.

The DC Office of Planning engaged planning and zoning consultants Clarion Associates and Farr Associates to prepare a diagnosis of issues pertaining to sustainability land use and development. This background analysis reviewed the plans, incentives, and regulations already in place in the District; diagnosed what additional measures might improve sustainability; and provided available information about the costs and benefits of various possible actions.

#### *Existing Code & Sustainability*

The existing zoning regulations have many shortcomings in the regulation of environmental sustainability. The following list contains issues that have been identified in previous working groups and public testimony that are addressed in the proposed text:

- A lack of cohesive regulations describing the areas on private property around built structures
- An absence of zoning regulations which specifically mandate the protection or provision of green or open spaces. Lot occupancy is traditionally perceived to fill this role, but only limits building area without requiring green, or even pervious, spaces.
- Geographically limited protections for sensitive tree and steep slope areas and limitations on impervious cover only in certain areas of the city. This only occurs in the Tree and Slope Protection Overlay District, which covers less than one percent of land area of the city.

#### *Other Environmental Regulations & Policy Goals*

##### Comprehensive Plan Policies

The 2006 Comprehensive Plan established the District's long history of environmental planning since the city's inception:

"Washington's legacy as America's "greenest" city has been seriously challenged over the centuries by urbanism. Our air quality does not meet federal standards, and our rivers and streams are polluted by raw sewage and urban runoff. Ninety percent of the District's wetlands have disappeared since 1790. Some sites in the city face soil and groundwater contamination problems from former industrial uses and municipal waste disposal. Perhaps most disturbing, the city has lost much of its tree cover in the last 35 years as trees have died or been removed at a much faster rate than they have been replaced.

Fortunately, the District has turned the corner and begun to tackle these challenges head on. In 2005, legislation was passed creating a District Department of the Environment. The most ambitious tree planting, water quality, and habitat restoration projects in decades are underway, and great strides are being made to promote more sustainable growth. The Environmental Protection Element builds on this momentum. It charts a course toward excellence in environmental quality and improved environmental health. Consistent with the notion of an "Inclusive City," it strives for

environmental justice so that all neighborhoods are provided with clean air, healthy rivers and streams, clean soils, healthy homes, and an abundance of trees and open spaces.”

The Comprehensive Plan is packed with guidance that supports the greening of the city and the zoning regulations. The following list is a partial summary of policies supporting the policies furthered by GAR:

- Promoting Water Conservation, CP Policy E-2.1.1: Promote the efficient use of existing water supplies through a variety of water conservation measures...
- Low Impact Development Criteria, CP Action E-3.1: A:... explore the expanded use of impervious surface limits ...to encourage the use of green roofs, porous pavement to reduce stormwater runoff.
- Mitigating Development Impacts, CP Policy E-3.4.1: Take measures to ensure that future development mitigates impacts ... Prohibit construction practices that result in unstable soil and hillside conditions
- Sustainable Landscaping, CP Policy E-5.1.4: Encourage landscaping practices ...that reduce the need for watering ... increase the use of landscaping for stormwater management...
- Preventing Erosion, CP Policy E-1.3.1: Ensure that construction activities do not result in soil erosion or the creation of unstable soil conditions... enforce requirements ... through the permitting and regulatory processes.
- Conservation of Steep Slopes, CP Policy E-1.4.1:
- River Conservation, CP Policy E-1.2.1:
- Flood Plains, CP Policy E-4.7.4:
- Waterfront Habitat Restoration, CP Policy E-1.2.2:
- Identification, Protection, and Restoration of Wetlands, CP Policy E-1.2.4:
- Wetland Buffers, CP Policy E-1.2.5:
- Retention of Environmentally Sensitive Areas as Open Space, CP Policy E-1.2.3:
- Groundwater Protection, CP Policy E-4.2.5:

#### Environmental Protection Agency's Stormwater Discharges from Municipal Separate Storm Sewer Systems MS4

- The District is in the process of updating their MS4 (Municipal Separate Stormwater Sewer Systems) permit with the EPA. Draft versions include significantly expanded reliance on low impact development measures to meet compliance.
- The implementation of the permit is the joint responsibility of the District Department of the Environment, the District of Columbia Water and Sewer Authority, the Department of Public Works and the District Department of Transportation.

#### WASA's Impervious Area Charge

- In May 2009 the District of Columbia Water and Sewer Authority implemented a fee system based on the amount of impervious surface on a piece of property. This fee was put in place to recover the costs of the federally mandated Combined Sewer Overflow Long-Term Control Plan. The charge is intended to ensure that property owners placing

the greatest amount of stress on water infrastructure will contribute a commiserate amount of fees.

#### DDOE's RiverSmart Program

- District Department of the Environment's RiverSmart program has two main components of incentives for homes and schools to implement reductions in stormwater pollution. The RiverSmart Homes program is a voluntary grant program offering up to \$1,200 to homeowners to adopt landscape enhancements such as shade trees, rain barrels, pervious pavers, rain gardens, and BayScaping. The RiverSmart Schools program is an initial public private partnership for the Center City Public Charter School to put in place a series of gardens and landscaping practices that will improve water quality, crate wildlife habitat and manage stormwater runoff.

#### DDOE's Proposed Stormwater Regulations & Fees

- The District Department of the Environment implemented a revised stormwater fee for impervious surfaces that runoff into the MS4 permit area of the District's water infrastructure. This fee was put in place to accurately charge users who put a larger burden on public infrastructure share a larger proportion of the cost of maintaining that infrastructure.
- In 2009 DDOE underwent the first rounds of public comment and editing to their proposed Soil Erosion and Sedimentation Stormwater regulations. These proposed regulations are designed to promote green roof construction and support green technology best management practices by intercepting runoff from rooftops, parking lots and roads as close as possible to its source, and directing it into vegetative recharge or filtration facilities incorporated into the overall site design. These regulations are still in draft form but are expected to be finalized soon.

#### Other Municipal Regulations

- DC's Green Building Act
- Sediment and Erosion Control Act: Controls stormwater run-off quality and quantity for new development
- D.C. Official Regulations: Title 8, Ch.2: Lots must drain to storm sewer
- Water Pollution Control Act: Water quality standards, protects areas of over 440 square feet of wetlands
- Municipal Code: Title 20, Ch. 31: Flood hazard rules
- Title 20 Ch. 41: Standards for hazardous waste facilities
- Urban Tree Preservation Act of 2002

## **2009 Concept Recommendations**

The District of Columbia Office of Planning looked at the issue comprehensively, initially exploring ideas outside of zoning but related to the built environment. The diagnosis was used to guide a series of public meetings and roundtables from November 2008 through February 2009. Participants included local environmental non-profits, smart growth advocates, landscape architects, land use attorneys, citizens, community gardeners, local planners, and architects. Major topics covered by the working groups included Climate Change; Energy Conservation and Renewable Energy Production; Integrating Land Use and Mobility; Water Conservation and Greywater; Slopes, Streams, Stormwater and Hydrology; Food Production/Security and Community Health; and Sustainable Business and 'Green' Jobs.

