Green Area Ratio (GAR): Background, Administration & Process

Image Source: Oculus, Inc.

AGENDA

- Green Area Ratio Regulation
- Triggers
- Administrative Considerations
- Related Regulations (Pervious Surface/Parking Lots)
- Landscape Elements

Environmental Regulation

DC Zoning Code

- Zoning Re-write
- Green Area Ratio (GAR)
- Pervious Surface Req.
- Surface Parking Regs.

Stormwater Regulatory Programs

- Bag Fee
- Stormwater Fee/Impervious Surface Fee
- Stormwater Management Regulations
- Coal Tar Ban

Zoning Regulations Review

- Improve clarity, ease of use, relevance
- Diagnosis of barriers to sustainability policy area
- Zoning Commission weighed in on recommendations on….
  - Integrating Land Use and Mobility
  - Energy Conservation and Renewable Energy
  - Water and Sensitive Resource Protection
  - Food Security
  - Green Jobs
  - Large Area Development

Green Area Ratio

What is it?

- A flexible green site design requirement that varies by zone.

How Achieve?

- Choose from a range of environmental landscape practices each of which have been assigned an environmental performance ranking.

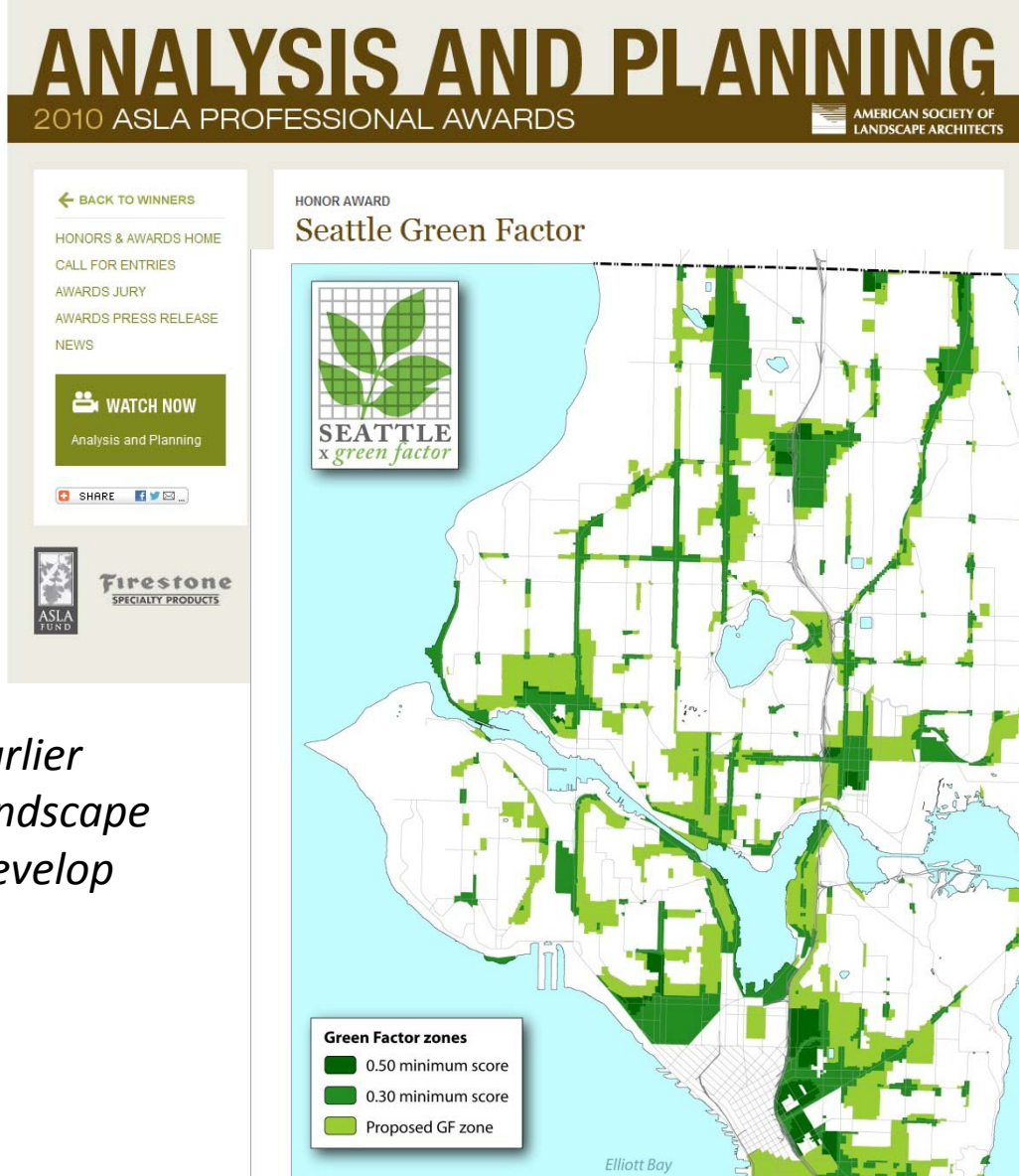
Examples may include…

- Permeable pavement
- Green roofs
- Natural ground cover
- Rain gardens
- Trees & shrubs
- Green facades

Seattle Green Factor

Stated Priorities:

- Livability
- Ecosystem Services
- Climate Change Adaptation



"Emphasizing landscape in site planning. Earlier involvement in the design process allows landscape architects to exercise more creativity and develop innovative design solutions."

GAR: How Does it Work?

How to calculate:

- **Add up landscape elements by number or size**
  - # trees
  - Size of green roof
  - Size of rain garden
  - # of plants
  - Soil depths
- **Divide by lot area**
- **= GAR score**

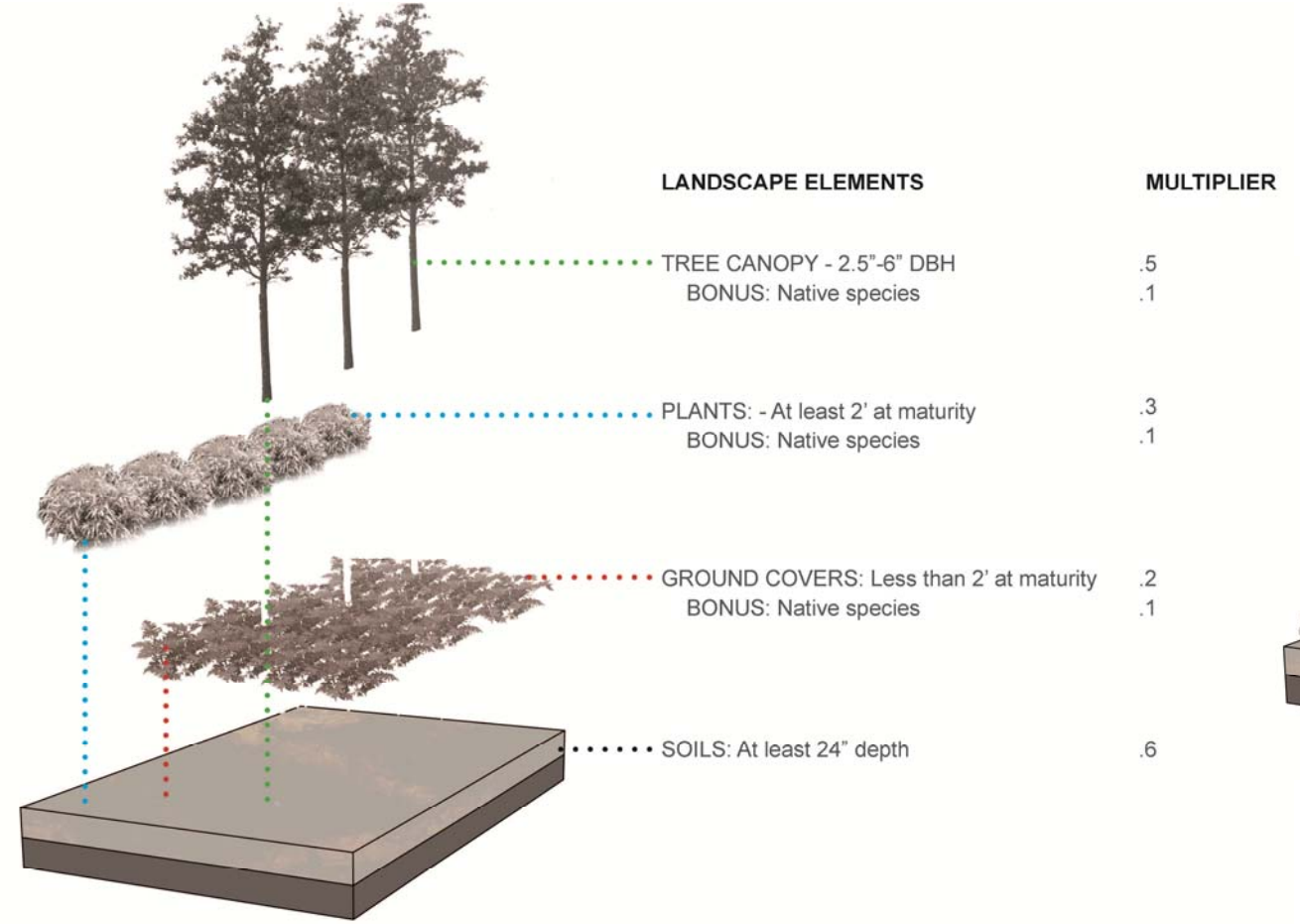
$$\text{GAR} = \frac{\text{(area of landscape element 1 x multiplier)} + \text{(area of landscape element 2 x multiplier)} + \ldots}{\text{Lot Area}}$$

