

# GREEN ROOF AND WALL POLICY IN NORTH AMERICA

Regulations, Incentives, and  
Best Practices (2019)



**GREEN ROOFS**  
FOR HEALTHY CITIES

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# ACKNOWLEDGEMENTS

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## About the Report

This report is designed to provide Green Roof for Healthy Cities' corporate members with information about where to source supportive policies and programs for green roof and wall installation across North America. It is also designed as a resource for policy makers and advocates that are interested in establishing or updating green roof and wall policies and programs. For support developing policy in your community, contact Steven Peck at [speck@greenroofs.org](mailto:speck@greenroofs.org)

## ON THE COVER: AWARD WINNING PROJECTS

**Top row: (left)** McArthur/McCollum Building Rooftop Meadow, Harvard Business School - Recover Green Roofs & Omni Ecosystems; **(right)** Nova Scotia Community College - Outside! Planning and Design Studio; **Upper middle row:** Teck Acute Care Centre (BC Children's and Women's Hospital) - Connect Landscape Architecture; **Lower middle row: (left)** The Southside Soapbox - William McDonough + Partners; **(centre)** Two Old Mill - Janet Rosenberg & Studio; **(right)** IAC Living Wall - Rana Creek Design; **Bottom row:** VanDusen Botanical Garden Visitor Centre - Connect Landscape Architecture Inc.



*The Edgeland house is designed in harmony with the surrounding Texas environment, featuring a palette of hardy native plants. 2016 Award Winner: Ecosystem Design Group - Lady Bird Johnson Wildflower Center. Photo: Dave Mead.*

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# INTRODUCTION

In an era of climate change marked by extreme heat, drought, flooding, fire and worsening air quality, policies makers the world over are looking to the roofs - and more recently the walls - of the buildings in their cities for relief. Over the past 15 years, local governments from across North America have been introducing green roof policies in order generate a market for these technologies and achieve multiple policy objectives.

A decade ago, the City of Toronto was the first major city in North America to adopt a mandatory green roof requirement for new buildings. Portland, Oregon and Chicago, Illinois were two early adopters that provided financial incentives and procurement policies for green roofs. Each of these cities has seen millions of square feet of growth in the green roof market, with the resulting increase in employment and many other benefits.

Targeted green wall policies lag behind the implementation of green roof policies, in part because of the relative newness of the green wall industry in North America, and because there is less performance data and a less-evolved universe of providers for these technologies. Some cities, however, have developed

more comprehensive green infrastructure policies that capture the many benefits of green walls as well as green roofs, urban forests, bioswales, and other forms of green infrastructure.

Green roof policies vary considerably: some have come to include regulations which require compliance, and others offer voluntary incentive programs. Certain municipalities have adopted regulation and incentives for installing green roofs, with different agencies operating programs with complementary goals to foster deployment of these technologies.

The specific construction requirements of mandated and incentivized green roofs also vary, from simple roof coverage and media depth requirements, to more complex construction standards which include items such as leak detection and minimum maintenance standards. Over the past five years, Green Roofs for Healthy Cities and the Green Infrastructure Foundation have worked to develop a comprehensive performance rating system for green roofs and walls called the Living Architecture Performance Tool (LAPT). The LAPT is intended as a readily implementable standard for municipalities to assert a consistent set of design, construction, maintenance, and performance requirements (See Appendix 6 for more information on the LAPT).

*The Southside Soapbox rooftop greenhouse at the Method Home manufacturing facility in Chicago grows a wide variety of greens. 2018 Award Winner: William McDonough + Partners*





In each case of where such policies and regulations have been considered, initial costs for a green roof have – unsurprisingly – proven to be a political challenge as development constituencies have reacted to first costs rather than considering life cycle costs. However, in a variety of markets, geographies, and bioclimates, the life cycle value and financial return of green roofs has been demonstrated to be consistently robust, resulting directly in the increasing number of cities establishing mandatory requirements.

Furthermore, regulations catalyze maturing markets. Requiring developers to implement green roofs provides a certain green roof economy that allows the most rapid

and successful emergence of local providers. Such deployment consistently results in an early and dramatic reduction in installation costs, thus furthering the cost-efficacy of these systems.

Cities that have established green roofs to address green building goals and/or stormwater management objectives include: New York, Seattle, Toronto, San Francisco, Washington, DC, and many more (see Appendices 2 for a summary). These cities each have a combination of green roof regulations and incentives to substantially, directly, and effectively manifest new development that cost-efficiently contributes positively and remedially to the built environment.

## GREEN ROOF POLICY IMPLEMENTATION - THE TIME IS NOW

Green roof policy contributes to the advancing of multiple public policy objectives. Unlike many other forms of infrastructure, green roof policies and programs can help leverage the considerable private sector investment in the development/redevelopment of buildings. Green roof policies and programs leverage underutilized roof space in communities, which, depending on the jurisdiction, make up as much as 30 per cent of the total land area.

*“Green roof policy contributes to the advancing of multiple public policy objectives.”*

Green roofs and walls provide multiple social, economic, and environmental benefits. Within a given city, thousands of green roof projects covering tens of millions of square feet of land area have the ability to reduce the growing threat of the urban heat island effect, as well as reduce flooding and water quality challenges and costs by retaining and detaining stormwater. The addition of plants improves air quality, resulting in better human health and well being. Some jurisdictions are also using roof space to provide habitat for pollinators and rare and endangered species of flora and fauna.