### **GAR-related recommendations from 2009 sustainability report:**

#### **Recommendation 13. Existing Tree Cover Protection**

*Study the expansion of tree protections from the Tree and Slope Overlay to other residential areas.*

#### **Recommendation 14. Vegetated ("Green") Roofs**

*Exempt vegetated roof components from zoning height restrictions up to four feet.*

#### **Recommendation 15. Water Conserving Landscaping**

*Specify native and low-water demand plant species in the zoning code.*

#### **Recommendation 16. Pavement Runoff and Soil Erosion Control**

*Standards for parking lots should include regulations for design and distribution of required landscaping.*

#### **Recommendation 17. Pavement Runoff Reduction**

*Reduce of runoff from paved areas by encouraging pervious surfaces.*

#### **Recommendation 18. Green Area Ratio (GAR)**

*Adopt a point threshold system to set requirements for green site design to meet goals for stormwater runoff, air quality, and urban heat island mitigation in an integrated way. The system would apply to low and moderate density zones, specifically properties not covered by new DDOE stormwater management requirements.*

Creating regulations to implement broad sustainability goals is complicated and involves comprehensive coordination and buy-in. The wide range of issues and the coordination of multiple objectives provide a significant challenge to the successful creation and implementation of requirements. Most municipal jurisdictions, including the District, are only beginning to directly address ecosystem protection through regulations and even then are continuing to do so through a varied patchwork of regulations that each address an individual issue, often only within a single

government agency. The GAR system has the potential to bridge administrative and regulatory gaps, allowing for achievement of higher value environmentally contributing landscapes in our city.

### **Development of GAR**

The principles of improved environmental performance achieved through LID are not new, and have been similarly packaged in a system of flexible requirements in major cities in Europe such as Berlin, Germany and Malmo, Sweden. Berlin's Biotope area factor program was established in 1994, setting ecological minimum standards for structural changes and new development for all types of residential, commercial development and infrastructure. The basis of the program is the same as the GAR, with total ecologically effective surface areas divided by total land area. This program is backed by both local and state law requiring protection and restoration of local ecology. Malmo's Green Space Factor is a program requiring developers to implement 10 out of a possible 35 sustainability measures. This program set an important precedent and vision for similar programs on a global scale.

The Green Area Ratio as an implementation option arose in the local area as a result of the outreach and research of Dr. Melissa Keeley<sup>1</sup> of George Washington University. Dr. Keeley had performed extensive research into the scientific basis for the Green Area Ratio, working with the City of Philadelphia as well as the Anacostia Waterfront Initiative to test early models of the GAR. Dr. Keeley shared her findings with the District Department of the Environment and the Office of Planning and solicited their input into the programs implementation feasibility. Concurrently, the public Sustainability Working groups were taking place, and recommendations being developed. The Office of Planning worked with Dr. Keeley to develop recommendations for implementing the GAR based on her scientific research.

This research centered on a comprehensive review of the environmental performance of an array of Low Impact Development (LID) best management practices. Dr. Keeley's published research includes study into LID best practices in Germany, Philadelphia, Washington state and the District of Columbia. Her research findings provided the Office of Planning with the latest

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<sup>1</sup> A research professor at George Washington University's Institute of Public Policy, Melissa Keeley's work focuses on urban environmental policy and planning, particularly water resource management. Having spent the last five years studying Northern Europe's investment in stormwater BMP technologies and sustainable development, she now regularly consults with government agencies such as the U.S. EPA, and advises decision-makers in cities including Miami, Chicago, Philadelphia, Boston, and Seattle on lessons and techniques that can be drawn from European experiences. Keeley is the only U.S. practitioner to have extensively researched the GAR planning instrument, reviewing German-language reports, examining outcomes on the ground, and conducting extensive interviews with the planners who developed the instrument and those responsible for ongoing administration. These findings are highlighted in an article currently under review at the *Journal of the American Planning Association*.

available scientific studies of environmental performance for LID best management practices. Her research in Philadelphia was performed in conjunction with local and state government and local stakeholders. This research describes the policy review and how final BMPs for the GAR were set; how data was collected; details on the metrics used to measure environmental performance; levels of scientific uncertainty related associated with this data; the process used to develop GAR performance numbers for the BMPs; examples of GAR application on sample parcels in Philadelphia, and limits on the research and future research needs. This and other research work by Dr. Keeley were used by the Office of Planning to determine the chosen environmental performance levels for the proposed GAR text.

Separately, the on-going work with Dr. Keeley has led to the development of a District of Columbia-specific set of GAR data analyses. As a part of a grant from the Cooperative Institute for Coastal and Estuarine Environmental Technologies (CICEET)(a NOAA and University of New Hampshire partnership) Dr. Keeley has been studying the potential for implementation of the GAR in the District as a part of her expertise in low impact development techniques. As a part of this research Dr. Keeley and the Office of Planning have worked with Futurity Inc., a firm that uses remote sensing aerial photograph landcover data for environmental analysis. The data was developed as the result of a targeted literature review into the environmental performance of different low impact development best management practices. This collaboration has led to a baseline analysis of existing conditions for a version of the GAR for the entire District. Access to this data has been provided to the Office of Planning to aid in the development of GAR target levels in different zones.

The GAR analysis is an online interface that allows for landcover analysis of all land parcels within the District of Columbia. The landcover information was developed by using aerial photographs with infrared imagery, and layers from OCTO for roads, buildings, sidewalks, water bodies, street trees and wooded areas in order to develop the combined data. The landcover information used to study the existing GAR are not exact proxies for the proposed GAR zoning standards, but rather close equivalents based on available data. This analysis is less detailed than the proposed regulations because of the large scale of data used, and the level of detail that can be accurately captured using aerial photographs. For example, an aerial photograph cannot accurately capture soil depths, particular plant species, or the heights of shrubs. This proxy GAR, along with costs per square foot for implementing GAR BMPs will be used to aid the Office of Planning in determining the appropriate GAR requirement per zone. This work will require further analysis that has not yet been completed. Initial data findings are available in the following figures.