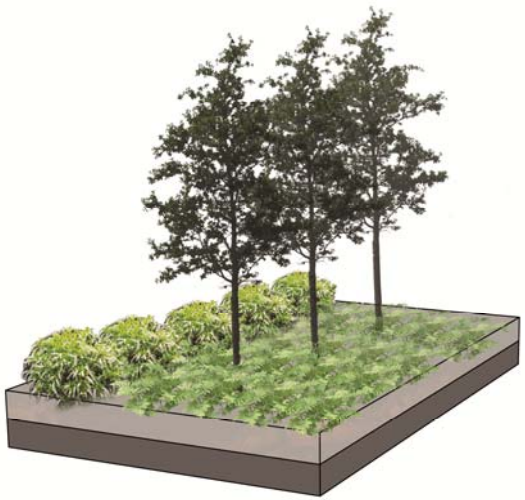
GAR LANDSCAPE ELEMENTS	MULTIPLIER
Landscaped area (select one of the following for each area)	
Landscaped areas with a soil depth of less than 24”	0.3
Landscaped areas with a soil depth of 24” or more	0.6
Bioretention facilities	0.4
Plantings	
Ground covers, or other plants less than 2’ tall at maturity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

GAR required by Zone District

Zone District	Green Area Ratio
R-5-A and R-5-B	0.40
R-5-C, R-5-D and R-5-E **C-1, C-2-A, C-2-B and C-2-C** **W-1, W-2, W-3** **SP-1, SP-2**	0.30
C-3-A, C-3-B	0.25
C-3-C, C-4, C-5, CR and any property within the DDD overlay	0.20
CM-1. CM-2, CM-3 and M, • **all structures except one story warehouses** • **one story warehouses**	• 0.30 • 0.10

