

# LA DENSIFICATION VERTE, C'EST POSSIBLE!

 milieux de vie  
en santé



**MARDI 25 OCTOBRE 2016**

Hôtel Plaza  
3031, boul. Laurier, Sainte-Foy



# Seattle Green Factor

Code standard for livable, functional landscapes

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CollinsWoerman

+ **Dave LaClergue** (*in absentia*)

Seattle Office of Planning and  
Community Development

25 October, 2016

Phase IV Terry Plaza Looking East



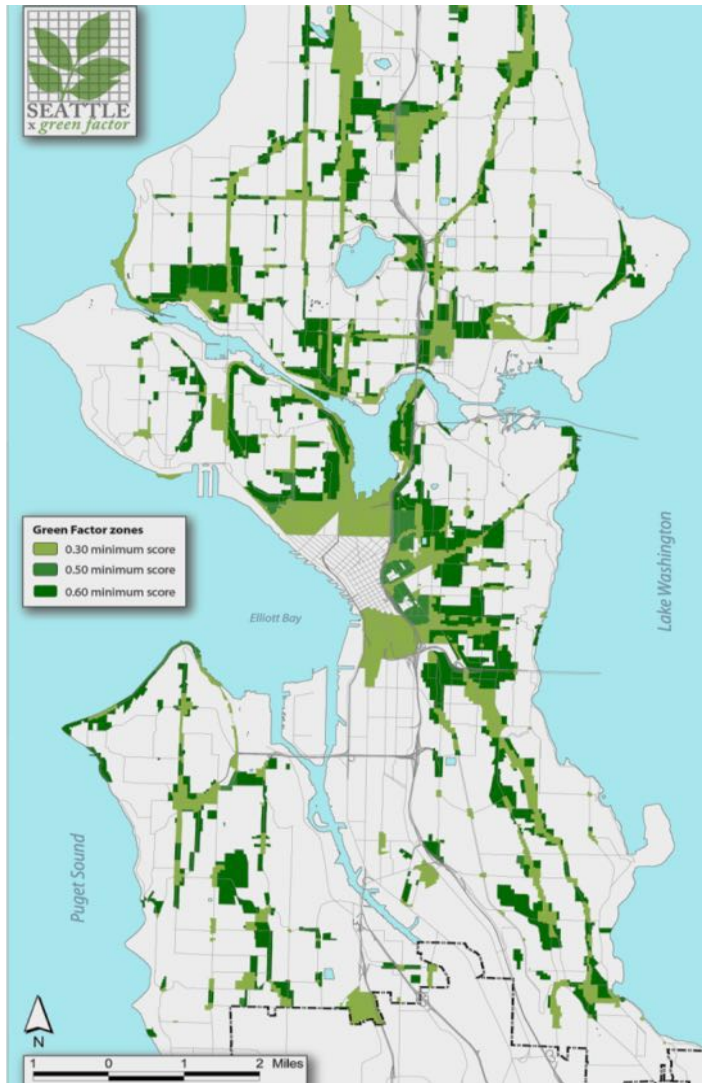
# Overview

1. What is the Green Factor?
2. Why do it?
3. How does it work?
4. How it was implemented
5. Results so far
6. Resilient cities and green infrastructure



## 1. What is the Green Factor?

- Requires a certain percentage of the lot area be occupied by trees, shrubs, green walls and roofs, or porous pavement
- Mandated in dense areas of the city for any new project or major redevelopment
- Menu-based scoring system for landscape



## 2. Why do the Green Factor?

- Balance density and livability
- Integrate ecosystem functions with urban functions stormwater and heat island
- Green building systems did not adequately address the role of vegetation