As green roofs benefits accrue at multiple scales, such policies constitute a natural public-private partnership.

At the building scale, green roofs provide private/building owner benefits, such as increasing the life expectancy of waterproofing membranes and reducing energy costs. Genuine added real estate value benefits building

owners, as well as affording the opportunity to generate additional revenue through the rental of roof space, and higher prices for amenity decks (whether for sale or rental). At the public/community scale, the benefits are also multiple, including: job creation, substantial energy savings, significant tax base increases resulting from added real estate value, and health benefits resulting from enhanced views, biophilic value and biodiversification.

Whether public or private, benefits result. Regardless of the form of ownership, independent life-cycle cost-benefit-analyses have demonstrated that extensive, lightweight green roofs offer as little as a five- or six-year simple payback. For privately owned projects, this value accrues directly to owners. For rental projects, ultimate savings can benefit the owner and renter. When applied to public buildings, the value returns to the public directly. For projects serving economically challenged communities, the resulting benefits contribute directly to meaningfully advancing social equity goals. The value-added and direct savings resulting from green roofs are genuinely equal opportunity.

*“Regardless of the form of ownership, independent life-cycle cost-benefit-analyses have shown that extensive green roofs offer as little as a five- or six-year simple payback.”*

# ONE TESTED TOOL TO ADDRESS MULTIPLE POLICY OBJECTIVES

Green roof policy allows governments to target a range of environmental and health issues, accelerate economic development objectives, and advance environmental and social equity agendas with a single regulatory action. Largely used as a tool to manage stormwater (retention and detention) and build resilience to climate change, green roofs also reduce impervious surfaces, filter stormwater and sequester carbon. Green roofs benefit human health by increasing access to green space and can also contribute to local food production and security through rooftop farming. Green roofs and walls also contribute broadly to energy cost savings at the city-scale through the reducing of the urban heat island effect, whether in heating or cooling dominated climates. An ancillary benefit is a resultant increase in real estate valuation, which benefits individual projects as well as increasing the overall tax base.

Voluntary implementation of green roofs continues to advance as enlightened and pioneering developers and institutions embrace the value and benefits of such facilities. However, only through the implementation of green roof policies and regulations can sufficient momentum occur that results in the creation or expansion of providers, substantial municipal benefits, a scale

sufficient to achieve expeditious first-cost reductions, and a more rapid and broad-scale response to emerging climatic and economic challenges.

## The Impacts of Toronto's Green Roof Policies

In Toronto, the Green Roof By-Law and Eco-Roof Incentive Program led to the development of 500,000 sq metres (5.4 million sq ft) of green roofs between 2009 and 2018. An analysis found the following benefits:

- 222 million litres of stormwater retained annually
- 225 tons of carbon sequestered annually
- 3.2 million kWh of annual electricity savings for the buildings with green roofs
- 1.6 million kWh of annual electricity savings for surrounding buildings due to a reduction in the urban heat island effect
- 1,618 FTE jobs in construction
- 25 FTE jobs annually in maintenance

*(Assumptions: average industry costs and benefits based on values from the Green Infrastructure Foundation Cost-Benefit Matrix; 20 per cent intensive roofs and 80 per cent extensive roofs).*

## Basic Types of Green Roofs



2016 Award Winner: FXFOWLE Epstein



2016 Award Winner: Bionic Landscape

### Extensive

- Lightweight
- Lower cost
- Lower maintenance
- Suitable for retrofits and large rooftops
- Narrower range of potential plants
- Often inaccessible

### Intensive

- Heavier, requiring greater structural capacity
- Higher cost
- Greater maintenance
- Can be designed for a wide range of benefits
- Wide range of potential plants
- Usually accessible



## PUBLIC POLICY AND PROGRAMS

The period of innovation and testing of feasibility of green roofs is in the past. The systems are available, technical approaches are well defined, and the economic efficacy has been determined over an array of economic and bioclimatic geographies, from Alaska to southern Florida. However, public policy programs and awareness campaigns may be required to break through the current barriers to widespread implementation and facilitate the use of green roofs. In cities already with high rates of green roof installation, public policies have served to stimulate the green roof market by educating developers and community members as well as providing financial incentives and/or regulations.

Increased exposure to green roofs through municipal demonstration projects can also serve to dismantle

public misconceptions about the technology. Education targeting building owners, architects, landscape architects, and policy makers will likely have the greatest impact on bringing green roof technology into the mainstream.

*“Few, if any, public policies can accomplish so much with so little, as green roof requirements. They leverage private investment for multiple public benefits, generate private benefits, do so on otherwise squandered space, and are relatively easy and low cost to administer.”*



*The HVAC-integrated living wall at Weiser Hall at the University of Michigan improves air quality and reduces energy costs. 2018 Award Winner: Diamond Schmitt Architects & Nedlaw Living Walls.*

For many building owners and developers, the common private benefits may not be perceived as sufficiently quantified or immediate enough to justify the additional upfront capital investment. This is where financial and regulatory incentives become important. Examples include the City of Toronto’s Eco-Roof Incentive Program which offers \$100 (Canadian Dollars) per square metre of green roof and Washington DC’s \$15 (US Dollars) per square foot incentive in targeted watersheds where combined sewer overflows are frequent.