Stackable Elements



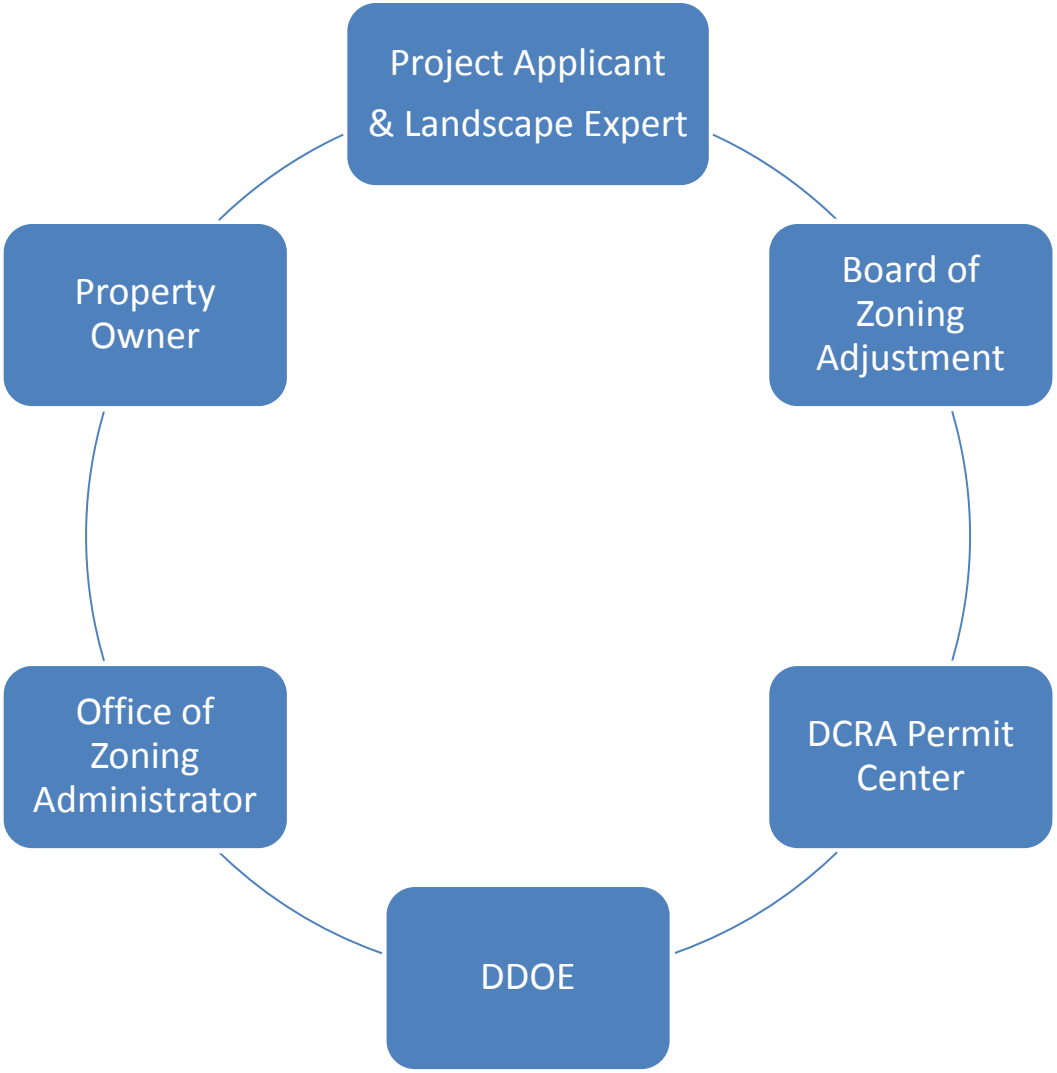


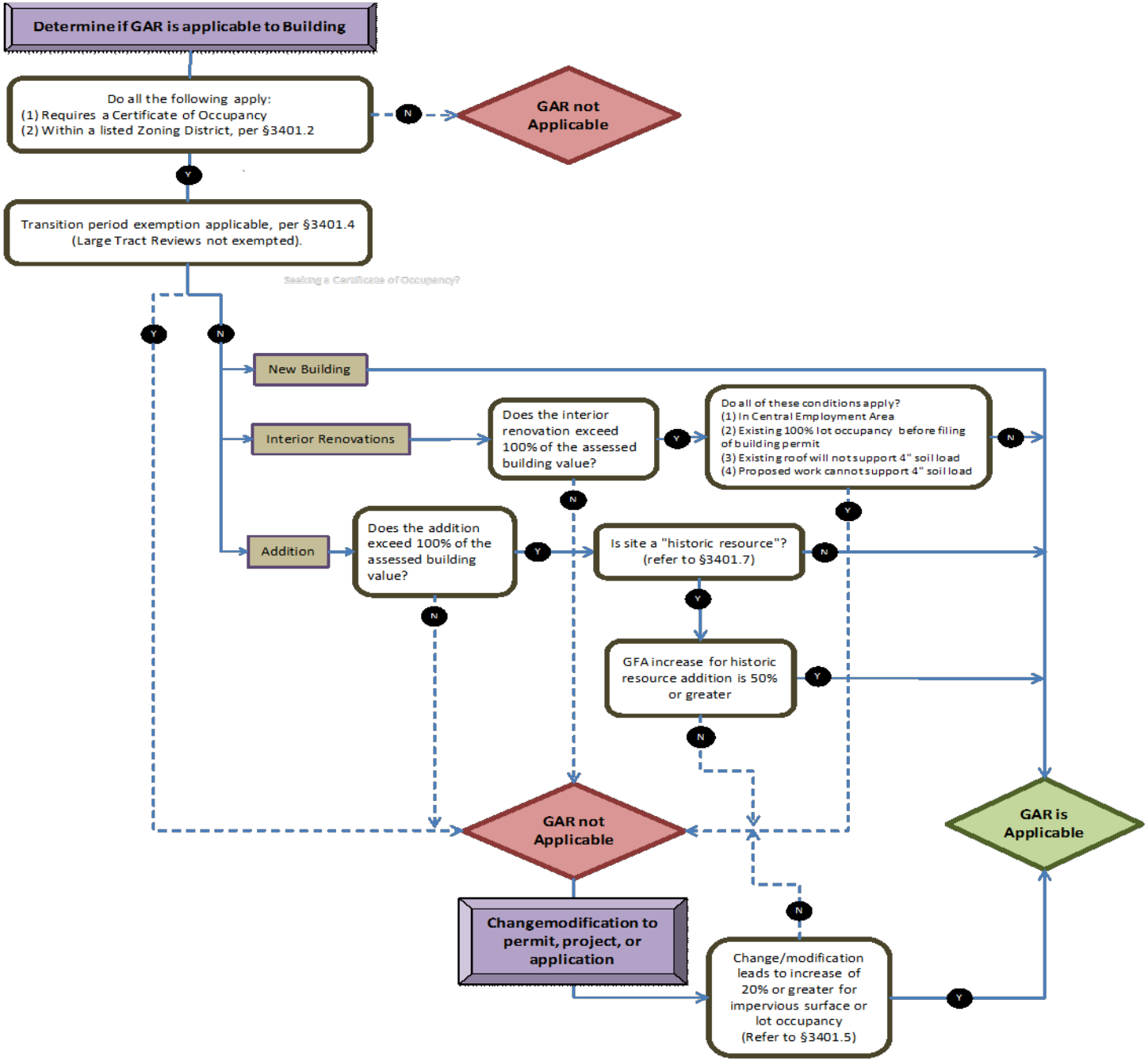
Stackable Elements

Landscape Elements	Soils	Bio retention	New or Existing Planting	Tree Protection	Vegetated Walls	Vegetated Roofs	Permeable Paving	Enhanced Tree Soil Systems	Renewable Energy	Water Features	Food Cultivation	Harvested Stormwater Irrigation	Native Plants
Soils													
Bioretention													
New/Existing Planting													
Tree Protection													
Vegetated Walls													
Vegetated Roofs													
Permeable Paving													
Enhanced Tree Soil Systems													
Renewable Energy													
Water Features													
Food Cultivation													
Harvested Stormwater Irrigation													
Native Plants													

REGULATION TRIGGERS
&
ADMINISTRATIVE PROCESS

Involved Parties




Determine if GAR is applicable to Building
Do all the following apply:
(1) Requires a Certificate of Occupancy
(2) Within a listed Zoning District, per §3401.2
N
GAR not Applicable
Y
Transition period exemption applicable, per §3401.4 (Large Tract Reviews not exempted).
Seeking a Certificate of Occupancy?
Y
N
New Building
Interior Renovations
Does the interior renovation exceed 100% of the assessed building value?
Y
Do all of these conditions apply?
(1) In Central Employment Area
(2) Existing 100% lot occupancy before filing of building permit
(3) Existing roof will not support 4" soil load
(4) Proposed work cannot support 4" soil load
N
N
Y
Addition
Does the addition exceed 100% of the assessed building value?
Y
Is site a "historic resource"? (refer to §3401.7)
N
N
Y
GFA increase for historic resource addition is 50% or greater
Y
N
GAR not Applicable
GAR is Applicable
Changemodification to permit, project, or application
N
Change/modification leads to increase of 20% or greater for impervious surface or lot occupancy (Refer to §3401.5)
Y

Who does not have a GAR?

- Buildings that do not require a certificate of occupancy,
  - Single family residences.
- DC Water wastewater treatment facilities.
- Interior renovations of existing buildings when,
  - Central Employment Area,
  - 100 percent lot occupancy,
  - Existing roof not capable of supporting vegetated system, ***and***
  - Proposed work does not result in a roof capable of supporting vegetated roof.
- Buildings or structures deemed “historic resources”,
  - Except when additions increase the gross floor area by 50 percent.

Who has a GAR?

- **All New Buildings** that require a Certificate of Occupancy (C of O).
- **Additions and Interior Renovations** to existing buildings,
  - When the construction cost exceeds 100 percent of the assessed building value within any twelve-month period.
  - A "historic resource" with a 50 percent (or more) increase to the gross floor area.

Definitions…

- ***Addition and interior renovation*** of existing building structure
  - Extension or increase in floor area or height.
  - Alteration, renovation or repair to the interior of the existing structure.
- ***Assessed value*** of the building
  - Office of Tax and Revenue records.
  - Date of the building permit application.
- ***Construction cost*** for an addition, alteration, or repair
  - Amount indicated by the applicant in the building permit application (Contract Agreement Form).
- ***Historic resource*** is a building or structure,
  - Certified by the DC Inventory of Historic Sites or State Historic Preservation Officer .

GAR Plan Development

- Is the project in a transition category?
- Have you hired a Landscape Expert?
- Are you asking for a BZA special exception?
- Do you know the score for your zone?
- Design considerations,
  - Building footprint within lot.
  - Stormwater obligations.
  - Energy goals.
  - Green building standards.

GAR Plan Development

- **Is the project in a transition category?**
- Have you hired a Landscape Expert?
- Are you asking for a BZA special exception?
- Do you know the score for your zone?
- Design considerations,
  - Building footprint within lot.
  - Stormwater obligations.
  - Energy goals.
  - Green building standards.

Exemption Forms

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF CONSUMER REGULATORY AFFAIRS

APPLICATION FOR EXEMPTION STATUS
FROM D.C. ZONING REGULATION GREEN AREA RATIO

I hereby request evidence of exemption from the Green Area Ratio (GAR) Chapter 34 of DCMR Title 11 for the proposed construction on the property identified below.

Address: _____

Square: _____ Lot: _____

Allowable Exemptions (CHECK ONE):

	Single Family House or CBRF with fewer than six handicapped persons.
	R1 through R4 Zone Districts.
	Municipal wastewater treatment facilities operated by DC Water and Sewer Authority.
	Building(s) or structure(s) certified by the DC Inventory of Historic Sites, or State Historic Preservation Officer, as "historic resource(s)"; additions increase the gross floor area by less than 50 percent.
	Additions, interior renovations, or both are less than 100 percent of the assessed building value as set forth in the records of the Office of Tax and Revenue as of the date of the building permit application.
	Interior Renovations: (a) Central Employment Area, (b)100 percent lot occupancy, (c) existing roof not capable of supporting vegetated system, and (d) proposed work does not result in a roof capable of supporting vegetated roof. (*Note: all four conditions are required for this exemption*)

Applicant _____ Telephone _____

Address _____

Signature _____ Date _____

DCRA, 1100 4th Street, SW, Suite E650 Washington, DC 20024 phone 202-442-4400 fax 202-442-9445

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF CONSUMER REGULATORY AFFAIRS

APPLICATION FOR EXEMPTION STATUS
FROM D.C. ZONING REGULATION GREEN AREA RATIO
BASED ON TRANSITION PERIOD FILING STATUS

I hereby request evidence of a transition period exemption from the Green Area Ratio (GAR) Chapter 34 of DCMR Title 11 for the proposed construction on the property identified below.

Address: _____

Square: _____ Lot: _____

Allowable Transition Period Exemptions (CHECK ONE):

	Building Permit filed prior to October 1st, 2013.
	Unexpired approval of a first stage, second stage, or consolidated planned unit development (PUD) when vote to approve occurred before October 1st, 2013.
	Unexpired approval of a variance, special exception, design review under the CG or SEFC overlay when vote to approve occurred before October 1st, 2013.
	Unexpired approval of a concept design by the Historic Preservation Review Board or Commission of Fine Arts when vote to approve occurred before October 1st, 2013.
	Unexpired approval of a variance, special exception, design review under the CG or SEFC overlay when a public hearing occurred before October 1st, 2013.
	Unexpired approval of a first stage, second stage, or consolidated planned unit development (PUD) when public hearing occurred before October 1st, 2013.

NOTE: When impervious surface or lot occupancy is increased by 20 percent or more, that increase is not covered under this exemption. The GAR is applied to the modification.

Applicant _____ Telephone _____

Address _____

Signature _____ Date _____

ZONING OFFICE USE ONLY

- ☐ Building Permit submitted prior 10/01/2013.
- ☐ PUD vote prior 10/01/2013.
- ☐ PUD with public hearing prior 10/01/2013.
- ☐ Variance, special exception, or design review under the CG or SEFC overlay vote prior 10/01/2013.
- ☐ Variance, special exception, or design review under the CG or SEFC public hearing prior 10/01/2013.
- ☐ Historic Preservation Review Board or Commission of Fine Arts vote prior 10/01/2013.

Office of Zoning Administrator _____ Date _____

Transition Period: No GAR

- **Building Permit Filed prior to October 1, 2013,**
  - DCRA officially accepted as being complete**.**
- **Building Permit Filed on or after October 1, 2013,**
  - Unexpired approval, provided the vote to approve occurred prior to October 1, 2013,
    - *A first stage, second stage, or consolidated planned unit development,*
    - *A variance, special exception, design review under the CG or SEFC overlay,* ***or***
    - *A concept design by the Historic Preservation Review Board or Commission of Fine Arts.*

Transition Period: No GAR

- **Building Permit Filed on or after October 1, 2013,**
  - Unexpired approval granted after October 1, 2013, provided a public hearing occurred prior to October 1, 2013,
    - *A variance, special exception, or design review under the CG or SEFC overlay.*
  - Unexpired approval granted after October 1, 2013, provided a set down for a public hearing occurred prior to October 1, 2013,
    - *A first stage, second stage, or consolidated planned unit development.*

Transition Period: Reduced GAR

- **Building Permit Filed on or after October 1, 2013 but no later than July 14, 2014,**
  - A Large Tract Review (LTR) completed prior to July 1, 2012,
  - Application consistent with conditions of LTR,
  - GAR equals 0.1 or greater,
    - independent of zone district.