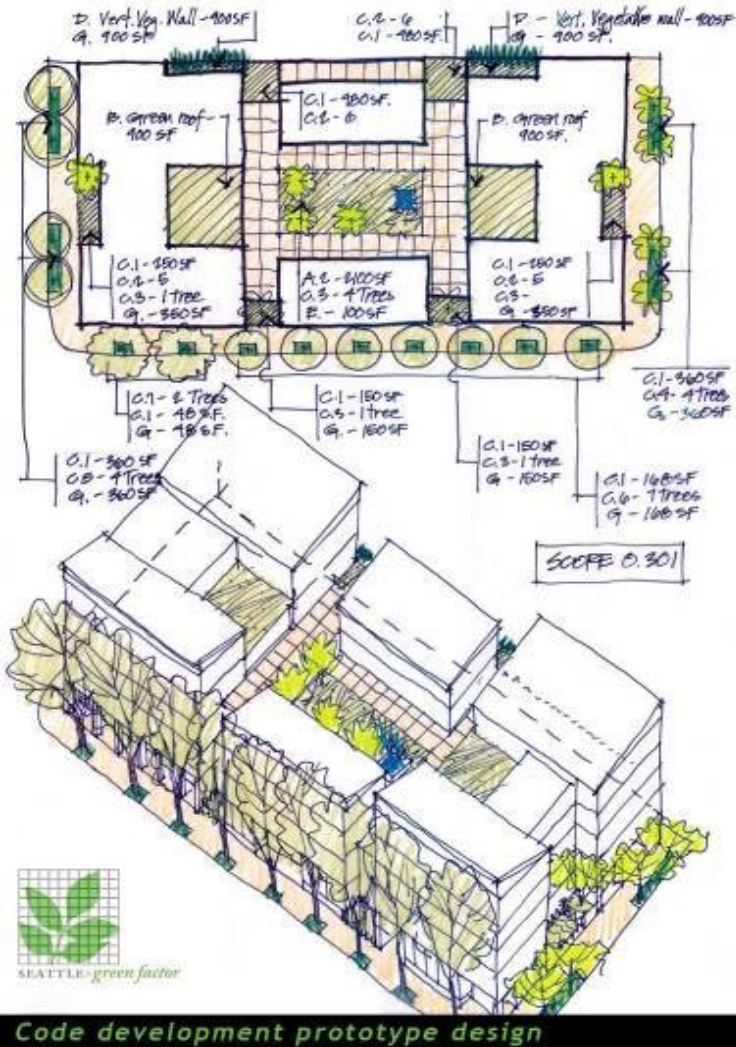
## Precedent programs

- Started with these examples, customized for Seattle context
- Berlin: Biotope Area Factor 1997. Applied in select neighborhoods.
- Malmö: Green Space Factor 2001. Applied to multifamily residential districts.



### 3. How does the Green Factor work?

- Provides weighted menu, sets minimum score
- Includes green roofs and walls, bioretention, and permeable paving
- Requirement for permit approval, can “double-count” toward other requirements



# The Green Factors

SEATTLE  $\times$  green factor

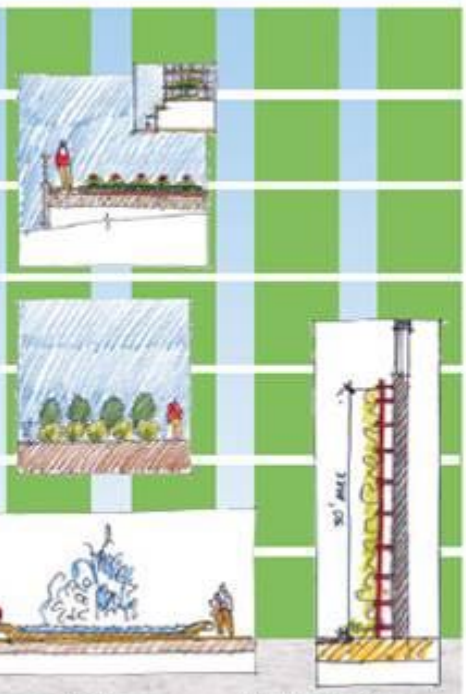
0.8  
0.7  
0.6  
0.5  
0.4  
0.3  
0.2  
0.1  
0

## SEATTLE GREEN FACTOR:

- Maximizes vegetation potential in rights-of-way
- Rewards layering of plant material
- Rewards tree preservation
- Rewards larger species of trees
- Rewards low water use
- Rewards landscapes visible to passersby
- Provides flexibility for developer to meet the code

Asphalt	Lawn	Ground Cover	Grass Pavers	Taller Shrubs	Small to Medium Trees	Medium to Large Trees	Protected Trees	Permeable Paving	Green Roofs Plantings under 3' with Deeper Soils	Vertical Green Walls Open Water Feature
Concrete										
Conventional Roof										