Some of the policies described in this report are helping to develop the market and turn these public benefits into private benefits through credit systems and development bonuses. There are also policies that help promote education and awareness about green roofs and their benefits through increased access and exposure to green roofs and resources.

The green roof job market for design, installation and maintenance is primarily a local one, and the past 15 years has clearly demonstrated that the industry has grown largely with the increased demand stimulated by education, financial incentives and green roof requirements.

Few, if any, public policies can accomplish so much with so little, as green roof requirements. They leverage private investment for multiple public benefits, generate private benefits, do so on otherwise squandered space, and are relatively easy and low cost to administer.



# OVERCOMING PERCEIVED BARRIERS TO GREEN ROOFS

With all the benefits that green roofs can provide, why aren't they more common in cities across the country? There are perceptual barriers to green roof installation. One is higher costs. The initial cost of a light weight, low maintenance extensive green roof, is estimated at being twice the price of a comparable traditional roof, which is

more than offset by the longer lifespan of waterproofing under a green roof assembly. There is also the added perception that these systems may leak or require costly maintenance.

These concerns have been consistently disproven. Green Roofs for Healthy Cities has developed a green roof calculator (GreenSave Calculator) to help municipalities and others address the issue of cost. Green roof maintenance requirements are modest and anticipatable, and the stability of such systems and their contribution to roof longevity and durability is well documented. Professional training and the Green Roof Professional (GRP) accreditation program have promoted best practices to help ensure that high-quality and well-performing systems and practices predominate.

Appendices 2-5 summarize policies that relate to green roofs and walls and encourage their widespread adoption across Canada and the United States. The policies are separated into two categories - mandatory requirements and incentive programs. There is also a section that lists other policies that promote green infrastructure for stormwater management. The document can be used to compare different policies and as a guide to more information on each policy. The policy document can be used in conjunction with Green Roofs for Healthy Cities' other resources to create well-developed and effective policy.



*The McArthur/McCollum Building Rooftop Meadow at the Harvard Business school features a wide range of native perennials and edible crops. 2018 Award Winner: Recover Green Roofs & Omni Ecosystems.*

*The courtyard green roof on this Williamsburg condo building provides valuable amenity space and a place to gather for residents. 2016 Award Winner: New York Green Roofs.*





# GREEN ROOFS FOR HEALTHY CITIES - POLICY SUPPORT

Green Roofs for Healthy Cities (GRHC) is an industry association that works on behalf of its members to establish cost-effective green roof and wall policies to recognize their public and private benefits and result in their widespread implementation. This is done by tracking a wide range of green roof and wall policies, providing case studies, completing cost-benefit studies, and supporting policy development and advocacy.

The Green Roof Professional (GRP) training and accreditation program can provide you with professionals to help understand best practices in the design, installation, and maintenance of green roof systems. ([greenroofs.org/find-a-grp](http://greenroofs.org/find-a-grp))

A number of jurisdictions require GRPs to work on green roof projects. GRP training is available online at the Living Architecture Academy. ([livingarchitectureacademy.com](http://livingarchitectureacademy.com))

GRHC's Technical Committee members are:

- Richard Hayden, Garden Roof and Blue Roof Department Manager, American Hydrotech (Chair)
- Ron Schwenger, GRP, President, Architek
- Tim Barrett, GRP, President, Barrett Roofing
- Matt Barmore, GRP, Vice-President, Greenrise
- Jeff Joslin, Deputy Planning Director, City of San Francisco
- Dr. Karen Liu, Product Manager, Low and Bonar
- Tom Hanzely, Product Manager, Firestone
- Joe DiNorscia, President, Rooflite

*“GRHC has a comprehensive training and certification program – the Green Roof Professional – which is focused on best practices in the design, installation, and maintenance of these systems.”*