GAR Plan Development

- Is the project in a transition category?
- **Have you hired a Landscape Expert?**
- Are you asking for a BZA special exception?
- Do you know the score for your zone?
- Design considerations,
  - Building footprint within lot.
  - Stormwater obligations.
  - Energy goals.
  - Green building standards.

Who is a Landscape Expert?

- **Certified Landscape Expert is:**
  - Maryland or Virginia certified Landscape Architect
  - International Society of Arboriculture Certified Arborist
  - Maryland certified Professional Horticulturist
  - Landscape Contractors Assoc. MD-DC-VA certified Landscape Technician

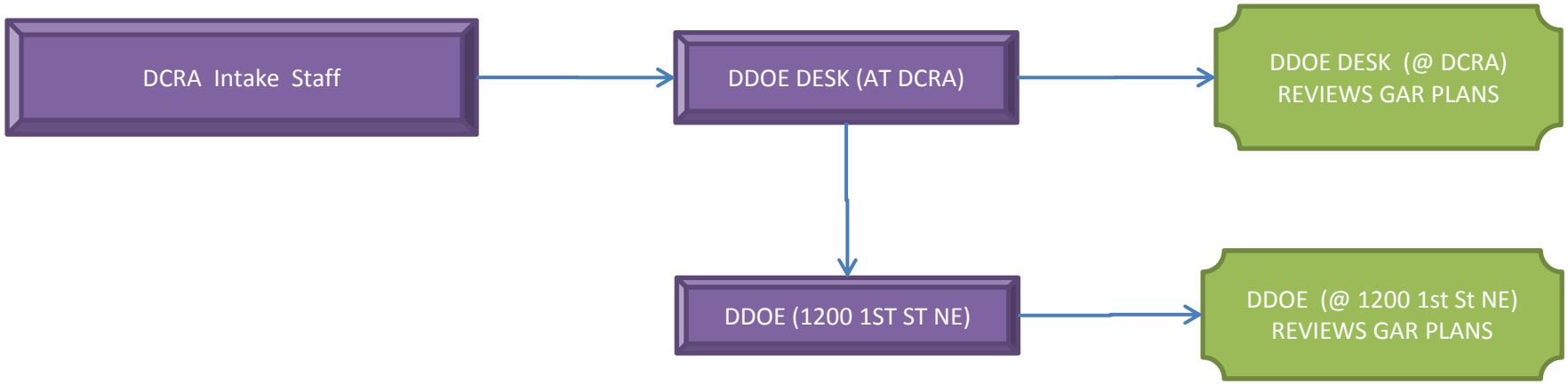
GAR Plan Development

- Is the project in a transition category?
- Have you hired a Landscape Expert?
- Are you asking for a BZA special exception?
- **Do you know the score for your zone?**
- Design considerations,
  - Building footprint within lot.
  - Stormwater obligations.
  - Energy goals.
  - Green building standards.

GAR Plan Development

- Is the project in a transition category?
- Have you hired a Landscape Expert?
- Are you asking for a BZA special exception?
- Do you know the score for your zone?
- **Design considerations,**
  - Building footprint within lot.
  - Stormwater obligations.
  - Energy goals.
  - Green building standards.

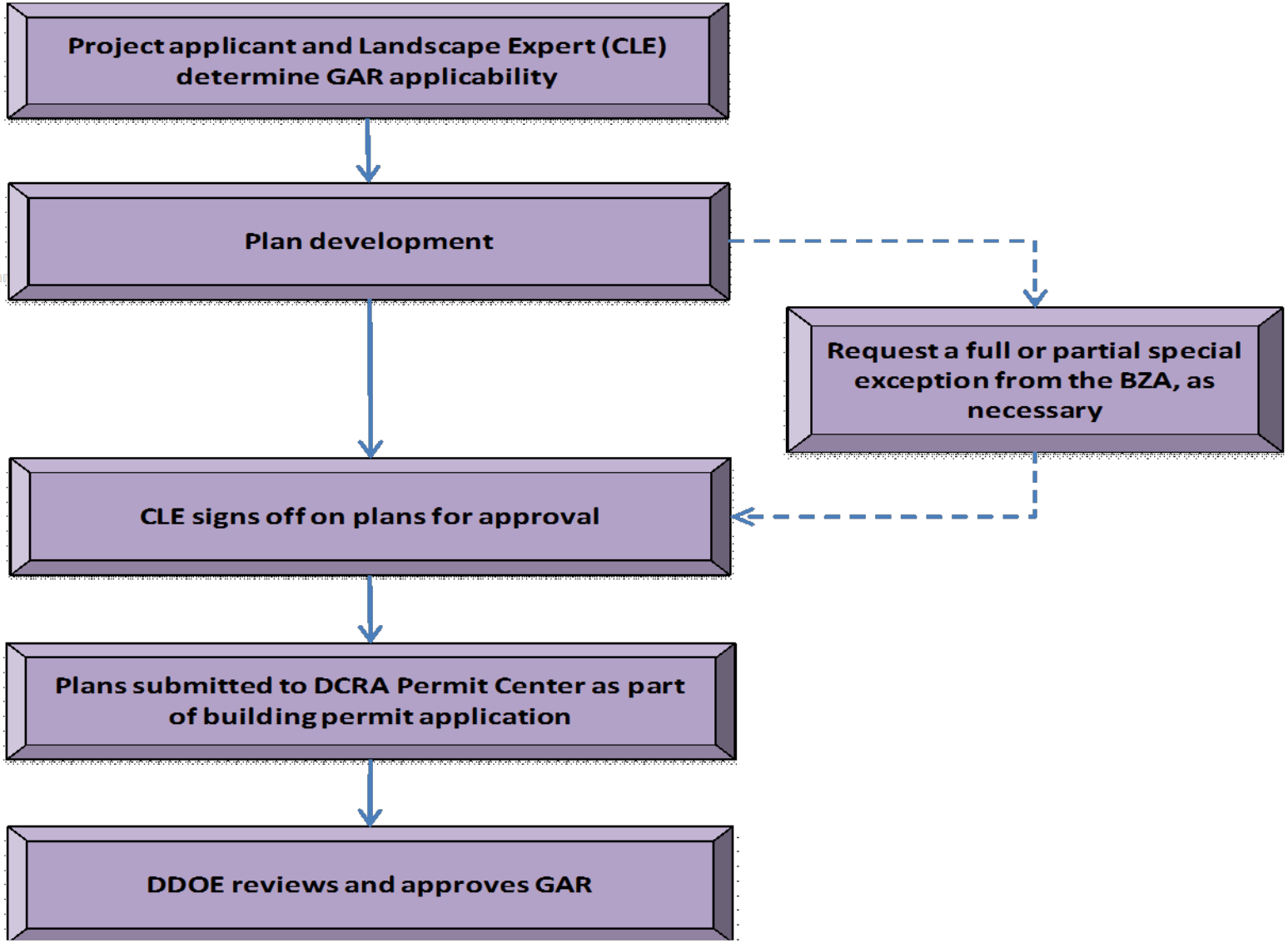
DCRA Intake Process



Which Permits Apply to GAR?

- New buildings – submit GAR with the Foundation-to-Grade (FD) or Civil (BCIV) permit to facilitate coordination with stormwater management plan review.

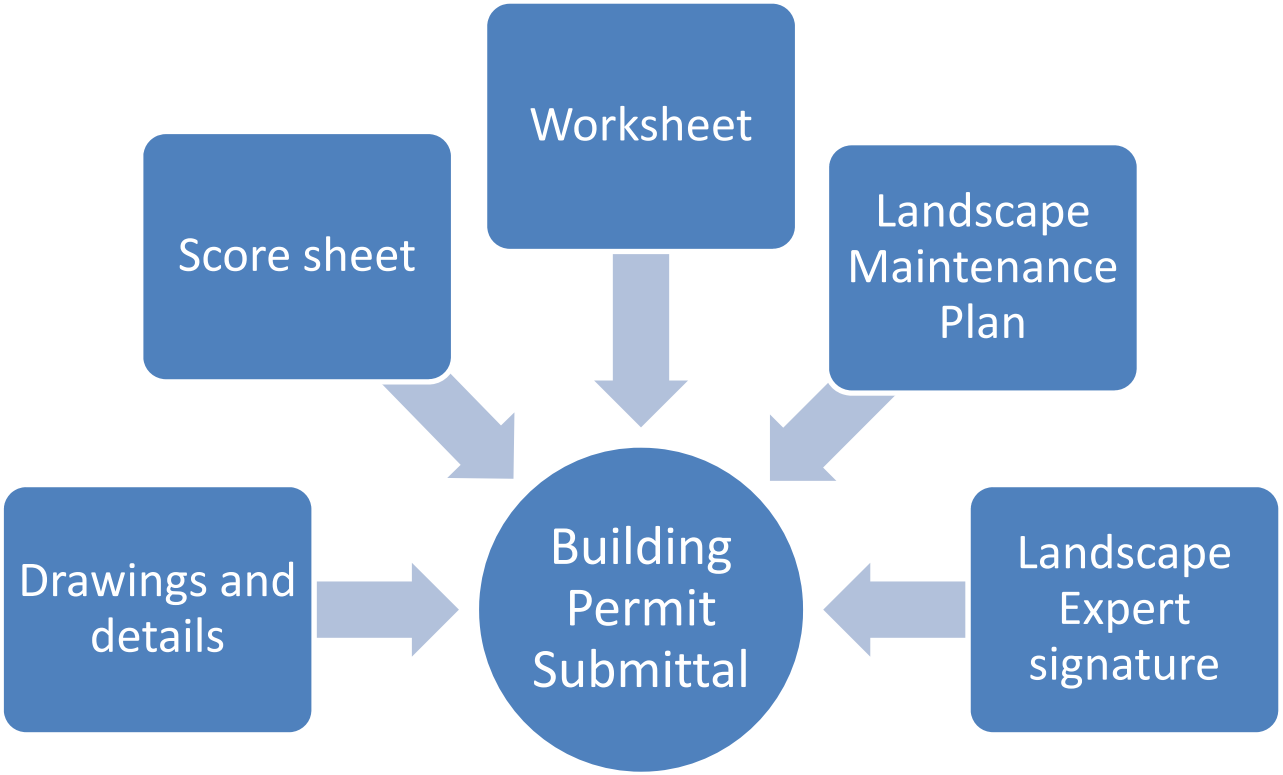
- Additions and Interior renovations – submit GAR with the Building (B) permit.