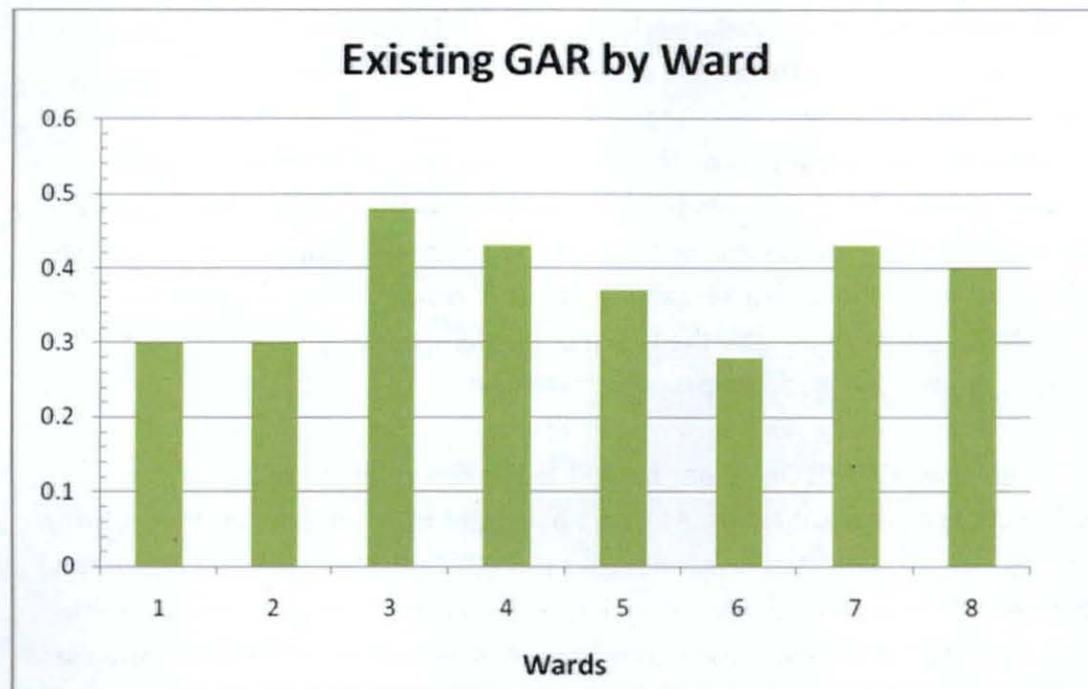


Figure 1. Existing GAR by Ward from Dr. Keeley's landcover analysis.

The following baseline information was determined from the initial data analysis of landcover GAR in the District. The available data is based on all parcels within a Ward, including both public and privately owned park lands and other open space not within the public right of ways. The inclusion of those parcels would provide some explanation of the peak GAR in Ward 3 which includes much of Rock Creek Park. Similarly, the high GARs in Wards 7 and 8 is likely attributable to higher levels of vacant land and a large percent of those Wards being zoned for single-family residential uses. Land uses with the highest levels of GAR are, not unexpectedly, vacant land, recreational uses, and single family homes. Land uses with the lowest levels of GAR tend to be commercially based such as motels, industrial uses, shopping centers and automobile service centers. Approximately two thirds of all parcels or uses have GARs that fall between 0.2 and 0.38. Generally, lower lot occupancy equates to higher existing GAR.

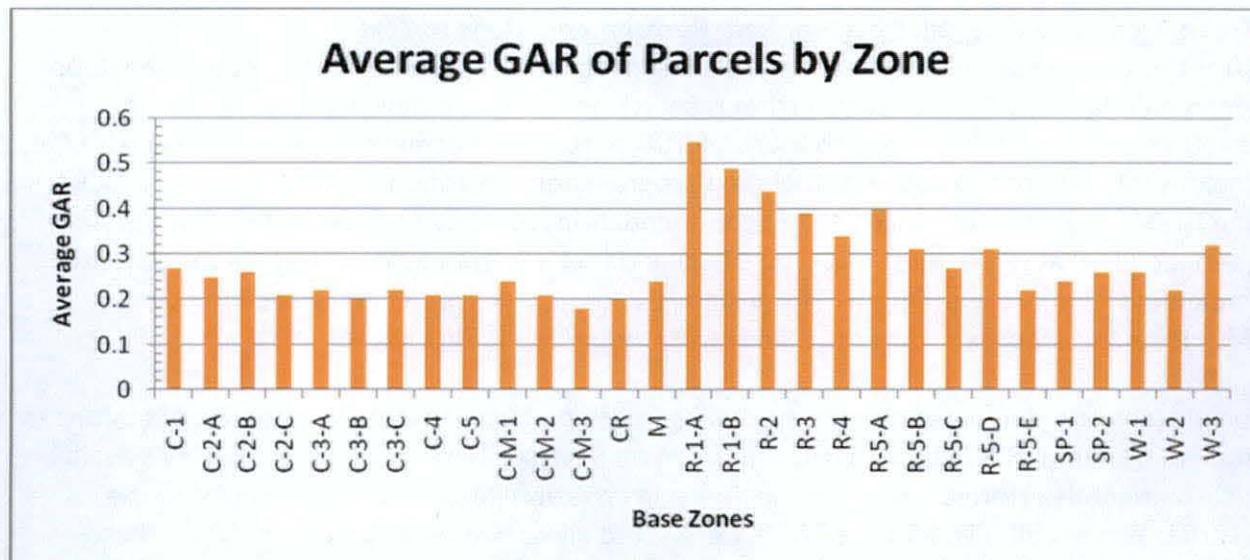


Figure 2. Average GAR by zone for base zones, developed from landcover analysis.

The city of Seattle, which implemented a version of the GAR in 2006, has been a helpful resource for study of program administration and lessons learned. The Office of Planning has done extensive outreach to the creators and administrators of the Seattle Green Factor, that city's version of the GAR. This outreach included meeting with Dave LaClergue, the head of the Green Factor program for the Department of Planning and Development (DPD) in Seattle, WA in August 2009. The Office of Planning and DPD discussed challenges to implementation, administrative procedures, testing methodologies and took a site visit to a recently completely Green Factor project. The information gained from these conversations and site visits helped to develop program implementation and administrative procedures, and should enable the District to avoid implementation issues experienced by the city of Seattle. After speaking with Seattle about the research methodology they undertook, the Office of Planning worked with Dr. Keeley to expand the scope and analysis of GAR conditions in the District. As a result of discussions with the city of Seattle, details of the program such as BMPs, levels of environmental performance, and strategies for interagency cooperation were tweaked in the District's GAR planning. A 2008 study of the implementation of the Green Factor found that approximately 60 projects had passed through the new requirements with discernable increases in the levels of LID and stormwater management measures on-site. Seattle won a 2010 Honor Award (Analysis and Planning Category) for the Green Factor program from the American Society of Landscape Architects.

### **Green Area Ratio Program Development: Recommendations to Text**

After the Zoning Commission hearing providing conceptual approval for the Green Area Ratio recommendation, OP underwent further research and program development. Working together with Dr. Keeley, research was undertaken to study sample sites, run a baseline analysis for GAR for the entire District, and program administration was discussed with DCRA and DDOE. In certain instances, the Recommendations made to the Zoning Commission have been modified at the request of DCRA, DDOE and findings from further study of the potential implementation of the program. These changes are fully described in the section below describing the proposed text of the Subtitle B Green Area Ratio Chapter.