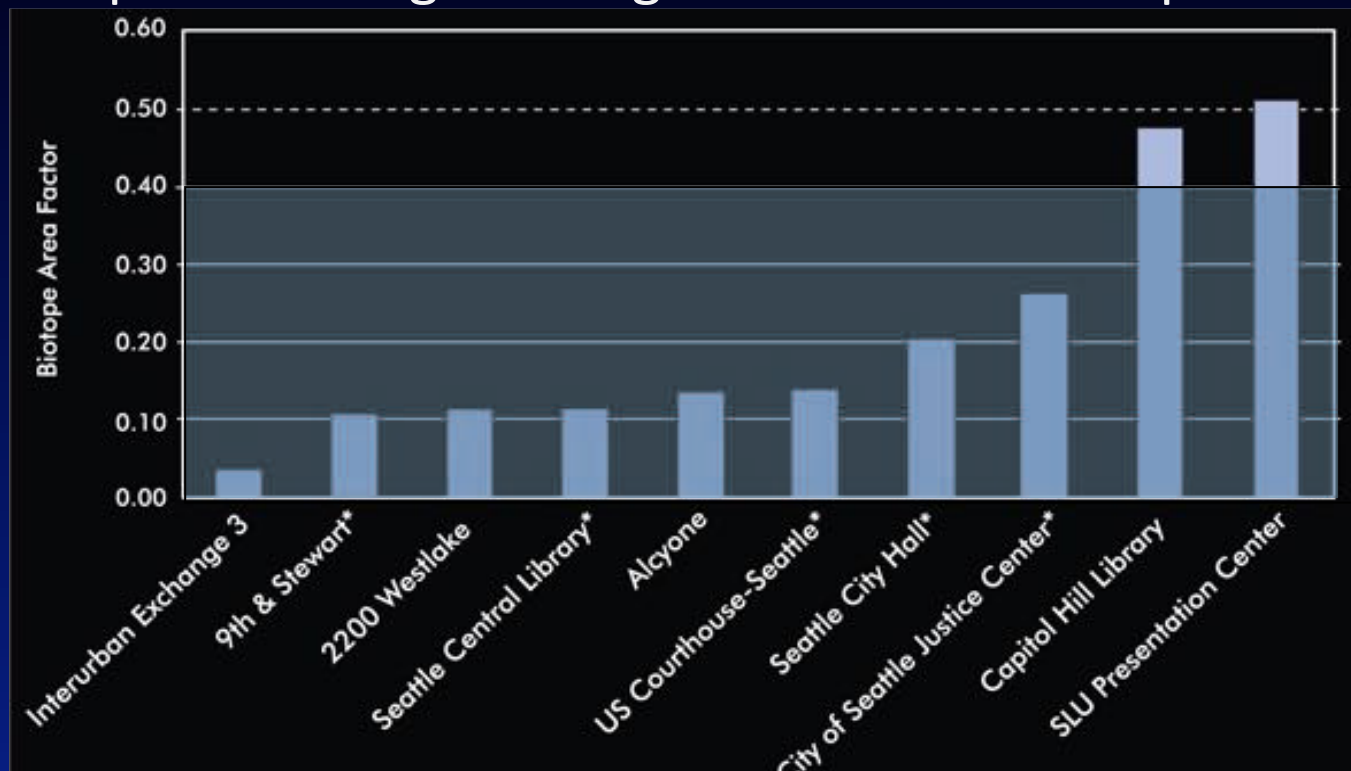
Bonus +0.1: For drought tolerant landscapes and for landscapes visible from the right-of-way.





## 4. How was the Green Factor implemented?

- Compare existing buildings to German “biotope area factor”



## 4. How was the Green Factor implemented?

### **Discuss and listen**

- City departments
- Property owners, developers, builders
- Neighborhood representatives, environmental activists

### **Test and analyze**

- Could applicants meet the standard without resorting to green roofs?
- What would it cost to apply to three recently built projects?

### **Prepare draft ordinance and reference materials**

- Director's Rule 13-92 Landscape Standards
- Client Assistance Memo 234 Landscaping Information