rtificate of Occupa

Plan submittals

- Synergy with stormwater plan submittals



Worksheet & Scoresheet

GREEN AREA RATIO Worksheet*

GOVERNMENT OF THE DISTRICT OF COLUMBIA
Vincent C. Gray, Mayor

		Quantity of GAR Features per Submitted Sheet						
		Sheet #	Sheet #	Sheet #	*keep adding columns as needed*			TOTAL**
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
B9	*square feet*							0
C1	*square feet*							0
C2	*square feet*							0
D1	*square feet*							0
D2	*square feet*							0
E1	*square feet*							0
E2	*square feet*							0
E3	*square feet*							0
H1	*square feet*							0
H2	*square feet*							0
H3	*square feet*							0

* See Green Area Ratio Scoresheet for category definitions
** Enter totals on the Green Area Ratio Scoresheet

Green Area Ratio Scoresheet

Ward	Lot	Square	Zoning District

Address:

Other / BZA Order:

enter sq ft of lot: 0

Lot size (enter this value first) *

multiplier: SCORE / RGN/ZIP

	Landscape Elements		Square Feet	Factor	Total
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		*enter sq ft* 0	0.4	-
B	Plantings (credit for plants in landscaped areas from Section A)				
1	Groundcovers, or other plants less than 2' tall at maturity		*enter sq ft* 0	0.2	-
2	Plants, not including grasses, 2' or taller at maturity - calculated at 9 sq ft per plant (typically planted no closer than 18" on center)	*enter number of plants* 0	0	0.3	-
3	Tree canopy for all new trees 2.5" to 6" in diameter or equivalent - calculated at 50 sq ft per tree	*enter number of trees* 0	0	0.5	-
4	Tree canopy for new trees 6" diameter or larger or equivalent - calculated at 250 sq ft per tree	*enter number of trees* 0	0	0.6	-
5	Tree canopy for preservation of existing trees 6" to 12" in diameter or larger or equivalent - calculated at 250 sq ft per tree	*enter number of trees* 0	0	0.7	-
6	Tree canopy for preservation of existing trees 12" to 18" in diameter or larger or equivalent - calculated at 600 sq ft per tree	*enter number of trees* 0	0	0.7	-
7	Tree canopy for preservation of all existing trees 18" to 24" in diameter or equivalent - calculated at 1300 sq ft per tree	*enter number of trees* 0	0	0.7	-
8	Tree canopy for preservation of all existing trees 24" in diameter or larger or equivalent - calculated at 2000 sq ft per tree	*enter number of trees* 0	0	0.8	-
9	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 6" of growth medium		*enter sq ft* 0	0.6	-
2	Over at least 6" of growth medium		*enter sq ft* 0	0.8	-
D	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	-
E	Other				
1	Enhanced tree growth systems***		*enter sq ft* 0	0.4	-
2	Renewable energy generation		*enter sq ft* 0	0.5	-
3	Approved water features		*enter sq ft* 0	0.2	-
		sub-total of sq ft =	0		
H	Bonuses				
1	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	-
			Green Area Ratio numerator =		

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

DDOE/WPD 08/2013

DDOE Plan Review

- Review of submittal requirements
- 10-30 working days for decision
- GAR stamp
- Fee payment

1200 First St, NE 5th Floor
Washington, DC 20002

GOVERNMENT OF THE DISTRICT OF COLUMBIA

DISTRICT DEPARTMENT OF THE ENVIRONMENT
NATURAL RESOURCES ADMINISTRATION
WATERSHED PROTECTION DIVISION

DISTRICT DEPARTMENT OF THE ENVIRONMENT

Green Area Ratio Approval

(As applicable) WPD File No._____

Notice: This Approval applies to the Green Area Ratio regulation only. The applicant is required to construct Green Area Ratio items as shown in the approved plans.
The Applicant must notify this office by phone (see below) after completing installation of all GAR landscape elements and providing the approved landscape maintenance plan to the property owner. If there is any need to make any changes or modifications in the approved design, this office must be notified immediately.

This Project is assigned Plan No. _____ **Phone No. (202) 535 – 2977**

_____
Approved By (Print Name):

_____ Date: _____
Signature

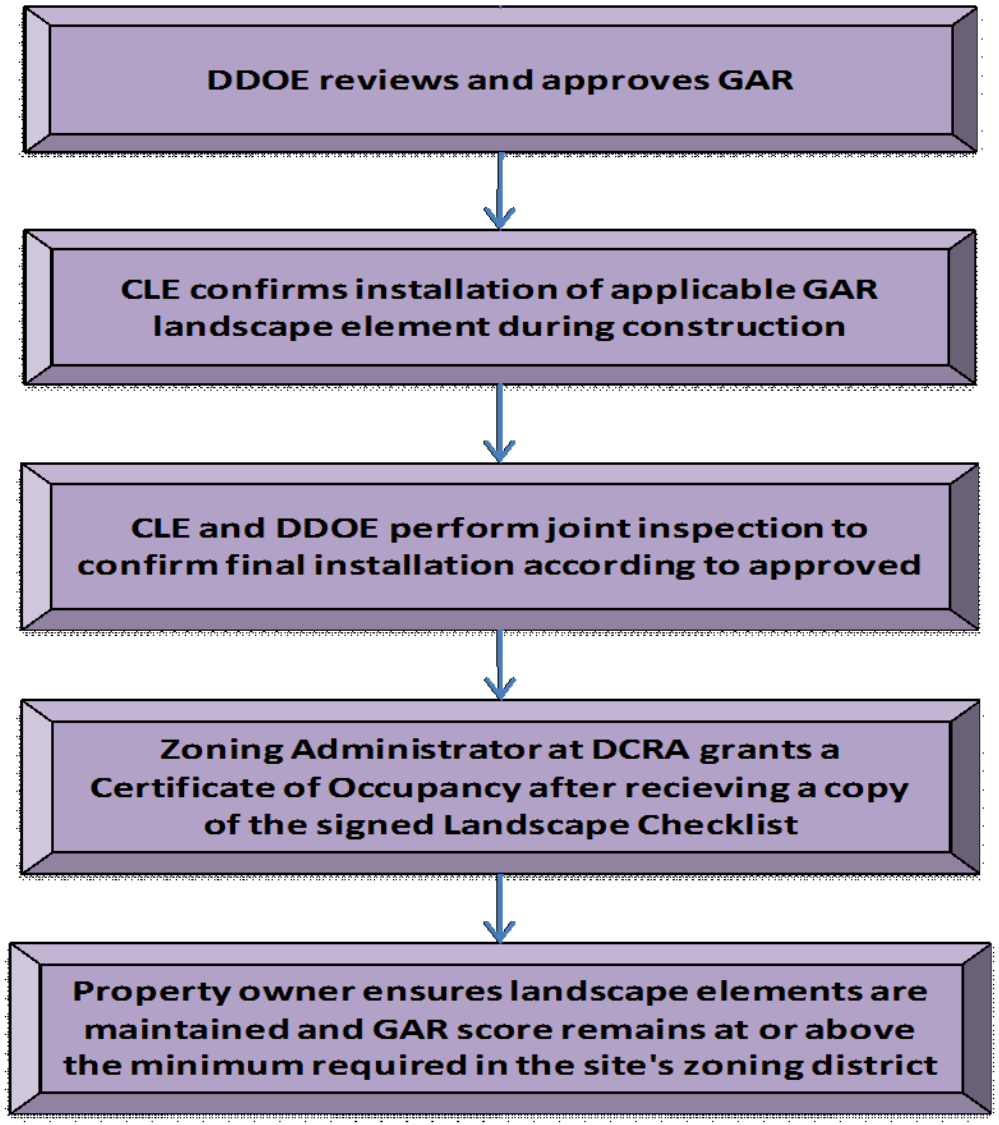
Fees

Payment Type	Payment Requirement	Fees by Land Disturbance Type and/or Building Footprint	
		≤10,000 ft^2	≥10,000 ft^2
Initial	Due upon filing for building permit	$575.00	$850.00
Final	Due before building permit is issued	$125.00	$200.00
Supplemental	For reviews after first resubmission	$500.00	