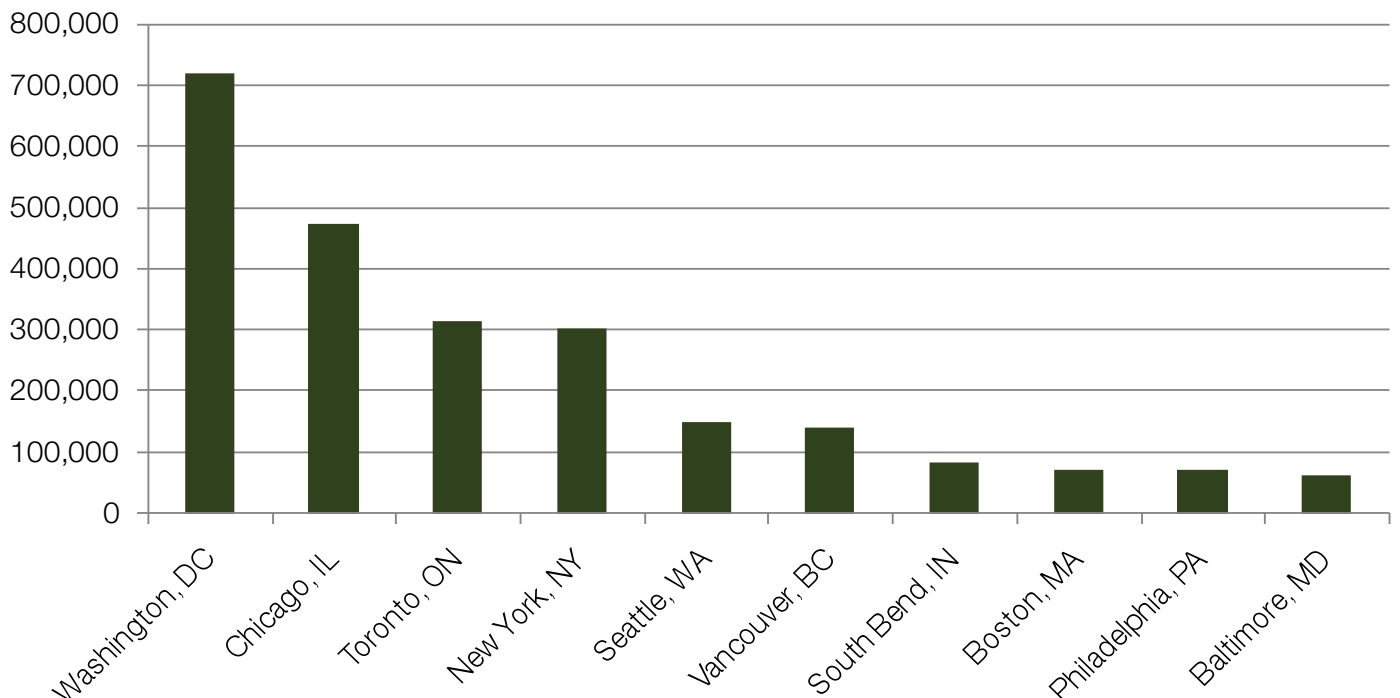
GRHC's Policy Committee members are:

- Jeff Joslin, Deputy Planning Director, City of San Francisco (Co-Chair)
- Dr. Hamid Karimi, Quality Assurance Officer, DC Department of Energy and Environment
- Peter Lowitt, Director, Devens Enterprise Commission
- Amy Chomowicz, Ecoroof Program Manager, City of Portland
- Shayna Stott, Environmental Planner, City of Toronto

Over the past five years, GRHC has been directly involved in policy development in Toronto, San Francisco, Denver, New York City, Vancouver, and Washington, DC.

The graph below provides information on the square footage of green roofs installed in 2018 from a cross-section of GRHC's corporate members.

### Green Roof Installation by Metropolitan Area (2018)



Source: 2018 Green Roofs for Healthy Cities Industry Survey

# PRINCIPLES FOR ESTABLISHING EFFECTIVE POLICIES

A review of successful policies and best practices has helped establish a set of principles for establishing effective policies:

- Understanding the added value and cost of any regulation is critical to both immediate and long-term support and effectiveness. Making the business case for new green roof policy is essential, in a way that incorporates local conditions and real costs based on local expertise, trades and real estate economics.
- The financial analysis should be applied to an array of building typologies given the wide range of economic factors at play. For example, multi-unit housing and big box retailers face very different cost and benefit scenarios and have different opportunities for cost savings/revenue generation associated with green roofs.
- Incentives have played a big role over the last decade in many cities, particularly when the benefits of green roofs were unproven and/or unknown. Incentives make sense now, only if it's the only politically viable path, or they are applied to existing buildings.
- Incentives can encourage markets, but regulations establish markets, and provide predictable demand so that private sector suppliers can ramp up their activities. Mandates are also simpler and more cost-effective to implement and less likely to fall victim to future budgetary cycles.
- Scale matters with green roofs. Scale lowers costs and city-scale implementation can result in substantial benefits well beyond those at the individual project scale.
- Economic analysis must be transparent, credible and defensible. Benefits at various building scales and at the community-wide scale have proven to win over a wide variety of constituencies for the policies in cities like New York, San Francisco, Chicago, Portland, and Toronto.

(For more information on conducting cost-benefit analysis see San Francisco Cost-Benefit Study. Also see Living Architecture Monitor, Volume 20, Issue 4 (Winter 2018) "Green Roof Mandates at The City Scale: Good Practice is Good Economics, Good Economics is Good Policy", by Jeff Joslin, Director of Current Planning, San Francisco.)

- It's necessary to be specific about what is meant by a 'green roof' with a clear delineation of performance

requirements, and appropriate but minimal detail about specific assemblies. For example, four inches of growing medium can retain a quarter inch of stormwater, or three inches of stormwater, depending upon its composition. If stormwater retention is a primary policy driver, it is more appropriate and accurate to define a requirement established based on inches of rainfall retained, rather than prescriptive language about individual systems. This is particularly important, as technologies and practices will evolve over time. A resilient regulation will be able to deliver results, while allowing for the evolution and innovation of technical approaches.

- The Living Architecture Performance Tool (See appendix 6) describes potential green roof and wall benefits and provides performance measures, minimum requirements, and examples of how they can be achieved. Many building owners/developers will seek the least costly compliance path so being able to clearly and convincingly define the relative costs and benefits of the technologies is important.



*Not only does the rooftop farm at Trent University produce food, but it also encourages pollinators and hosts research and demonstration projects. 2016 Award Winner: ZinCo Canada Inc.*



# LESSONS LEARNED

Green roof and wall policy development across North America has led to many important lessons being learned:

- Policy is a great tool to address the lack of awareness of green roofs and promote education about green roofs. However, policies without implementation tools are not effective at increasing the installation of green roofs or walls in cities. The time to implement meaningful tools is now. Any effort to establish a policy or regulation should include anticipatory financial analysis to address inevitable concerns about the first-cost of green roof installation and maintenance.