Version 12/26/10

## Green Factor Score Sheet

SEATTLE *green factor*

Project title: \_\_\_\_\_

Parcel size (enter this value first)  enter sq ft of parcel  SCORE

Landscape Elements**	Totals from GF worksheet	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"	<input type="text" value="0"/>	0.1	-
2 Landscaped areas with a soil depth of 24" or greater	<input type="text" value="0"/>	0.6	-
3 Bioretention facilities	<input type="text" value="0"/>	1.0	-
<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	<input type="text" value="0"/>	0.1	-
2 Shrubs or perennials 2'+ at maturity - calculated at 12 sq ft per plant (typically planted no closer than 18" on center)	<input type="text" value="0"/>	0.3	-
3 Tree canopy for "small trees" or equivalent (canopy spread 8' to 15') - calculated at 75 sq ft per tree	<input type="text" value="0"/>	0.3	-
4 Tree canopy for "small/medium trees" or equivalent (canopy spread 16' to 20') - calculated at 150 sq ft per tree	<input type="text" value="0"/>	0.3	-
5 Tree canopy for "medium/large trees" or equivalent (canopy spread of 21' to 25') - calculated at 250 sq ft per tree	<input type="text" value="0"/>	0.4	-
6 Tree canopy for "large trees" or equivalent (canopy spread of 26' to 30') - calculated at 350 sq ft per tree	<input type="text" value="0"/>	0.4	-
7 Tree canopy for preservation of large existing trees with trunks 6"+ in diameter - calculated at 20 sq ft per inch diameter	<input type="text" value="0"/>	0.8	-
<b>C Green roofs</b>			
1 Over at least 2" and less than 4" of growth medium	<input type="text" value="0"/>	0.4	-
2 Over at least 4" of growth medium	<input type="text" value="0"/>	0.7	-
<b>D Vegetated walls</b>			
1	<input type="text" value="0"/>	0.7	-
<b>E Approved water features</b>			
1	<input type="text" value="0"/>	0.7	-
<b>F Permeable paving</b>			
1 Permeable paving over at least 6" and less than 24" of soil or gravel	<input type="text" value="0"/>	0.2	-
2 Permeable paving over at least 24" of soil or gravel	<input type="text" value="0"/>	0.5	-
<b>G Structural soil systems</b>			
1	<input type="text" value="0"/>	0.2	-
<b>H Bonuses</b>			
1 Drought-tolerant or native plant species	<input type="text" value="0"/>	0.1	-
2 Landscaped areas where at least 50% of annual irrigation needs are met through the use of harvested rainwater	<input type="text" value="0"/>	0.2	-
3 Landscaping visible to passersby from adjacent public right of way or public open spaces	<input type="text" value="0"/>	0.1	-
4 Landscaping in food cultivation	<input type="text" value="0"/>	0.1	-

sub-total of sq ft =

Green Factor numerator =

# Score sheet

- Online form
- Enter number and/or square footage of landscape features
- Score sheet weights each feature by a factor (from 0.1 to 1.0)
- Total divided by parcel size, translates to % or Green Factor score
- Counts layers, right-of-way improvements, and various bonus credits

# Green Factor Score Sheet



Project title:

Parcel size (enter this value first) \*

enter sq ft of parcel

5,000

SCORE

-

## Landscape Elements\*\*

Totals from GF worksheet

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

0.1

-

2 Landscaped areas with a soil depth of 24" or greater

enter sq ft

0

0.6

-

3 Bioretention facilities

enter sq ft

0

1.0

-

### 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

0.1

-

2 Shrubs or perennials 2'+ at maturity - calculated at 12 sq ft per plant (typically planted no closer than 18" on center)

enter number of plants

0

0

0.3

-

3 Tree canopy for "small trees" or equivalent (canopy spread 8' to 15') - calculated at 75 sq ft per tree

enter number of plants

0

0

0.3

-

4 Tree canopy for "small/medium trees" or equivalent

enter number of plants

0

0

0.3

-

4	Tree canopy for "small/medium trees" or equivalent (canopy spread 16' to 20') - calculated at 150 sq ft per tree	<input type="text" value="0"/>	0	0.3	-
		<i>enter number of plants</i>			
5	Tree canopy for "medium/large trees" or equivalent (canopy spread of 21' to 25') - calculated at 250 sq ft per tree	<input type="text" value="0"/>	0	0.4	-
		<i>enter number of plants</i>			
6	Tree canopy for "large trees" or equivalent (canopy spread of 26' to 30') - calculated at 350 sq ft per tree	<input type="text" value="0"/>	0	0.4	-
		<i>enter inches DBH</i>			
7	Tree canopy for preservation of large existing trees with trunks 6"+ in diameter - calculated at 20 sq ft per inch diameter	<input type="text" value="0"/>	0	0.8	-
<b>C Green roofs</b>					
1	Over at least 2" and less than 4" of growth medium	<input type="text" value="0"/>	<i>enter sq ft</i>	0.4	-
2	Over at least 4" of growth medium	<input type="text" value="0"/>	<i>enter sq ft</i>	0.7	-
<b>D Vegetated walls</b>					
		<input type="text" value="0"/>	<i>enter sq ft</i>	0.7	-
<b>E Approved water features</b>					
		<input type="text" value="0"/>	<i>enter sq ft</i>	0.7	-
<b>F Permeable paving</b>					
1	Permeable paving over at least 6" and less than 24" of soil or gravel	<input type="text" value="0"/>	<i>enter sq ft</i>	0.2	-
2	Permeable paving over at least 24" of soil or gravel	<input type="text" value="0"/>	<i>enter sq ft</i>	0.5	-