DDOE Stormwater Management Regulations - Chapter 5, DCMR Title 21 § 501.10

Plan Revisions

Plant Quantity	Change in location	Species substitution	Decrease in GAR score


DDOE reviews and approves GAR
CLE confirms installation of applicable GAR landscape element during construction
CLE and DDOE perform joint inspection to confirm final installation according to approved
Zoning Administrator at DCRA grants a Certificate of Occupancy after recieving a copy of the signed Landscape Checklist
Property owner ensures landscape elements are maintained and GAR score remains at or above the minimum required in the site's zoning district

Construction

Landscape Expert confirms installation as per plan

↓

DDOE Inspector Inspection

↓

Landscape Checklist

↓

Certificate of Occupancy

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DISTRICT DEPARTMENT OF ENVIRONMENT
WATERSHED PROTECTION DIVISION/INSPECTION & ENFORCEMENT BRANCH

Green Area Ratio - Landscape Checklist

I, _____, declare as follows:
Full Name of Certified Landscape Expert (Printed)

☐ I am a Certified Landscape Expert, as defined in DCMR Title 11, Chapter 34, responsible for confirming installation of the approved landscape plan for development located at:

_____, Washington, DC, and developed pursuant to:
Street Address (Printed)

_____ _____
Building Permit Number **DDOE Plan Number**

_____ _____ _____
Ward **Lot** **Square**

☐ The landscape elements shown on the DDOE-approved landscape plan or DDOE-approved modification for this property have been installed as approved and in a manner consistent with the standards of 11 DCMR Chapter 34. This includes the number size, and approximate location of plantings and other approved landscape elements.

☐ Any changes or species substitutions (if applicable) have been approved by DDOE.

☐ A completed Landscape Maintenance Plan has been submitted to the property owner.

I declare under penalty of perjury under the laws of the District of Columbia that the following is true and correct.

_____ _____ _____
Signature of Certified Landscape Expert **Certification/Registration Number** **Date**

NOTE: If any landscape elements have been changed during installation, DO NOT SIGN OR SUBMIT this checklist until a revised landscape plan has been approved by the District Department of Environment. If you provide false information in this document, you will subject yourself to criminal liability.

[TO BE COMPLETED BY DDOE INSPECTOR]

Document received by: _____ **Inspector Signature** _____ **Printed Name** _____ **Date**

DDOE (WHITE) OWNER/AGENT (YELLOW) LANDSCAPE EXPERT (GOLDENROD) INSPECTOR (PINK)

Temporary Certificate of Occupancy

- Apply to Office of Zoning Administrator
- Granted only twice, each time for 4 months.

Considered under the following conditions:

- Weather
- Seasonal restrictions
- Site construction

Maintenance

Property owner responsible after given Certificate of Occupancy		
Landscape Maintenance Plan	GAR Plan submittal not applicable	Complaint-based inspection

GAR & STORMWATER OVERLAP

GAR & Stormwater Overlap

Green Area Ratio Rule

- DCMR Chapter 34
- Requires a C of O
- No Maintenance Covenant
- Interior Renovations:
  - 100% construction cost trigger
- Area Calculations
- Design constraints maximizes healthy vegetation

Stormwater Rule

- DCMR Chapter 21
- Includes Public Right of Way
- Unrelated to C of O
- Maintenance Covenant Required
- Interior Renovations:
  - 50% construction cost trigger
- Volume Calculations
- Contributing Drainage Area
- Design constraints maximizes stormwater retention

Overlap: to achieve stormwater environmental benefits
Landscape Elements often the same practices as LID BMPs

LID BMPs vs Landscape Elements

Stormwater Best Management Practices	Landscape Elements
Bioretention	Only considers practice area
Vegetated Roofs (green roofs)	Assigns greater value based on depth
Permeable Paving	Only considers practice area
Rainwater Harvesting	Limited to irrigation
Tree Canopy (new and preserved)	Higher value, more variability
Land abstraction not a BMP	Ground cover plantings
May improve BMP or land abstraction	Soil depth for landscaping
Is it receiving stormwater runoff?	Green Walls
Is it receiving stormwater runoff?	Enhanced tree growth systems
Suggested not required	Native planting rewarded in scoring
Not considered	Food cultivation
Not consider unless a harvest demand	Water feature
Not considered	Renewable energy

Pervious surface requirements

Landscaping for parking lots

RELATED ZONING REQUIREMENTS

Pervious Surface Requirements

- In zones R-1 through R-4
- Applies when increasing existing lot occupancy by 10%+ or 25%+ for historic structures
- Pervious = grass; mulched groundcover; plants; trees; permeable pavers; and decks or porches

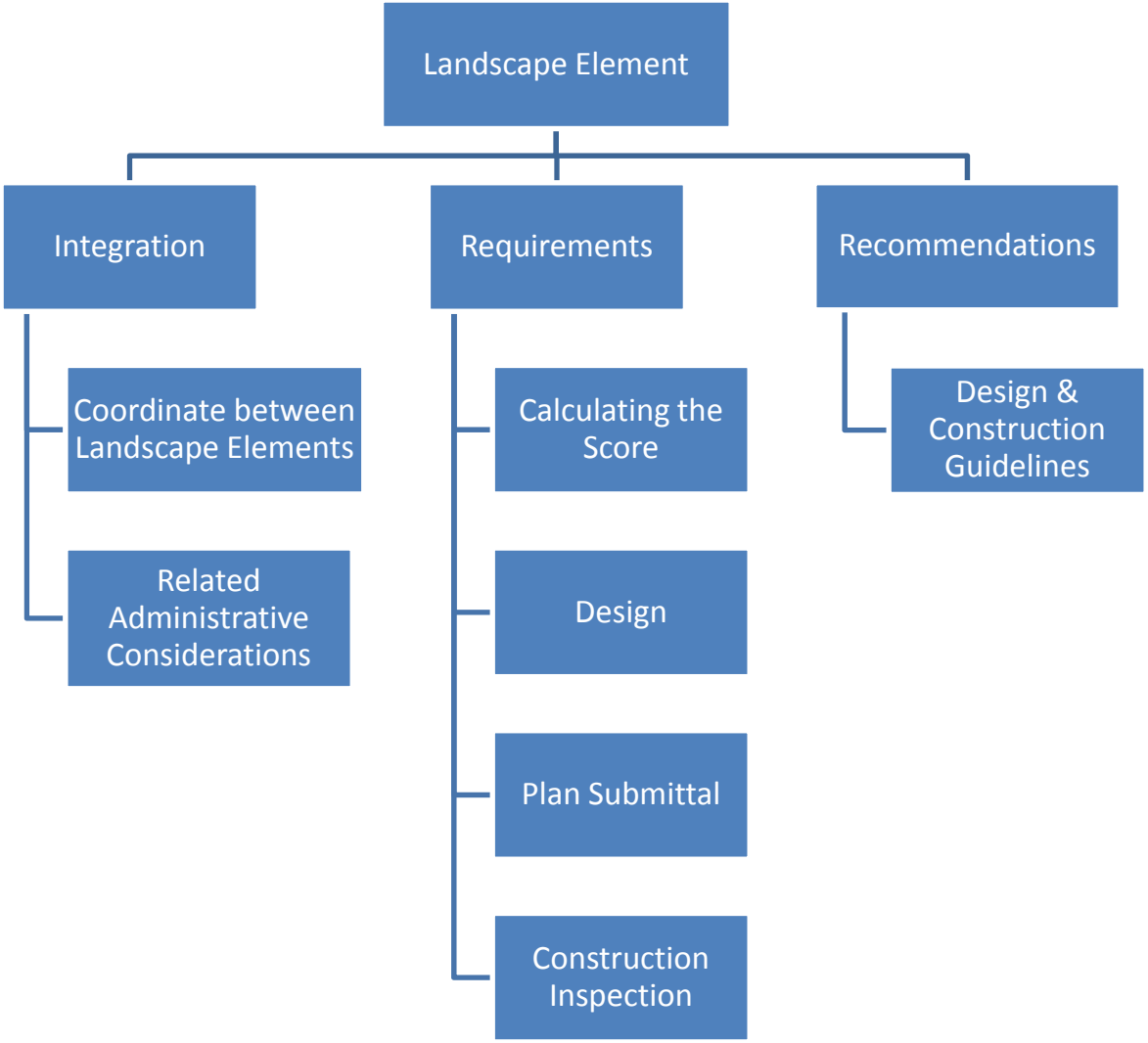
ZONE DISTRICT AND STRUCTURE	MINIMUM PERCENTAGE OF PERVIOUS SURFACE
R-1 through R-4 Public recreation and community centers	30%
R-l-A, R-l-B All other structures	50%
R-2 All other structures	30%
R-3 All other structures	20%