- It is recommended to seek feedback from other municipalities who have generated policies and regulations, as well as attempt to achieve early support from stakeholders.

In 2017, Denver passed the Green Roof Ordinance after a citizen-led effort advocated for green roof policy. The ordinance mandated green roofs on both new and existing buildings. The requirements for green roofs on all existing buildings were particularly concerning to some constituencies, and led to well-organized and funded opposition to the initiative.

Following passage, a technical committee was convened to adjust the requirements mandated by the sweeping initiative. Over the course of that process, it was determined that green roofs are not a feasible option for 95% of existing buildings because they would be unable to support the extra loading requirements. This opened the initiative language to a fundamental reworking, and it was ultimately amended to mandate that buildings have a cool roof and one of a series of compliance options, of which installing green roofs or walls are included. Mandatory policies that offer a variety of compliance options, with green roofs as one of the compliance options, make it easy for developers to choose the option that will have the highest return on investment. As such, more advocacy and education is required in Denver to emphasize the private benefits of green roofs.

- This is not to say flexibility is inherently problematic. In the case of San Francisco, the option to employ solar, living roofs, or a combination was key to its ready path to approval and implementation.
- Complementing compliance options for mandatory policies with incentive policies may make choosing a green roof option more appealing. However, incentive policies with low tax abatements, minimal rebates, or strict restrictive covenants do not make installing green roofs accessible or appealing. The benefits of

incentive programs should outweigh or meet the cost of installing a green roof for private property owners.

- Conducting a cost-benefit analysis that is transparent and defensible to best understand and describe the implications and benefits of prospective policy initiatives is key. Once an analysis is established for a particular geography, it's a modest effort to apply it to various building typologies as appropriate for the locality. This information will help you not only to address concerns of stakeholders but can also contribute to a more effective policy.
- Consulting with various stakeholders and you will likely find that there is a very large public constituency in favor of policies that support green roofs and walls. Building owners and developers are already on board with green roof and wall policies can be hugely helpful in countering concerns.
- Be clear about what is meant by 'green roof' as it relates to other roof technologies, such as solar panels or reflective roofing. Language matters: San Francisco employed the term "living roof" because that ordinance was advanced following a period of drought, and it was thought "green roof" could be optically problematic in a moment where homeowners were being asked to minimize water use.
- Use performance-based measures, such as minimum retention rates for stormwater, rather than prescribing systems or their components. This allows the market flexibility in how best to meet the performance requirements. The Living Architecture Performance Tool is designed to improve the performance of green roofs and walls by providing a scientifically based framework of performance measures and minimum prerequisites for the design, installation, and maintenance of these technologies. It can provide a framework for meeting your policy objectives and performance goals.
- Support professional training by acknowledging the Green Roof Professional designation which is designed to provide those who earn the accreditation with knowledge of best practices in design, installation, and maintenance.

In this age of significant public resource constraints and growing challenges, green roofs and walls provide proven approaches to meeting multiple policy objectives at minimal cost, and can contribute over time, to helping make our communities more resilient.

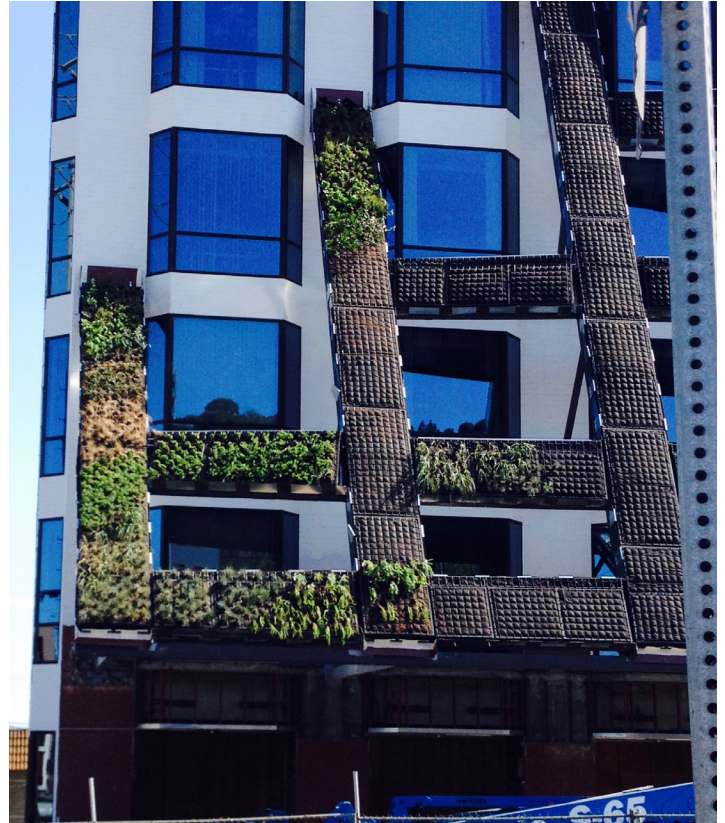
# CONCLUSION

There have been numerous recent advances in implementing green roof regulations. Cities each year are establishing increasingly stringent beneficial requirements in order to address a number of policy goals. It's appropriate and necessary to continue to advocate for policy where there is none to incorporate green roofs and walls in all major new development. Appropriately conceived policy will ensure that green roofs and walls are installed and maintained according to best practices. Such expansive deployment is already advancing the real estate value and city-scale environmental benefits.