D	Vegetated walls	<i>enter sq ft</i> 0	0.7	-
E	Approved water features	<i>enter sq ft</i> 0	0.7	-
F	Permeable paving			
1	Permeable paving over at least 6" and less than 24" of soil or gravel	<i>enter sq ft</i> 0	0.2	-
2	Permeable paving over at least 24" of soil or gravel	<i>enter sq ft</i> 0	0.5	-
G	Structural soil systems	<i>enter sq ft</i> 0	0.2	-
		<i>sub-total of sq ft =</i>	0	
H	Bonuses			
1	Drought-tolerant or native plant species	<i>enter sq ft</i> 0	0.1	-
2	Landscaped areas where at least 50% of annual irrigation needs are met through the use of harvested rainwater	<i>enter sq ft</i> 0	0.2	-
3	Landscaping visible to passersby from adjacent public right of way or public open spaces	<i>enter sq ft</i> 0	0.1	-
4	Landscaping in food cultivation	<i>enter sq ft</i> 0	0.1	-
		<i>Green Factor numerator =</i>		-

# Green Factor Score Sheet

Project title:

*enter sq ft of parcel*

Parcel size (*enter this value first*) \*

5,000

SCORE

0.302

## Landscape Elements\*\*

Totals from GF worksheet

Factor

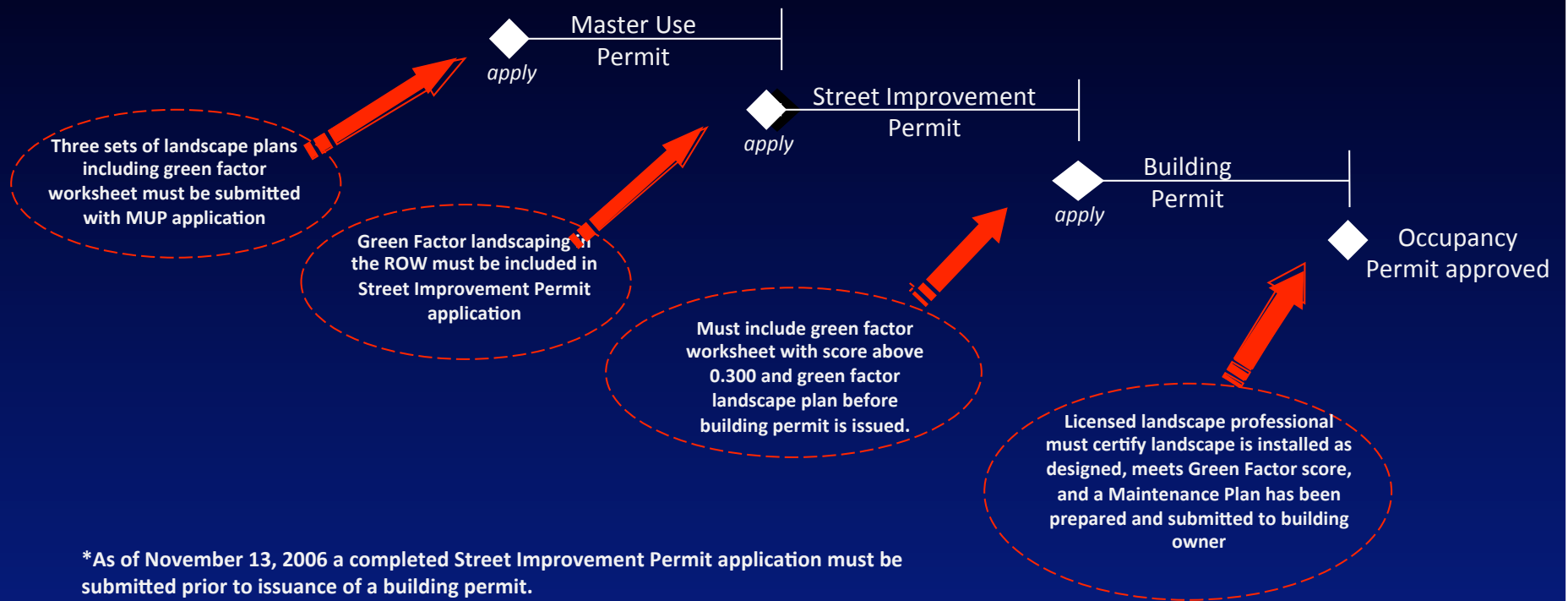
Total

### A Landscaped areas (select one of the following for each area)

1	Landscaped areas with a soil depth of less than 24"	<i>enter sq ft</i> 0	0.1	-
2	Landscaped areas with a soil depth of 24" or greater	<i>enter sq ft</i> 0	0.6	-
3	Bioretention facilities	<i>enter sq ft</i> 0	1.0	-
<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	<i>enter sq ft</i> 0	0.1	-
2	Shrubs or perennials 2'+ at maturity - calculated at 12 sq ft per plant (typically planted no closer than 18" on center)	<i>enter number of plants</i> 0	0	0.3
3	Tree canopy for "small trees" or equivalent (canopy spread 8' to 15') - calculated at 75 sq ft per tree	<i>enter number of plants</i> 0	0	0.3
4	Tree canopy for "small/medium trees" or equivalent	<i>enter number of plants</i> 0	0	0.3