Initial steps included determining best management practices to include in the list of options to implement the GAR. These were chosen based on Seattle's best practices, Dr. Keeley's available environmental performance benchmarking, and environmental conditions specific to the District. Next, multipliers for the BMPs were set to allow two base sample analyses. These multipliers are based both on data and analyses from Dr. Keeley and input from Low Impact Development specialists in the Department of the Environment. The first analysis studied typical lot and building configurations in different zones to determine potential cost and ability to meet differing levels of GAR requirements. The second analysis was a parcel by parcel examination of a simplified version of GAR existing conditions for the entire District. The findings from this analysis will be used to determine the levels of GAR requirement on a zone by zone basis.

### **Additional GAR User Tools and Submittals**

In addition to the legally established requirements of the GAR that are included in the proposed zoning text, other forms and tools will be provided to users to enable them to meet their GAR requirements. These extra tools for the user could range from informational step by step powerpoints, webinars or reports. They will also include additional forms and explanatory tools will not be included in the text of the zoning, but may be referred to as submittal requirements. These additional forms are intended to provide further detail about how a user will meet their GAR requirement, and having these documents outside of the zoning text enables flexibility to improve clarity and understanding for users. For example, Appendix B and C include sample forms that are referred to in the submittal requirements for the GAR. The first of these forms is the sample scoresheet which enables a user to test different options for meeting the GAR in an interactive form. The second is a sample worksheet that allows a user to do hand calculations of various options.

### **Development of GAR Program Administration**

In addition to the data analysis undertaken to develop the GAR text, discussions with partner agencies have been ongoing regarding the administration and implementation of the GAR requirement. Ongoing discussions with the District Department of the Environment, and the Department of Consumer and Regulatory Affairs have occurred to help determine responsibilities. They are expected to be the primary partner agencies for the GAR requirement and, as program administration is further developed, memorandums of understanding will be used to establish responsibilities for different elements of the program. These agreements will outline the steps of GAR requirement processing from forms submitted, to levels of review,

inspection, and enforcement of the requirements. In addition to initial program development, additional on-going training and education will need to be provided to staff members in OP, DCRA, and DDOE.

In addition to providing training to staff members, a number of explanatory educational materials will need to be developed for a variety of audiences. Educational outreach should target developers, potential applicants, District staff, and the general public. These materials should be prepared to be accessible in a range of media, from handouts at zoning and permit review counters, to online webinars, to step by step explanations of how to meet the requirement. These additional materials and tools can be integrated into the larger public education program about the updates to the zoning code, and should help to expand public understanding about the importance of the requirement and the improvements it will make to the District's environment.

#### **Proposed Text**

##### ***1. Sections 1300 and 1301 - Introduction to Regulation of Green Area Ratio and Relationship of the General Chapter to Land Use Subtitles***

*Provide background information about the proposed system of Green Area Ratio in order to add clarity for users.*

- Section 1300 explains what the Green Area Ratio is and the purpose of regulating environmental performance through the GAR system.
- Section 1301 contains information about where GAR regulations are located in the Title and Subtitle.

##### ***2. Section 1302 – Applicability of Green Area Ratio***

*Provide an explanation of rules for when the Green Area Ratio must be met.*

- Section 1302 contains an explanation of conditions and situations when the GAR applies.
- 1302.1 establishes the assessed value threshold at which the GAR must be applied to renovations of existing buildings or structures. This level was based on an already existing standard established in the current code in the DD overlay which requires application on all new buildings and renovations that exceed 100% of the cost of the assessed value of the building. This standard has been in place since October 20, 2000 and is a known and used standard in the existing code.
- 1302.1 states that the GAR applies to all development which requires a Certificate of Occupancy. This provision ensures that single dwelling unit residences are not required to meet the standards of the GAR. This decision is based on three considerations: , first that an undue financial and logistical burden not be placed on homeowners, secondly, recognition that these dwelling typically already have a higher landscaped or green area on their lots, and thirdly, that the program can be efficiently administered. Including one dwelling unit residences in the requirement would be logically complicated

before the program has been piloted because single dwelling unit homes occupy a majority of the parcels in DC.

- For the overall applicability of the GAR, different levels of requirement will be set for different levels in different zones, based on a combination of factors including existing conditions, cost of implementation, and desired levels of environmental achievement.
- This text is based on its correlation with the District Department of the Environment's stormwater regulations, and impervious surface fees. DDOE's regulations will apply to all lots over 5,000 (s.f.) square feet. The implementation of the GAR should aid property owners in meeting requirements for stormwater and impervious surfaces. This is a change from the original recommendation made before the Zoning Commission, but one that should better enable implementation and enforcement of the requirement.

### **3. Section 1303 – Calculation of Green Area Ratio**

*Provide an explanation of how the GAR is calculated.*

- Section 1303 contains an explanation of elements included in the calculation, applicable landscape elements, how to measure elements included in the GAR, and the formula used to calculate the GAR.
- 1303.1 identifies the elements that are included in the GAR calculation. The GAR is calculated by identifying landscape elements that will be used on the lot, calculating the area or equivalent square footage of the elements, multiplying the elements by the environmental multipliers and dividing the total by the land area of the lot.
- 1303.2 provides a table of optional landscape elements that may be included, and the environmental performance multipliers used in calculating GAR. The table gives a user a list of all the flexible options that can be used to meet the GAR requirements. The listed multipliers for these landscape elements have been developed in conjunction with Dr. Keeley's literature review of environmental performance of landscape elements. The multipliers were also developed through outreach to the City of Seattle, and the District Department of the Environment. The landscape elements which were included in the spreadsheet were developed as a result of outreach to the aforementioned sources, as well as research into local best practices and stormwater regulations. Additionally, the final bonus elements of native plant species, landscaping in food cultivation, and harvested stormwater irrigation were developed in direct response to requests from the District Department of the Environment, or recommendations from the Sustainability Working group of the Zoning Review.
- In 1303.3, the detailed steps for measuring GAR are given, including references to more detailed information about particular landscape elements. This section also explains how certain types of landscape elements should be measured, and when overlapping landscape elements can be counted for additional GAR credits. This is allowed in order to provide credit for the stormwater retention abilities of differing surface types (impervious, or pervious by depth.) Measurement for trees is set for diameter breast height (dbh) which is considered to be industry standard. "Breast height" is translated to four feet six inches (4'6") in the regulations for ease of use by users not familiar with this system. Vegetated walls are given a different scope of measurement, allowing them to count the entire area covered by the plant. This is proposed in order to allow for the full

air quality improvement effects that result from a vegetated wall, as opposed to counting only the square footage of plant in the soil, which may be quite small in comparison to the overall size of the plant.