Green Roofs for Healthy Cities continues to monitor and provide feedback on legislation to evaluate individual policies and facilitate continuous improvement. GRHC is committed to continuing to develop tools that municipalities can use as a guide to create their own policy. In addition to green roof performance standards, it will continue to address the applicability of appropriate programs in different geographies and bioclimates, elaborate on different regulatory measures, and be available to support future such efforts. Some of the mandatory policies detailed in this document have compliance options of solar panels or green roofs, or a combination of the two.

Ultimately, success in increasing green roof policy and the widespread implementation of green roofs is a direct result of green roof champions in government and industry collaborating to promote and sponsor

legislation. In partnership with third parties, such as Green Roofs for Healthy Cities, and passionate citizens advocating for change, green roofs will continue to be assertively advocated for and implemented as an essential and effective means to combat local and global environmental, social, and economic challenges at hand.



*The IAC Headquarters Living Wall in Los Angeles demonstrates the possibilities of lush vegetation using no potable water in an arid climate. 2018 Award Winner: Rana Creek Design.*

*The MEC HQ green roof captures and re-uses rainwater, uses food producing plants, provides amenity space, and features a panoramic view of Vancouver's North Shore Mountains. 2017 Award Winner: Connect Landscape Architecture, Inc.*





# APPENDIX 1 - TYPES OF GREEN ROOF AND WALL POLICIES

Green roof and wall policies are the result of unique regulatory and political environments. Hence, various approaches may be employed individually or in combination as fitting for a given community. The following provides some simple defining of the types of policies and programs from across North America that can be used to increase the installation of green infrastructure – focused mainly on green roofs and walls. Some require direct expenditures, while others only administrative costs.

- **Density/Floor Area Ratio Bonus** By including green infrastructure in building design, developers are permitted to increase the density of their building through the allowance of additional floor area than otherwise allowed. Additional height may also be a bonused attribute if that's otherwise a code limiter.
  - **Funding (Grant)** Up-front funding to cover the installation costs of green roofs, often required to retain a certain amount of stormwater. Such funding support typically ranges from \$7.50 to \$15 per square foot and may be capped at a certain amount per project. Below these amounts program uptake is typically minimal. Some jurisdictions provide grants to offset the cost of initial structural loading assessments for existing buildings, thereby removing a barrier to program uptake.
  - **Funding (Rebate)** Projects may be reimbursed for the cost (up to a certain amount) of installing green roofs.
  - **Funding (Subsidy)** Property owners make co-payments for part of the cost of the installation of the green roof.
  - **Mandate (Laws and Regulations)** Green roofs are required under specific circumstances to meet specific standards, typically for stormwater management or green space requirements.
  - **Residential Stewardship Programs** Financial incentives and technical support to inspire property owners to volunteer to install and/or maintain green infrastructure and stormwater management techniques.
  - **Stormwater Fee Credit** Property owners receive a credit on their annual stormwater fee. Stormwater fee credits are typically calculated based on the amount of impervious area targeted or based on how effective the green roof is in reducing stormwater runoff and in some cases quality. Often the value of the credits alone are too low to shift market behaviour.
  - **Tax Credit/Abatement** Deductions from taxes (credit) or a reduction of taxes (abatement) for the construction of a green roof. The amount is often calculated as a percentage of the cost of construction, or as a dollar amount per square foot of green roof constructed up to a certain limit.
  - **Green Area Factor** The regulatory authority assigns different targets for green space across the city. When a major development of retrofit occurs, the owner must meet the targeted green space requirement, using different types of green infrastructure, each of which has a different benefit value assigned to it. Provides flexibility and steadily increases the overall green space in the city.
- For example; if a building with a 5,000 square foot footprint is in an area with a green factor target of 0.8, then they must design the green infrastructure on and around the building to achieve 4,000 square feet of coverage (5,000 sf x 0.8). If a green wall is constructed that is 1,000 square feet and its benefit value is 0.7, this results in 700 square feet (1000 sf x 0.7). With the addition of an intensive green roof that is 4,000 square feet with a benefit value of 0.9 this would yield an additional 3,600 square feet (4,000 sf x 0.9). Together the green roof and wall total 4,300 square feet, which exceeds the green factor target for that area. In addition to green roofs and green walls, trees, planters and porous pavement are also included as options to meet the green area factor targets.
- **Procurement** New and or existing government facilities, or the facilities of government funded agencies, boards and commissions are required to install green roofs during new construction and/or when re-roofing occurs, if structural support is sufficient.
  - **Other** Additional, less common policies and programs to inspire the construction and installation of green roofs and walls, such as: expediting project permits if green roofs are a part of the project plan; low interest loans; and using green roofs and walls to achieve points for sustainable development plans.

The City of Chicago has an elaborate Sustainable Development Policy that includes support for green roof installations. The District of Columbia also has a sophisticated stormwater credit trading system that allows developers to purchase credits on the open market to meet some of their stormwater retention regulatory requirements.