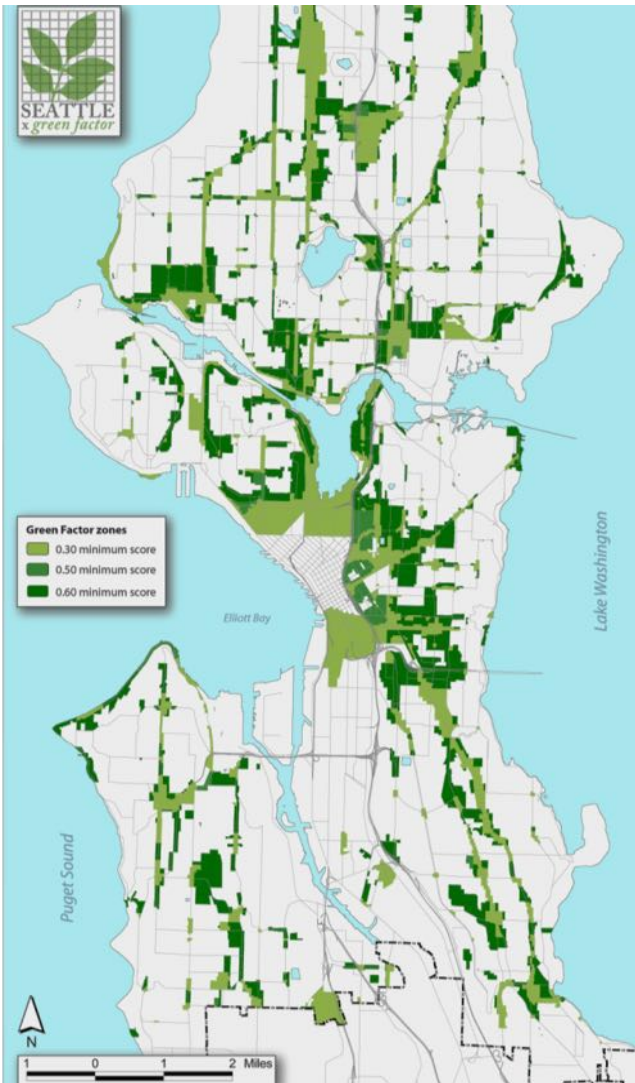
# Green Factor permit flow

November 1, 2006





# Where does the Green Factor apply?



Zone	Minimum score
Commercial & Neighborhood Commercial	0.30 (2006)
Industrial Commercial (in Urban Villages)	0.30 (2010)
Midrise and High-rise Residential	0.50 (2009)
Low-rise Multifamily Residential	0.60 (2010)
South Downtown	0.30 (2011)
South Lake Union	0.30 (2013)

- Each time, introduced as part of broader code changes
- Same score sheet: different minimum score in each zone



## Revisions

- Clarified score sheet
- New credits and bonuses
- Caps on permeable paving and vegetated walls
- Increased credit for trees, decreased for shrubs
- Director's Rule provides details on plant materials, permit process, and installation.

## 5. Results so far



- Higher quality, better-integrated landscape design
- Permeable paving, green roofs, and green walls
- More planting in or adjacent to rights-of-way
- Landscaped rooftop/terrace amenity areas







































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## **6. Application beyond the parcel: Resilient cities and green infrastructure**

- What if we retrofit existing development?