Landscaping for Surface Parking

- Minimum 10% of lot landscaped
- Landscape end islands of 9+ spaces
- Trees must be min. 2.5” dbh at planting
- Plant 4’ from protective barriers
- Special exceptions if impracticable

LANDSCAPE ELEMENTS

Landscape Element Format



Soils and Amendments

Opportunities to Overlay Landscape Elements	Soils	Bioretention	New or Existing Planting	Tree Protection	Vegetated Walls	Vegetated Roofs	Permeable Paving	Enhanced Tree Growth	Renewable Energy	Water Features	Food Cultivation	Harvested Stormwater Irrigation	Native Plants
Soils													

Source: Univ. Mich. Biological Station

Depth < 24” = 0.3

Depth > 24” = 0.6

- Depth is measured by total uncompacted soil and subsoil.
- Existing soils with vegetation are credited with > 24” depth

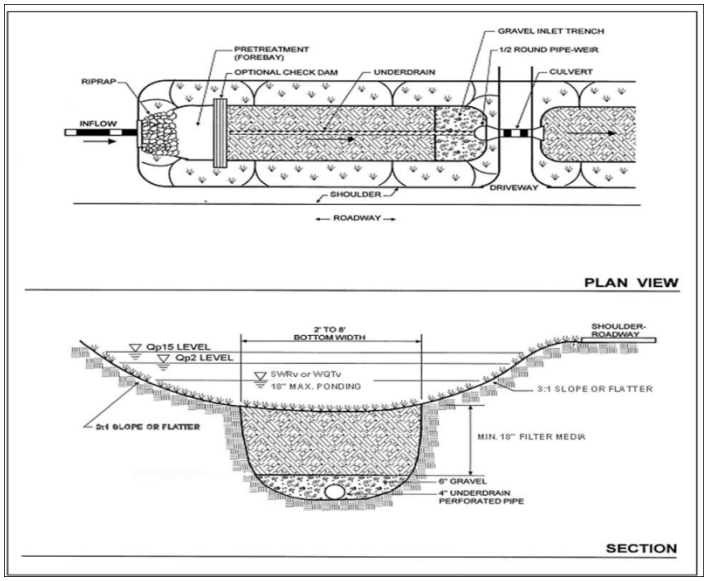
Design

- Existing soils – specify protection fencing or stockpiling
- Disturbed topsoil – incorporate compost
- Imported topsoil – meet specifications

Construction

- Area and depth of uncompacted soil
- Subgrade preparation and drainage
- Soil testing – imported and disturbed soils
- Soil stabilized with vegetative cover or mulch

Bioretention



Multiplier 0.4	• Extents of bioretention and pre-treatment area
Design	• Rain garden, bioretention, stormwater planters, dry swales • Specify primarily native plantings • Soils to comply with Stormwater Management Guidebook. • Considerations – trees near underdrains
Construction	• Surface area • Soil media • Plant quality and installation.

New & Existing Plantings

Variable

0.2-0.6

- Caliper measurements for tree size
- Transplanted trees are credited as new
- Multi-stem trees – measure ½ of 3 largest trunks

Green Area Ratio Landscape Elements	Equivalent Square Footage (ft^2 per plant/tree)
Groundcovers, or other plants less than 2 feet tall at maturity	Square footage at maturity
Plants, not including grasses, at least 2 feet tall at maturity	9
Tree canopy for trees 2.5–6 inches in diameter	50
Tree canopy for trees 6–12 inches in diameter	250
Tree canopy for trees 12–18 inches in diameter	600
Tree canopy for trees 18–24 inches in diameter	1,300
Tree canopy for trees larger than 24 inches in diameter	2,000

New & Existing Plantings

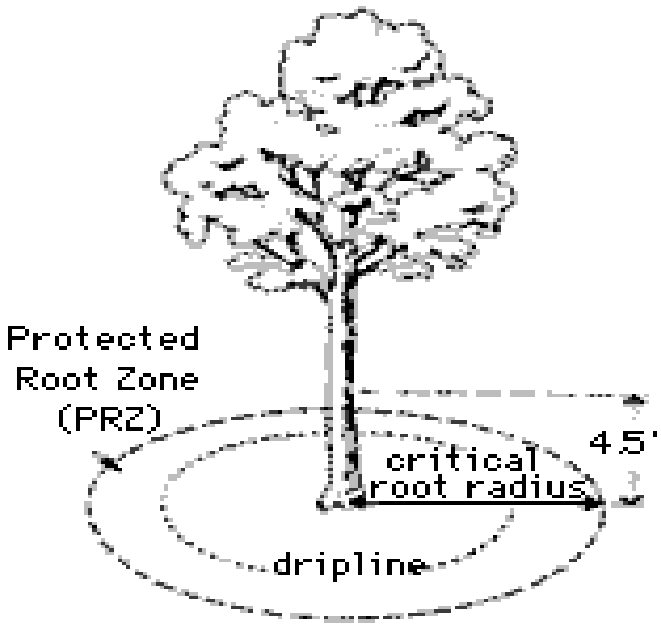
Design Requirements

- ANLA Standards (rootball, caliper, branching, height)
- Specify perennials and woody plants (not annuals) unless for food cultivation
- Plant spacing and rooting depth

Inspection Responsibilities

- Scheduling - planting season and construction sequence
- Plant material inspection before/during installation
- Layout as per plan
- Planting hole preparation

Tree Protection



2.5-6”dia. = 0.5

6-24” dia. = 0.7

> 24” dia. = 0.8

- Variable multipliers
- DBH Measurement

Design

- Tree Survey – consider additional coordination with ISA Arborist for tree condition assessment
- Tree preservation plan – identify CRZ (or dripline) protection, including fencing and other protection or design measures

Construction

- Preconstruction meeting – protection measures installed
- During construction - adherence to protection plan
- Adjust GAR plan as necessary if tree protection not adhered to during construction.

Vegetated Walls

Multiplier 0.6

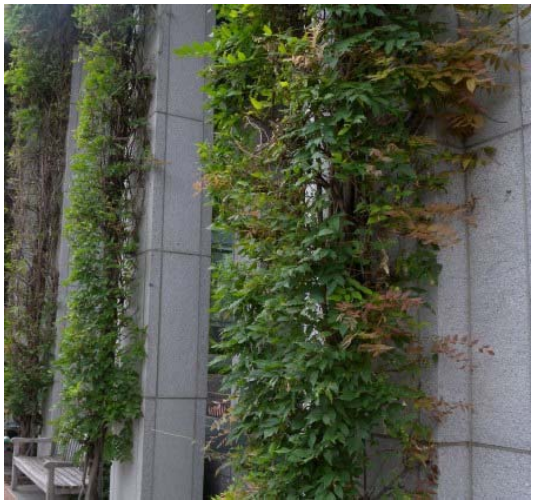
- Measure along ground plane.
- Standard vegetated width is 1 foot.
- Linear coverage is expected growth in soil area along vertical element

Design

- 5’ from side or rear lot line
- May require harvested stormwater irrigation
- Plant cultural requirements
- 12-foot minimum height

Construction

- Area and spacing of plantings
- Verify installation of vertical support
- Installation and function of irrigation
- Plant quality and establishment



Source: Tournesol Siteworks

Vegetated Roofs

Extensive = 0.6
Intensive = 0.8

- Extensive (2-8” soil) – groundcover vegetation built into score
- Intensive (> 8” soil) – additional credit for plants > 2’ ht.

Design

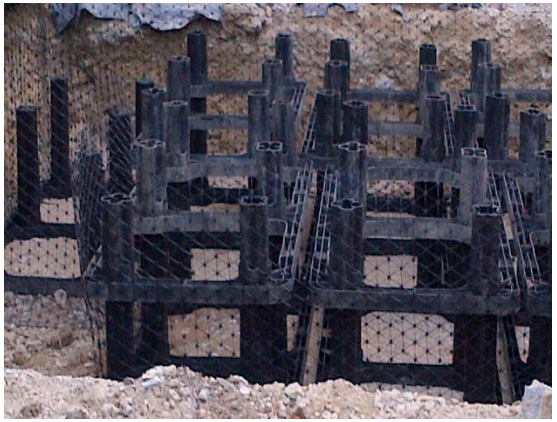
- Supplemental irrigation required (hose bib, drip, spray)
- Harvested stormwater irrigation connection if proposed

Construction

- Vegetation coverage and quality
- Depth of soil media
- Suitable drainage for plantings

Enhanced Tree Growth

Opportunities to Overlay Landscape Elements	Soils	Bioretention	New or Existing Planting	Tree Protection	Vegetated Walls	Vegetated Roofs	Permeable Paving	Enhanced Tree Growth	Renewable Energy	Water Features	Food Cultivation	Harvested Stormwater Irrigation	Native Plants
Enhanced Tree Growth													