## APPENDIX 2 - OVERVIEW OF POLICIES AND PROGRAMS

The following is a table that provides an overview of the major policies instituted in various jurisdictions and a comparison of the policy tools they employ. An overview of each of these policies is provided in Appendices 3-5 as well as links to more detailed information.

Location	Mandate or Regulation	Incentives						Policy Name(s)*
		Tax Credit	Funding (Grant, Rebate, or Subsidy)	Stormwater Fee Credit	Density or Floor Area Ratio Bonus	Residential Stewardship Program	Other	
Adams County, CO				X				2014 - Stormwater Utility Credit
Austin, TX					X			2014 - Downtown Density Bonus Program
Baltimore, MD				X		X		2012 - Stormwater Fee Credit
Chicago, IL					X		Sustainable Development Policy Green Permit Program Procurement	2014 - Green Permit Program 2015 - Green Roof Incentives 2017 - Sustainable Development Policy
Denver, CO	X						GRP Requirement	2017 - Green Building Ordinance
Devens Enterprise Zone, MA	X			X			GRP Requirement	2012 - Industrial Performance Standards and Regulations 2013 - Vegetated Rooftops and Vegetated Walls 2014 - Stormwater Management Credits for Green Roofs
Fife, WA	X						Green Factor	2009 - Green Area Factor
Fort Wayne, IN			Grant (Cash Incentive)					2018 - Catching Rain Green Infrastructure Initiative
Guelph, ON			Rebate	X				2018 - Stormwater Credit and Rebate Program
Hoboken, NJ					X			2018 - Green Infrastructure Bonus Standards for Impervious Surfaces
Kitchener, ON				X				2012 - Stormwater Credit Policy
Marion County, City of Indianapolis, IN				X				2016 - Stormwater Credit Manual
Milwaukee, WI			X					2018 - Green Infrastructure Partnership Program
Minneapolis, MN				X				2017 - Chapter 510 of Minneapolis Code of Ordinances
Montgomery County, MD			Rebate					2018 - RainScapes Rewards Rebate Program
Nashville, TN				X				2016 - Green Roof Rebate Program



# APPENDIX 2 - OVERVIEW OF POLICIES AND PROGRAMS

Location	Mandate or Regulation	Incentives						Policy Name(s)*
		Tax Credit	Funding (Grant, Rebate, or Subsidy)	Stormwater Fee Credit	Density or Floor Area Ratio Bonus	Residential Stewardship Program	Other	
New York, NY	X	X	Grant					2013/2019 - Green Roof Property Tax Abatement Program 2017 - Green Infrastructure Grant Program 2019 - Green Roofs Act
Palo Alto, CA			Rebate					2017 - Stormwater Measures Rebate Program
Philadelphia, PA		X	Grant	X	X			2015 - Density Bonus 2015 - Stormwater Credit Programs and Incentives
Portland, ME				X				2015 - Stormwater Credit
Portland, OR	X					X		2018 - The Ecoroof Requirement Private Property Retrofit Program
Prince George County, MD			Rebate					2013 - Rain Check Rebate Program
Saint Laurent, Montreal, QC	X							2016 - Reglement sur le zonage no RCA08-08-0001
San Francisco, CA	X							2017 - Better Roofs Ordinance 2019 - Central SOMA Plan Living Roof + Solar Requirement
Seattle, WA	X		Rebate and funding	X	Land Use Code		Green Factor	2007 - Green Factor 2009 - RainWise Program Stormwater Facility Credit Land Use Code
Syracuse, NY			Grant					2018 - Onondaga County's Green Improvement Fund
Toronto, ON	X		Grant				Procurement	2009 - Greenroof Bylaw 2016 - Eco-roof Incentive Program
Washington, DC	X		Subsidy and rebate	Discount (on stormwater fee and impervious area charge)		X	Stormwater Retention Credit Trading Program	2012 - RiverSmart Homes 2013 - Stormwater Retention Credit Training Program 2013 - RiverSmart Rewards Program 2013 - Clean Rivers Impervious Area Charge Incentive Program 2016 - Green Roof Rebate Program 2017 - Green Area Ratio 2018 - RiverSmart Landscaping rebates

# APPENDIX 3 - MANDATORY GREEN ROOF REQUIREMENTS

## Chicago, Illinois

**Policy Name:** Sustainable Development Policy

**Year:** 2017

**Policy Details:** The Sustainable Development Policy requires that development projects earn a number of points by implementing select sustainable strategies. It applies to new developments, TIF funded developments receiving over \$1 million, or multi-family housing projects over 5 units that receive specific financial assistance. All new developments are required to reach 100 points. The two compliance pathways are earning points from the strategies menu without building certifications or earning points from a building certification and earning the reset of the points from the strategies menu. The menu includes strategies in the following categories: health, energy, stormwater, landscapes, green roofs, water, transportation solid waste, work force and wildlife. The green roofs will earn a project 10 points if 50-100% of the building's net roof area is covered with vegetation, or 20 points if it covers 100% of the net roof area. The net roof area is the gross roof area with the exception of the area for mechanicals, maintenance pathways, window washing systems, swimming pools and skylights. More than 5 million square feet of green roofs have been implemented in Chicago to date as a result of its policy initiatives in support of green roofs.