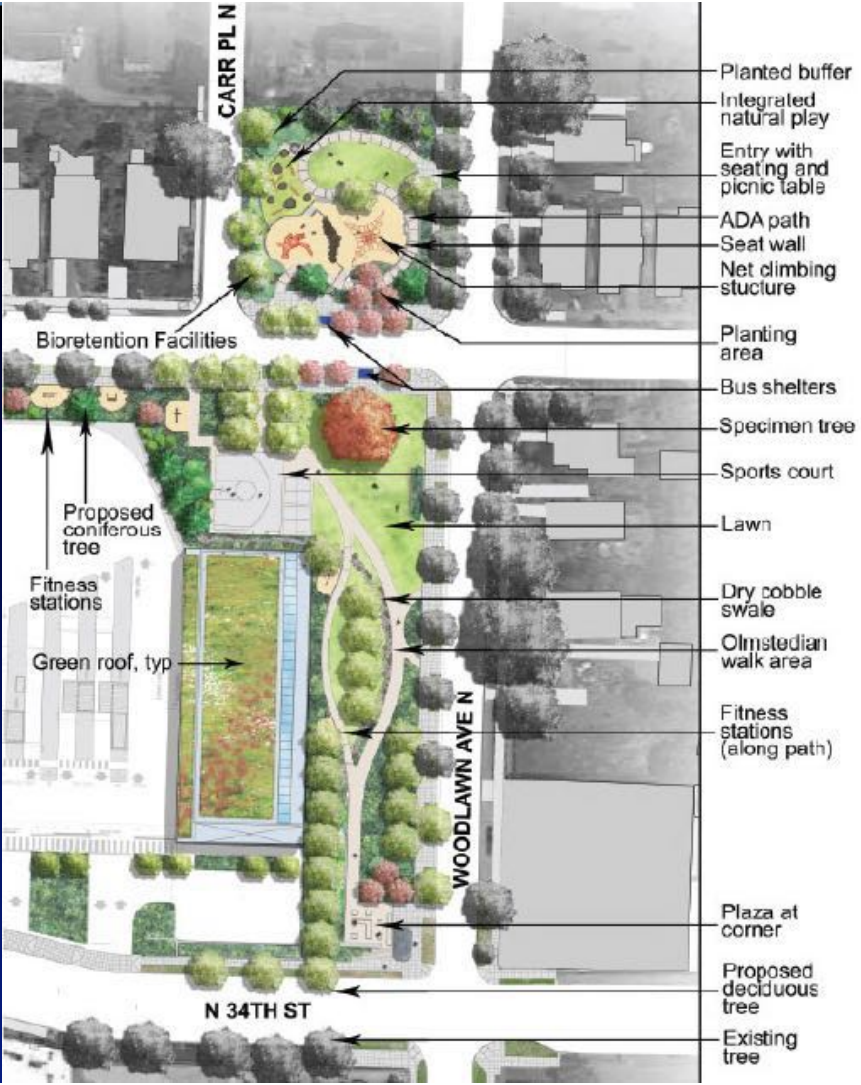
## Modeled benefits

UBC study found that Green Factor, applied over a 9-block area, would result in...

- 13% reduction of stormwater runoff
- 9% reduction of energy demand
- 12% GHG reduction

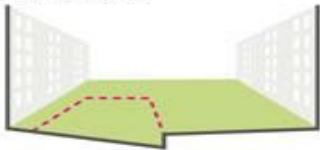
## **6. Application beyond the parcel: Resilient cities and green infrastructure**

- What if we retrofit existing development?
- What if we apply to multiple streets?