Multiplier

0.4

- Cannot exceed 1/3 of total GAR score along with permeable paving
- Permeable pavers may be placed over Enhanced Tree Growth systems

Design

- Minimum 24” soil depth
- Underneath pavement and adjacent to tree pits
- Neither contaminated or compacted (CERCLA)
- Consider passive irrigation (pavers, drain inlets with pipe)

Construction

- Area and depth of soil media
- Irrigation and drainage (as necessary)
- Topsoil meets approved specification

Permeable Paving

6-24” soil/gravel = 0.4

> 24” soil/gravel = 0.5

- Cannot exceed 1/3rd of GAR total score in combination with “enhanced tree growth”

Design

- Shall meet the guidelines in Stormwater Management Guidebook
- Vegetated pavers - use for overflow parking only

Construction

- Area
- Depth of aggregate or soil structural layer

Renewable Energy

Opportunities to Overlay Landscape Elements	Soils	Bioretention	New or Existing Planting	Tree Protection	Vegetated Walls	Vegetated Roofs	Permeable Paving	Enhanced Tree Growth	Renewable Energy	Water Features	Food Cultivation	Harvested Stormwater Irrigation	Native Plants
Renewable Energy													

Multiplier
0.5

- Square footage of array

Design

- Solar photovoltaic and solar thermal
- Site plan with array location and dimensions
- Schematic plan for electrical or plumbing systems

Construction

- Visually confirm area after certification/inspector signoff

Water Features

Multiplier 0.2	• Area of water element • Pools, fountains, constructed water amenities
Design	• Harvested rainwater - 50% annual flow • Water feature underwater 6 mo./ yr. (min.) • Submit plumbing documents, water budget • Water must recirculate
Construction	• Confirm area per approved plan • Confirm connection to harvested rainwater

Harvested Stormwater Irrigation

Multiplier 0.1

- Bonus - green roof, green wall, new plantings
- Irrigation from Contributing drainage area and cistern

Design

- Submit schematic irrigation/drainage plan
  - Irrigation area
  - Delivery system (drip vs spray)
  - Anticipated water demand (inch/week, % harvested)
  - Drainage

Construction

- Area of irrigation
- System is functional and connected to cistern/rain barrel

Native Plants

Opportunities to Overlay Landscape Elements	Soils	Bioretention	New or Existing Planting	Tree Protection	Vegetated Walls	Vegetated Roofs	Permeable Paving	Enhanced Tree Growth	Renewable Energy	Water Features	Food Cultivation	Harvested Stormwater Irrigation	Native Plants
Native Plants													

Bonus Feature 0.1

- New plants and tree preservation
- Green roof
- Vegetated wall

Design

- USFWS - Native Plants for Wildlife Conservation Landscaping:
- Referenced as native
- Non-invasive

Construction

- Plant species

Source: Northcreek Nurseries

Source: Northscaping, Inc.

Food Cultivation

Bonus Feature
0.1

- Soil area
- Green roof
- Vegetated wall
- Plantings

Design

- Accessible to building occupants
- Water source is available
- Annuals, perennials, woody species

Construction

- Planting of crops
- Soil is stabilized

LANDSCAPE MAINTENANCE PLAN

SOILS AND AMENDMENTS

Seasonal application

Mulch – Apply yearly or as necessary to replace decomposed mulch.
Compost – Apply compost yearly at 1–2 inch depth. Coarse textured sand and clay soils require greater compost addition than loamy soils. The organic matter content of the chosen compost will determine the depth applied
Fertilizer – If choosing to apply fertilizer, perform a soil test for nutrient levels only after incorporating compost into topsoil. This will avoid over-application of nutrients, as compost itself will increase the nutrient content.

Material source

Compost should be well-decomposed material, stable, free of weeds, contaminants and foul odors. Compost may be derived from yard waste (decomposed leaves, grass clippings, branches) or food waste.
Mulch can be derived from organic sources such as shredded bark, or leaf mulch.

BIORETENTION

Frequency **Maintenance Tasks**

Upon establishment
For the first 6 months following construction, the practice and CDA should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. Conduct any needed repairs or stabilization.
Inspectors should look for bare or eroding areas in the contributing drainage area or around the bioretention area, and make sure they are immediately stabilized with grass cover.
One-time, spot fertilization may be needed for initial planting.
Watering is needed once a week during the first 2 months, and then as needed during first growing season (April-October), depending on rainfall.
Remove and replace dead plants. Up to 10% of the plant stock may die off in the first year, so construction contracts should include a care and replacement warranty to ensure that vegetation is properly established

At least 4 times per year
Mow grass filter strips and bioretention with turf cover
Check curb cuts and inlets for accumulated grit, leaves, and debris that may block inflow

Twice during growing season
Spot weed and mulch

Annually
Conduct a maintenance inspection
Supplement mulch in devoid areas to 3” depth
Prune trees and shrubs
Remove sediment in pre-treatment cells and inflow points

Once every 2–3 years
Remove sediment in pretreatment cells and inflow
oints

As needed

• Add reinforcement planting to maintain desired vegetation density

• Remove invasive plants using recommended control measures

• Remove any dead or diseased plants

LANDSCAPE AREAS ALL PLANTINGS

Provide supplemental watering if rainfall is less than 1 inch per week during the first two growing seasons.
Conduct weeding as necessary to reduce competition between weeds and new plantings for nutrients, soil moisture, and sunlight.
Replace mulch as necessary to reduce competition for available moisture and nutrients.
Monitor the plantings for disease or stress and modify cultural practice as necessary. Employ an integrated pest management (IPM) approach if possible.
Remove dead plant material and replant in the next appropriate growing season.

TREES AND SHRUBS

For trees, install slow leak watering bags or tree buckets during the first two growing seasons and water as necessary to supplement precipitation if less than 1 inch per week.
Inspect trees for signs of dead, diseased, or crossing branches and prune accordingly. Remove hazard limbs especially from established trees. Never remove more than 20% of the tree canopy during pruning activities in any year.
Spread mulch to 2-4 inch depth.
Maintain the health of the tree by limiting all grade changes and other soil disturbance underneath the tree’s Critical Root Zone.

PERENNIALS AND GROUNDCOVERS

In the early spring, trim dead top-growth from perennials and warm-season grasses.
Periodically divide perennials as necessary to encourage rejuvenated growth.
Spread mulch at a maximum 2-inch depth.

TURFGRASS

Test soil for pH and apply lime only as necessary.
Maintain turfgrass at an increased height to reduce weed germination. Never mow more than one third of the grass height.
Leaving grass clippings in-place after mowing requires less fertilizer application.
Regularly monitor and over-seed bare spots to prevent weed establishment.
In late fall, core aerate and topdress with organic matter.

VEGETATED WALLS

Living Facades

Periodically inspect roof gutters and drains for clogging with vegetation or debris.
Cable systems may require re-tensioning or inspection of the integrity of wall tie-ins.
Schedule regular plant maintenance during establishment and ongoing growth. Inspect the plants for signs of disease, weed competition, training along the support structure, and pruning needs.

Living Walls

Individual vegetated panels from living walls should be removed to inspect the wall and support structures for drainage and anchorage issues. Clean all drains and gutters yearly.
When using harvested stormwater irrigation, valves and fertilizer injectors should be checked for function, and the irrigation pipes checked for leaks. Schedule frequent irrigation inspections. Drip irrigation emitters should be checked during operation to ensure water is being delivered to all panels. Winterize irrigation systems as per the irrigation specification.
Schedule regular plant maintenance during establishment and ongoing growth. Inspect the vegetated wall for signs of disease, inadequate irrigation, and erosion.

HARVESTED STORMWATER IRRIGATION

Cistern

The cistern must be cleaned yearly. To clean, use a submersible pump to remove the water. Brush walls with a hard bristle brush or use a high pressure cleaner.
Purpose of the maintenance is to remove the sediment that inevitably deposits on the cistern's floor and which may give rise to parasitic fermentation and odor. The rate at which the sediment accumulates depends on the region's atmospheric pollution (for dust), the roof type, and the quality of the set-up upstream from the cistern's storage compartment.
A fine mesh filter placed between the roof gutter's main downspout and the sedimentation basin will substantially delay the accumulation of sediment in the barrel or cistern. Additionally, a sedimentation basin equipped with an appropriate trapped overflow that prevents the passage of floating impurities can work. Filters need to be cleaned monthly.
Cisterns and rain barrels should be dewatered often to ensure available volume on the onset of rain events.

Irrigation

Conduct frequent inspections to verify integrity of irrigation system.
Periodically review the pressure regulators, filters, controller, sensors, valves, sprinkler heads and other system components to verify they meet original design criteria for efficient operation and uniform water distribution.
Ensure that replacement hardware used for system repairs matches the existing hardware, and is in accordance with the design. Ensure that system modifications are in keeping with design specifications and do not cause water demand to exceed the system’s hydraulic capacity.
Winterize irrigation systems and re-establish operation in the spring.

Questions & Answers

- For additional information:

ddoe.dc.gov/GAR

- **Markku McGlynn**
- **David Wooden**
- **Rebecca Stack**
- **Laine Cidlowski**