- 1303.4 is used to ensure that the GAR score is not achieved by merely paving an entire site with permeable pavement, but rather that a higher environmental and aesthetic value is achieved through the GAR requirement.
- 1303.5 shows how trees are to be measured for the purposes of meeting the GAR requirements. The regulations use this equivalency table to enable standardization of credits for landscape elements of different species which may vary incrementally in size. Providing equivalent square footage to be used for certain size plants and trees allows for standardization of calculations in the GAR scoresheet. Three variations of square footage that may be used for different sized trees are used in order to give a higher multiplier in the landscape elements chart in order to capture the higher environmental performance that is achieved from a larger tree. This number is embedded in the calculations a user must perform in the scoresheet, but provided in the regulations so that users might better understand how their GAR score is calculated. The plant size equivalency will be used to determine the correct square footage per plant to include in the GAR scoresheet.
- 1303.6 provides the detailed instructions on calculation of GAR score.

#### **4. Section 1304 - Landscape Element Conditions and Standards for Green Area Ratio**

*Provide an explanation of conditions of eligibility for landscape elements, and standards of application.*

- Section 1304 provides specific details and conditions that landscape elements must meet in order to count towards the GAR requirements.
- 1304.2 establishes that different depths of soils in which landscape elements may be planted provide different multipliers, and subsequently different levels of environmental performance.
- 1304.3 establishes the definition of landscape elements that may be considered bioretention facilities, i.e. rain gardens.
- 1304.4 establishes how and where trees may be measured and standards for healthy and hardy in an urban climate. The American Standard for Nursery stock established by the American Nursery and Landscape Association was chosen for this requirement because it corresponds with the District Department of Transportation's baseline standards for street trees.
- 1304.5 establishes how vegetated or 'green' walls may be used towards meeting GAR requirements. Specific conditions for vegetated walls were developed in conjunction with the City of Seattle and District Department of the Environment.
- 1304.6 proposes vegetated roof conditions based on input for the District Department of the Environment and best practices within the DC metropolitan region.
- 1304.7 proposes water features conditions developed as a result of work with the City of Seattle, in order to ensure that they achieve environmental performance, rather than only aesthetics.

- 1304.8 establishes enhanced tree growth systems, some examples of which include structural soils and other methodologies of promoting tree root growth and overall tree health.
- 1304.9 establishes requirements for the bonuses which are available for native plant species. The requirements were developed as a result of work with the District Department of the Environment, and are designed to encourage plant choices that are best suited to the local climate and conditions. Requirements that plants not be on DDOE's list of invasive plants is intended to aid larger city-wide goals of species diversity and habitat creation.
- 1304.10 establishes the conditions for bonuses for the use of landscaping that provides edible plants and is intended to work in conjunction with city-wide initiatives such as the proposed Food, Environmental, and Economic Development Act in the District of Columbia of 2010 or the Healthy Schools Act of 2010 both of which focused on the development of more locally grown foods.
- 1304.11 establishes conditions in which water harvested for irrigation purposes would be considered eligible for the GAR requirement. These conditions were developed in conjunction with the District Department of Environment.

## **5. Section 1305 - Submittal Requirements for Green Area Ratio**

*Provide an explanation of the submittal requirements needed to meet the GAR.*

- Section 1305 contains information about the process, submittal requirements, and expertise required to meet the GAR requirement.
- 1305.2 requires that the landscape plan be signed off on by a certified landscape expert. This requirement has been put in place to ensure that the GAR is developed by trained professionals who will be able to accurately develop landscape plans and execute their proposed landscape elements. By providing a list of options for expertise, the intention of the requirement is to ensure that existing professionals will be eligible to complete the GAR requirements at the time it is enacted, without developing an entire separate training curriculum.
- 1305.3 requires that a separate GAR scoresheet must be submitted showing which landscape elements and what quantity or size of each are proposed in order for the user to meet the GAR requirement. This scoresheet will be provided to the user at the Department of Consumer and Regulatory Affairs along with all other building permit requirements. The form is an automated calculator in order to improve clarity and easier the user experience for those meeting the GAR.
- 1305.4 requires a worksheet to demonstrate how the particular square footages for the proposed landscape elements on a property are determined.
- 1305.5 establishes the specific elements that must be included in the submitted landscape plan in order for the plans to be properly reviewed for GAR compliance.
- 1305.6 establishes that a landscape maintenance plan is required and identifies the elements which must be included in the submitted landscape maintenance plan. The maintenance plan is required to ensure that the GAR requirement continues to be met over time, the same as all zoning requirements.

- 1305.7 explains changes to landscape or maintenance plans that require a plan revision and approval.
- 1305.8 establishes the timing requirements of meeting GAR requirements and that landscape elements must be installed before a Certificate of Occupancy is issued.
- 1305.9 describes that a temporary Certificates of Occupancy may be issued under a series of conditions that prohibit installation of the required GAR elements. This provision is included in order to ensure that development can still move forward in unfavorable seasonal, weather, or site construction conditions.
- 1305.10 requires signed verification by a certified landscape expert that the landscaping was installed according to the approved building permit

## **6. *Section 1306 - Special Exceptions for Green Area Ratio***

*Provide an explanation of exceptions from the GAR.*

- Section 1306 contains conditions and requirements under which a property may be eligible for a special exception from the GAR requirement.
- The exception for historic preservation was included in order to enhance and preserve the historic and cultural resources of the District.

## **7. *Section 1307 – Maintenance Requirements for Green Area Ratio***

*Provides an explanation of maintenance requirements.*

- This section is included in order to provide a basis for enforcement action by the District, should a property owner no longer comply with the requirement at a point in the future.

### **How would it Work: Case Study Example 1433 T Street NW**

A sample is given below in order to aid in the illustration of how an applicant could determine their existing GAR and weigh options for meeting their GAR zoning requirement. The sample site is a multi-family residential building in an R-5-B zone. The existing GAR according to proposed GAR zoning requirements would be 0.23.



Figure 3. 1433 T Street NW, looking north



Figure 4. Aerial photo of 1433 T Street NW, note the tree and parking area to the north.

If all the paved area in the rear of the building, currently used for parking, were replaced with permeable paving, the GAR score would be raised to 0.325. Alternatively, if a green roof of native species were installed on the roof of the building, leaving room for mechanical structures, the building could achieve a GAR of 0.438. If the two options were combined, the property could achieve a GAR score of 0.532. The sample GAR scoresheet showing these potential interventions is included below in figure 5.