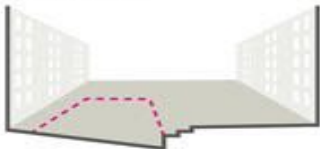


**CLOUDBURST TOOLBOX 01-04**

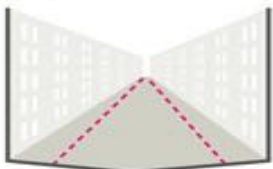
**01** Park  
Hans Tavsens



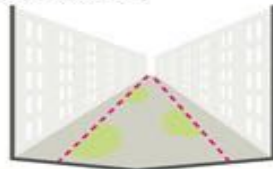
**02** Plaza  
Blågårds Plads



**03** Street  
Korsgade



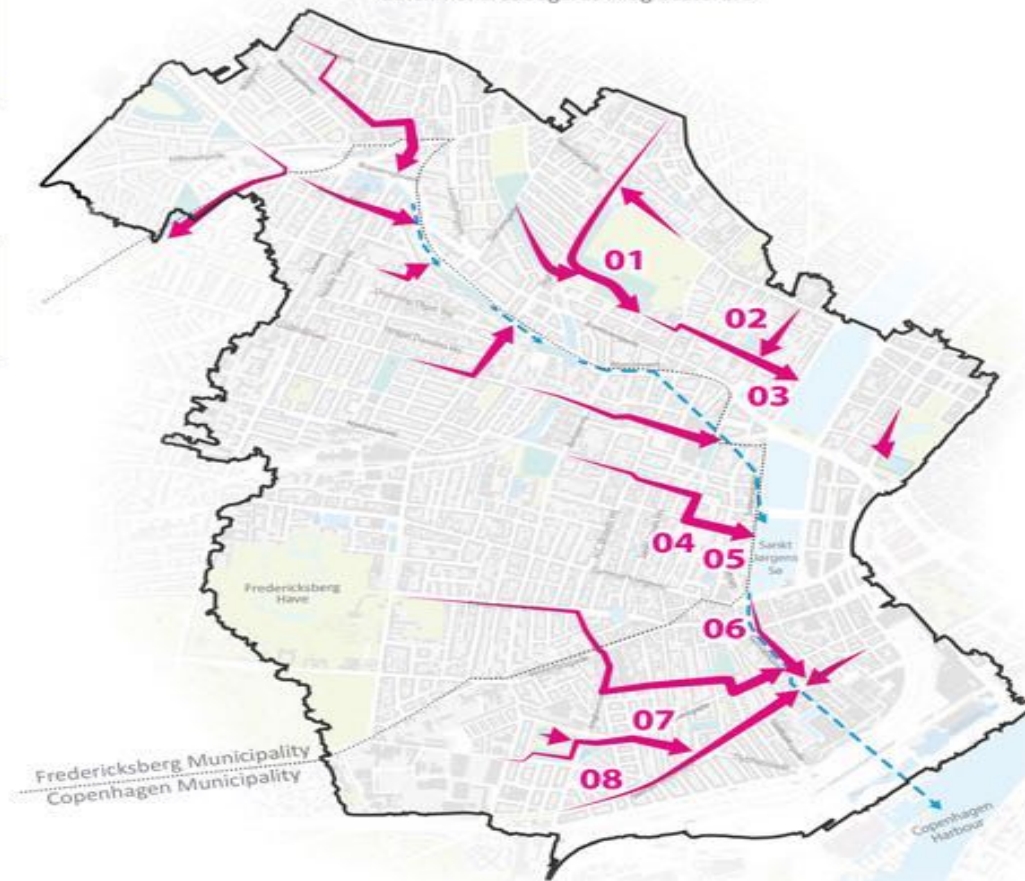
**04** Green Street  
Svend Trøsts Vej



# COPENHAGEN

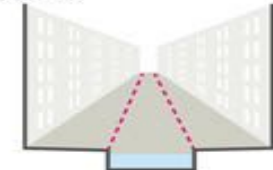
## Strategic Urban Flood Plan

Catchment: Ladegårds Å og Vesterbro

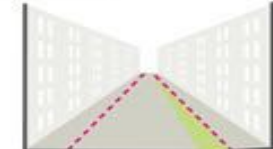


**CLOUDBURST TOOLBOX 05-08**

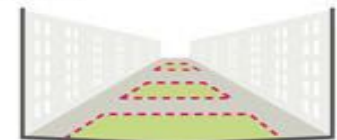
**05** Urban Canal  
Vodrofsvej



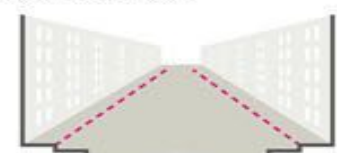
**06** Urban Creek  
Gasværksvej



**07** Retention Boulevard  
Istegade



**08** Boulevard  
Sønderboulevard



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# Copenhagen Strategic Flood Masterplan

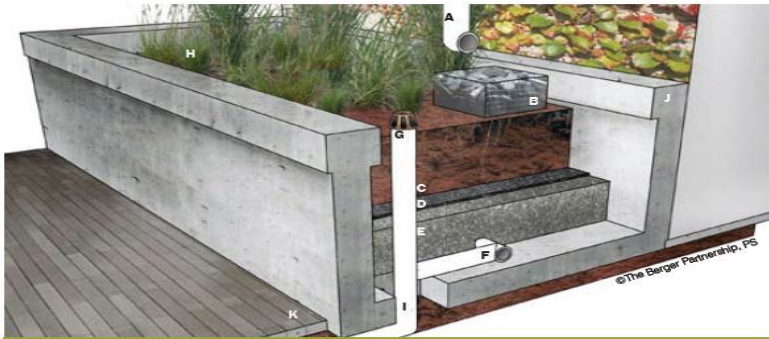
© Atelier Dreiseltl



Copenhagen Strategic Flood Masterplan

© Atelier Dreiseltl





Stormwater Planters

Stormwater planters are containers designed to capture and either retain or infiltrate stormwater based on their design. The amount and frequency of water captured depends on storm events, so they should be populated with a variety of plants adapted to both wet and dry conditions. Visually they can be striking landscape features providing a high functional value. While more expensive than bioswales, stormwater planters provide many benefits and are appropriate for areas with space constraints or on structure.

**Graphic Legend**

- A Rainwater Source
- B Splash Block
- C Amended Soil
- D Filter Fabric
- E Gravel
- F Perf. pipe along planter bottom
- G Overflow Drain
- H Plantings
- J Pipe to stormwater system
- K Planter wall w/ waterproofing
- K Pedestrian area

**A3**

**Element- Stormwater Planter**

**Functional Benefits**

Reduced runoff  
Improved runoff quality

**Environmental Considerations**

Embodied energy and carbon in concrete

Factor - 1.0



# Resources

- Case studies: photos and landscape plans
- Score sheet
- Plant and tree lists
- Landscaping Director's Rule
- Templates & calculators
- Research

# Thank you!

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