DRAFT 9/29/2010 Project title: R-5-B Sample Site			District of Columbia Office of Planning 	
		enter sq ft of parcel	minimum score determined by zone	
(enter this value first) *		13,717	SCORE	0.532
<b>Landscape Elements**</b>				
Square Foot Factor Total				
<b>A Landscaped areas (select one of the following for each area)</b>				
1	Landscaped areas with a soil depth of less than 24"	enter sq ft 0	0.3	-
2	Landscaped areas with a soil depth of 24" or greater	enter sq ft 2866	0.6	1,719.6
3	Bioretention facilities (raingarden)	enter sq ft 0	0.4	-
<b>B Plantings (credit for plants in landscaped areas from Section A)</b>				
1	Mulch, ground covers, or other plants less than 2' tall at maturity	enter sq ft 2866	0.5	1,433
2	Plants 2' or taller at maturity - calculated at 16 sq ft per plant (typically planted no closer than 18" on center)	enter number of plants 0	0	0.3
4	Tree canopy for "medium/large trees" in Street Tree Planting Schedule or equivalent (canopy spread of 25') - calculated at 100 sq ft per tree	enter number of plants 0	0	0.4
5	Tree canopy for "large trees" in Street Tree Planting Schedule or equivalent (canopy spread of 30') - calculated at 200 sq ft per tree	enter number of plants 0	0	0.5
6	Tree canopy for preservation of "exceptional trees" or other large existing trees 8" + diameter	enter inches DBH 0	0	0.7
7	Tree canopy for preservation of "exceptional trees or other large existing trees greater than 24" + diameter	enter inches DBH 0	0	0.8
8	Vegetated wall, plantings on a vertical surface	enter sq ft 0	0	0.6
<b>C Vegetated or "green" roofs</b>				
1	Over at least 2" and less than 4" of growth medium	enter sq ft 0	0.3	-
2	Over at least 4" of growth medium	enter sq ft 5700	0.4	2,280.0
<b>D Approved water features</b>				
enter sq ft 0				
<b>E Permeable paving***</b>				
1	Permeable paving over at least 6" and less than 24" of soil or gravel	enter sq ft 3248	0.4	1,299.2
2	Permeable paving over at least 24" of soil or gravel	enter sq ft 0	0.5	-
<b>F Structural soil systems***</b>				
enter sq ft 0				
sub-total of sq ft = 14,680				
<b>G Bonuses</b>				
1	Drought-tolerant or native plant species	enter sq ft 5700	0.1	570.0
2	Landscaping in food cultivation	enter sq ft 0	0.1	-
Green Area Ratio numerator = 7,302				

\*\*\* Permeable paving and structural soil systems together may not qualify for more than one third of the Green Area Ratio score.

Figure 5. Sample scoresheet for GAR sample site R-5-B.

## CHAPTER 13 GREEN AREA RATIO

### 1300 INTRODUCTION TO GREEN AREA RATIO

1300.1 *Green Area Ratio* (GAR) is the ratio of the weighted value of landscape elements to land area. The GAR score relates to an increase in the quantity and quality of environmental performance of the urban landscape.

1300.2 *Green Area Ratio* sets integrated environmental requirements for landscape elements and site design that contribute to the reduction of stormwater runoff, the improvement of air quality, and the mitigation of the urban heat island effect.

1300.3 The purposes of the *green area ratio* regulations are to:

- (a) Implement a value-based system of requirements for environmental site design that provides flexibility in meeting environmental performance standards.
- (b) Promote attractive and environmentally functional landscapes.

1300.4 The purpose of this chapter is to:

- (a) Provide general guidance about the regulation of *green area ratio* requirements;
- (b) Define the applicability of *green area ratio*;
- (c) Set forth the formula for calculating the Green Area Ration and define its component parts;
- (d) Identify those landscape elements that are included in the *green area ratio*, explain how their area is measured, and set forth eligibility requirements;
- (e) Establish multipliers for each eligible landscape element;
- (f) Indicate what plans and certifications must accompany an application submitted to demonstrate proof of *Green Area Ratio* compliance; and
- (g) Establish maintenance requirements for the landscape elements that are counted toward a property's *green area ratio* requirement.

## **Appendix A: Draft GAR Chapter Text**

### **1301 RELATIONSHIP TO LANDUSE SUBTITLES**

1301.1 The *green area ratio* regulations of this chapter apply to all zones in all land use subtitles. Each land use subtitle also includes development standards tables containing *green area ratio* standards specific to zones within that subtitle.

### **1302 APPLICABILITY OF GREEN AREA RATIO STANDARDS**

1302.1 The *Green Area Ratio* applies to all new buildings requiring a Certificate of Occupancy and to all existing buildings requiring a Certificate of Occupancy where any additions, alteration, or repairs within any twelve month (12) period exceed one hundred percent (100%) of the assessed value of the building as set forth in the records of the Office of Tax and Revenue as of the date of the building permit application; provided:

- (a) The cost basis for alterations or additions to an existing building shall be the amount indicated by the applicant on the application for a building permit; and
- (b) The assessed value of the building shall be the value set forth in records of the Office of Tax and Revenue as of the date of the building permit application.

### **1303 CALCULATION OF GREEN AREA RATIO**

1303.1 The *Green Area Ratio* shall be calculated using the following formula:

$$\text{GAR} = \frac{\text{(area of landscape element 1 x multiplier)} + \text{(area of landscape element 2 x multiplier)} + \dots}{\text{Lot area}}$$

1303.2 For the purposes of this formula and the remainder of this section:

- (a) The term “landscape element” refers to one of the elements listed in the left hand column in Table B § 1303.9, and will be hereafter referred to as “landscape element” or “element;”
- (b) The term “multiplier” refers the number listed in the right hand column of Table B § 1303.9 that corresponds to a “landscape element”; and
- (c) The term “area of landscape element” means the square feet of a landscape element, unless the element is a tree or large shrub, in which case “area of landscape area” refers to the element’s equivalent square footage as indicated in B § 1303.7.

## Appendix A: Draft GAR Chapter Text

1303.3 The process for calculating a property's GAR under the formula is as follows:

- (a) The area of each landscape element is multiplied by its corresponding multiplier;
- (b) The resulting numbers for all landscape elements are added together;
- (c) The resulting point total is then divided by the total land area of the lot;
- (d) The product of the equation equals the property's GAR.

1303.4 The total points for all permeable paving and enhanced tree growth credits may not count for more than one third (1/3) of the *Green Area Ratio* score for a lot.

1303.5 If multiple landscape elements occupy the same area, for example groundcover under a tree, the full square footage or equivalent square footage of each element may be counted.

1303.6 A landscape element must meet the eligibility requirements of B § 1304.

1303.7 Equivalent square feet of tree and large shrubs are identified in the table below.

GREEN AREA RATIO LANDSCAPE ELEMENTS	EQUIVALENT SQUARE FOOTAGE
Plants at least 2 feet tall at maturity	9 square feet per plant
Tree canopy for trees 2.5 inches (2.5 in.) to 8 inches (in.) in diameter	100 square feet per tree
Tree canopy for trees 8 inches (8 in.) to 24 inches (24 in.) in diameter	350 square feet per tree
Tree canopy for trees 24 inches (24 in.) diameter or larger	450 square feet per tree

1303.8 Landscape elements of the GAR shall be measured in the following ways:

- (a) All trees shall be measured for diameter at a height four feet- six inches (4 ft. 6 in.) above grade when planted. Use the square footage equivalent based on diameter in the table in § 1303.5.
- (b) For vegetated walls, use the vertical square footage of the portion of the wall covered by vegetation.
- (c) For all other elements other than trees, large shrubs, perennials, and vegetated walls, square footage is determined by the area of a horizontal plane that is over the element.

## Appendix A: Draft GAR Chapter Text

1303.9 Eligible landscape elements are identified in the table below:

GREEN AREA RATIO LANDSCAPE ELEMENTS	MULTIPLIER
<b>Landscaped area (select one of the following for each area)</b>	
Landscaped areas with a soil depth of less than 24 inches	0.3
Landscaped areas with a soil depth of 24 inches or more	0.6
Bioretention facilities	0.4
<b>Plantings</b>	
Ground covers, or other plants less than 2 feet tall at maturity	0.5
Plants at least 2 feet tall at maturity	0.3
Tree canopy for all trees 2.5 inches (2.5 in.) to 8 inches (in.) in diameter	0.4
Tree canopy for new trees 8 inches (in.) in diameter or larger	0.5
Tree canopy for preservation of existing trees 8 inches (8 in.) to 24 inches (24 in.) in diameter	0.7
Tree canopy for preservation of existing trees 24 inches (24 in.) diameter or larger	0.8
Green wall, plantings on a vertical surface	0.6
<b>Vegetated roofs</b>	
Extensive vegetated roof over at least 2 inches but less than 4 inches of growth medium	0.3
Intensive vegetated roof over at least 4 inches of growth medium	0.4
Water features (using at least 50% recycled water)	0.2
<b>Permeable paving</b>	
Permeable paving over at least 6 inches and less than 2 feet of soil or gravel	0.4
Permeable paving over at least 2 feet of soil or gravel	0.5
Enhanced tree growth systems	0.4
<b>Bonuses</b>	
Native plant species	0.1
Landscaping in food cultivation	0.1
Harvested stormwater irrigation	0.1

## 1304 LANDSCAPE ELEMENT ELIGIBILITY CONDITIONS FOR GREEN AREA RATIO

- 1304.1 No landscape element may be counted towards a property's GAR unless it meets the applicable eligibility condition stated in this section.
- 1304.2 Plantings over the specified soil depths shall meet the required conditions listed in the Table of Landscape Elements and Multipliers in B §1303.2.
- 1304.3 *Bioretention facilities* shall be landscaped areas that receive rainwater from surrounding areas and use plants and soils to slow, filter, and infiltrate stormwater runoff. *Bioretention facilities* include but are not limited to rain or rainwater gardens,

## Appendix A: Draft GAR Chapter Text

bioretention planters, or linear cells or swales. These do not include cement or concrete only structures.

1304.4 Trees shall meet the following conditions:

- (a) All trees shall be at least two and one half (2.5) inches in diameter measured at a height four feet- six inches (4'6") above grade when planted and shall be replaced if damaged or killed by any cause.
- (b) All trees shall meet the American Standard for Nursery stock, as set forth by the American Nursery and Landscape Association.

1304.5 *Vegetated walls* shall meet the following conditions:

- (a) The maximum calculated vertical dimension shall not exceed thirty (30) feet unless the vegetated wall features a built-in growth medium;
- (b) The area calculated for the vegetated wall features shall be fully covered within a period of two (2) to five (5) years from planning;
- (c) The walls shall be at least five (5) feet from a side or rear lot line; and
- (d) Where stormwater harvesting for irrigation is proposed, vegetated walls shall contain a connection to the proposed irrigation system.

1304.6 *Vegetated roofs* shall meet the following conditions:

- (a) Designs for vegetated roofs must include plans to provide supplemental water for a minimum of two (2) growing seasons;
- (b) Where stormwater harvesting for irrigation is proposed, vegetated roofs shall contain a connection to the proposed irrigation system;
- (c) The vegetation on a vegetated roof is not additionally eligible for groundcover value towards GAR requirements.

1304.7 Water features shall meet the following conditions:

- (a) Water features must use harvested rainwater for at least fifty percent (50%) of the annual flow.
- (b) The water features must be under water for at least six (6) months out of twelve (12).

## **Appendix A: Draft GAR Chapter Text**

1304.8 Enhanced tree growth systems shall be at least twenty-four (24) inches deep, under pavement, and adjacent to planting areas.

1304.9 Native plant species shall meet the following conditions:

- (a) The plants are listed in the U.S. Fish and Wildlife Service's Native Plants for Wildlife Conservation Landscaping: Chesapeake Bay Watershed guide; or
- (b) The Applicant provides two references in current publications showing that the plant is native to the region; and
- (c) The plant is not listed on the U.S. Fish and Wildlife Service's list of Plant Invaders of Mid-Atlantic Natural Areas.

1304.10 Food cultivation shall meet the following conditions:

- (a) All food cultivation areas must be easily accessible to at least one occupant of the building;
- (b) All food cultivation areas must have a source of water that can reach all portions of the food cultivation area.
- (c) The cultivation of animals for food is not eligible for GAR credits.

1304.11 Harvesting stormwater for irrigation shall meet the following conditions:

- (a) If the irrigation type is spray, applicants shall follow treatment standards set forth in the current District Department of Environment's Stormwater Management Guidebook.
- (b) If the irrigation type is drip, no additional treatment of stormwater is required.

## **1305 SUBMITTAL REQUIREMENTS FOR GREEN AREA RATIO**

1305.1 This section lists the submittal requirements for demonstrating compliance with a *Green Area Ratio* requirement.

1305.2 For the purposes of this section, the term Certified Landscape Expert means a person who is a:

- (a) State of Virginia certified landscape architect;
- (b) State of Maryland certified landscape architect;
- (c) International Society of Arboriculture Certified Arborist;

## Appendix A: Draft GAR Chapter Text

- (d) Maryland's certified Professional Horticulturist; or
- (e) Landscape Contractors Association MD-DC-VA, Certified Landscape Technician.
- (f) Certified U.S. Green Building Council professional

1305.3 Applicants shall submit a *Green Area Ratio* score sheet with the GAR calculated for the given lot at the time of building permit application.

1305.4 Applicants shall provide the *Green Area Ratio* worksheet showing how the GAR was calculated for the given lot.

1305.5 Applicants shall provide a landscape plan prepared by a Certified Landscape Expert that includes the following information:

- (a) *Green Area Ratio* elements called out by category and area, which may be provided as a part of the landscape plan or as a separate document;
- (b) Lot dimension and size;
- (c) Location and areas of all landscape elements with dimensions;
- (d) Location, size, and species of all plants used to meet requirements;
- (e) Both common and botanical names of all plant material;
- (f) Identification of all existing trees that are to be preserved, with their location, trunk diameter at four feet- six inches (4'6") above grade, canopy radius, and species;
- (g) Plans indicating how preserved trees and other plants will be protected during demolition and construction;
- (h) Location and dimensions of wheel stops, curbs, or other devices to protect landscaping for landscaped areas adjacent to driveways;
- (i) A schematic irrigation and drainage plan and the size and depth of all plant containers for rooftop or container landscaping or areas to be irrigated with rainwater;
- (j) Location and size of any trees to be removed;
- (k) Specifications for soil improvement; and
- (l) Signature of the certified landscape expert who prepared the plans together as verification that plantings and other landscape elements meet the requirements of the this Chapter.

## Appendix A: Draft GAR Chapter Text

1305.6 Applicants shall provide a landscape maintenance plan prepared and signed by a Certified Landscape Expert that describes how the plantings will be cared for and maintained including:

- (a) Soil preparation;
- (b) Use of compost;
- (c) Plant replacement;
- (d) Irrigation;
- (e) Weed and pest control;
- (f) Control of noxious or invasive species, and;
- (g) Care and maintenance of water and *hardscape features*.

1305.7 The following modifications or substitutions to the landscape elements of an approved landscape plan require a plan revision and approval:

- (a) Number of trees, shrubs, or groundcovers;
- (b) Location of required plantings or landscape features;
- (c) Substitution of species; or
- (d) Revisions of any feature that could decrease planting area or lower the *Green Area Ratio* score.

## **Appendix A: Draft GAR Chapter Text**

- 1305.8 Except as provided below, approved landscape elements shall be installed in accordance with the approved plan prior to the issuance of the Certificate of Occupancy.
- 1305.9 Prior to the issuance of the certificate of occupancy, a landscape checklist must be signed by a Certified Landscape Expert, verifying that that landscaping was installed according to the building permit approved by DCRA.
- 1305.10 The Zoning Administrator may grant a temporary certificate of occupancy when installation of the required landscaping is not currently possible due to weather, season or site construction subject to the condition that landscaping must be installed within four (4) months after the date the temporary certificate is issued.
- 1305.11 The temporary certificate of occupancy may be extended up to two times by four (4) month periods by the Zoning Administrator based on the same conditions of § 1305.10.

### **1306 SPECIAL EXCEPTIONS FOR GREEN AREA RATIO**

- 1306.1 The Board of Zoning Adjustment may grant, by special exception, a full or partial reduction in the GAR required for an addition to a *historic resource* if, in addition to meeting the general requirements of [§3104], the applicant demonstrates that providing the required GAR is impractical as a result of the nature or location of the *historic resource*.

### **1307 MAINTENANCE REQUIREMENTS FOR GREEN AREA RATIO**

- 1307.1 All plantings and landscape elements used to calculate a property's GAR must be maintained for the life of the project. If, for any reason, the installed landscape fall below the minimum required GAR score, new eligible landscape elements shall be added to compensate and result in the required ratio.

## Appendix B: Proposed GAR Draft Scoresheet

DRAFT

9/23/2010

DRAFT 9/24/2010 Project title:		District of Columbia Office of Planning		
		enter sq ft of parcel	minimum score determined by zone	
(enter this value first) *			SCORE	#DIV/0!
<b>Landscape Elements*</b>				
A Landscaped areas (select one of the following for each area)				
1	Landscaped areas with a soil depth of less than 24"	enter sq ft	0	0.3
2	Landscaped areas with a soil depth of 24" or greater	enter sq ft	0	0.6
3	Bioretention facilities (raingarden)	enter sq ft	0	0.4
B Plantings (credit for plants in landscaped areas from Section A)				
1	Mulch, ground covers, or other plants less than 2' tall at maturity	enter sq ft	0	0.5
2	Plants 2' or taller at maturity - calculated at 16 sq ft per plant (typically planted no closer than 18" on center)	enter number of plants	0	0.3
3	Tree canopy for "medium/large trees" or equivalent (trunk diameter at XX) - calculated at 150 sq ft per tree	enter number of plants	0	0.4
4	Tree canopy for "large trees" or equivalent (trunk diameter at XX) - calculated at 200 sq ft per tree	enter number of plants	0	0.5
5	Tree canopy for preservation of "exceptional trees" or other large existing trees 8" + diameter	enter inches DBH	0	0.7
6	Tree canopy for preservation of "exceptional trees or other large existing trees greater than 24" + diameter	enter inches DBH	0	0.8
7	Vegetated wall, plantings on a vertical surface	enter sq ft	0	0.6
C Vegetated or "green" roofs				
1	Over at least 2" and less than 4" of growth medium	enter sq ft	0	0.3
2	Over at least 4" of growth medium	enter sq ft	0	0.4
D Approved water features				
E Permeable paving***				
1	Permeable paving over at least 6" and less than 24" of soil or gravel	enter sq ft	0	0.4
2	Permeable paving over at least 24" of soil or gravel	enter sq ft	0	0.5
F Enhanced Tree Growth Systems				
G Bonuses				
1	Drought-tolerant or native plant species	enter sq ft	0	0.1
2	Landscaping in food cultivation	enter sq ft	0	0.1
3	Harvested stormwater irrigation	enter sq ft	0	0.1
sub-total of sq ft = 0				
Green Area Ratio numerator = 0				

\*\*\* Permeable paving and structural soil together may not qualify for more than one third of the Green Area Ratio score.

## Appendix C: Proposed GAR Landscape Worksheet

### Green Area Ratio Worksheet\*

DRAFT 9/24/2010

District of Columbia  
Office of Planning



		Planting Area				TOTAL**
		1	2	3	keep adding columns as needed	
A1	square feet					0
A2	square feet					0
A3	square feet					0
B1	square feet					0
B2	# of plants					0
B3	# of trees					0
B4	# of trees					0
B5	# of trees					0
B6	# of trees					0
B7	# of trees					0
B8	# of trees					0
C1	square feet					0
C2	square feet					0
D	square feet					0
E1	square feet					0
E2	square feet					0
F1	square feet					0
F2	square feet					0
G1	square feet					0
G2	square feet					0
G3	square feet					0

\* See Green Area Ratio score sheet for category definitions

\*\* Enter totals on the Green Area Ratio score sheet