**Link:** [https://www.chicago.gov/city/en/depts/dcd/supp\\_info/sustainable\\_development/chicago-sustainable-development-policy-handbook0.html](https://www.chicago.gov/city/en/depts/dcd/supp_info/sustainable_development/chicago-sustainable-development-policy-handbook0.html)

## Denver, Colorado

**Policy Name:** Green Building Ordinance

**Year:** 2017

**Policy Details:** New buildings, new additions to buildings and existing buildings with a certificate of occupancy that are 25,000ft<sup>2</sup> must have a cool roof and comply with one other Green Building requirement. The compliance options are: green roofs, onsite solar panels, offsite renewable energy purchases, demonstration of decreased energy consumption, select building certifications, green space and renewable energy, green space and offsite renewable energy, and green space and decreased energy consumption. The compliance option for green space can be achieved by installing a green roof. With this option, the green roof of new buildings must cover 60% of the total roof area; the green roof

of existing buildings must cover 18% of the total roof area. Vegetation shall be designed to cover 80% of the vegetated roof within 3 years, or be used for urban agriculture.

**Link:** [https://www.denvergov.org/content/dam/denvergov/Portals/696/documents/Other\\_forms\\_and\\_guides/Green-Building-Rules-Regulations-Draft.pdf#page=10](https://www.denvergov.org/content/dam/denvergov/Portals/696/documents/Other_forms_and_guides/Green-Building-Rules-Regulations-Draft.pdf#page=10)

## Devens, Massachusetts

**Policy Name:** Policy for Construction of Vegetated Roofs

**Year:** 2011, amended 2012

**Policy Details:** When building a green roof, a member of the construction team must be a Green Roof Professional (GRP). The policy requires that the vegetation on the roof not be an invasive species, and that it must be native plants with seeds appropriate to Devens' USDA hardiness zone (5b). Green roofs shall have a minimum of 4 inches of growing media that cover 40% of the roof area, with at least 80% coverage within three years of the date they are planted.

**Link:** [http://devensec.com/development/DEC\\_vegetated%20Roof\\_policy\\_revised\\_January2012.pdf](http://devensec.com/development/DEC_vegetated%20Roof_policy_revised_January2012.pdf)

**Policy Name:** Industrial Performance Standards and General Regulations: Greenhouse Gas Mitigation (974CMR 4.11 2.(c))

**Year:** 2012

**Policy Details:** Projects that require an air quality permit are required to have a vegetated roof that covers at least 40% of the roof. The roof must be designed in compliance with the Policy for Construction of Vegetated Roofs.

**Link:** <http://www.devensec.com/rules-regs/decregs411.html>

**Policy Name:** Viewshed Overlay District Vegetated Rooftops and Vegetated Walls Requirement (974CMR 3.04(8) (i)5)

**Year:** 2013

**Policy Details:** The design standards for buildings in the Viewshed Overlay District (projects visible from the Museum of the New England Landscape) are required to the extent possible to install green roofs and green walls.

**Link:** <http://www.devensec.com/rules-regs/decregs304.html>



# APPENDIX 3 - MANDATORY GREEN ROOF REQUIREMENTS

## Fife, Washington

**Policy Name:** Green Factor

**Year:** 2009

**Policy Details:** In order to receive a project permit, new developments, redevelopments and construction sites must have a landscaping plan that achieves the green factor. Plans meet the green factor by implementing green factor elements, each of which have a score. The total green factor score that must be met is calculated by dividing “the green area factor by the lot area”. Each green factor element has a correlated multiplier, which is used to calculate the green factor. The green factor elements include green roofs.

**Link:** <https://www.codepublishing.com/WA/Fife/?Fife19/fife1964.html&?f>

## New York City, New York

**Policy Name:** Green Roofs for New Construction

**Year:** 2019

**Policy Details** New buildings and existing buildings undergoing major renovations in specific occupancy groups defined in the New York City Building Code are required to have a 100% of the available roof space as a sustainable roofing zone. A sustainable roofing zone is covered in a green roofing system and/or solar panels and/or wind turbines. Currently, only 1 in one thousand buildings have a green roof in New York City.

**Link:** <https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3557657&GUID=B4C3A822-2FBB-45FD-8A74-C59DD95246C1&Options=ID%7CText%7C&Search=1032>

**Policy Name:** Green Roofs on Smaller Buildings

**Year:** 2019

**Policy Details:** The requirements for green roofs for new construction are adjusted for smaller buildings. Additionally, the Department of Housing Preservation and Development must study the impact that the installation of green roofs has on building affordability.

**Link:** <https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3332071&GUID=A2326DB7-EBE2-4CF3-AC1D-50834B9BDDC9>

## Portland, Oregon

**Policy Name:** EcoRoof Requirement

**Year:** 2018

**Policy Details:** New buildings with a net building area

of 20,000 square feet or more must have an ecoroof that covers 100% of the building area (with exceptions). At least 50% of the ecoroof vegetation must be an evergreen species. The vegetation should be hardy and achieve 90% coverage within 2 years of planting. The roof must reduce annual runoff volume by 50%. The roof must have at least 4 inches of growing media. Previously, Portland provided grants for green roof installations to help manage stormwater.

**Link:** <https://www.portlandoregon.gov/shared/cfm/image.cfm?id=53363>

## Saint Laurent, Quebec

**Policy Name:** Reglement sur le zonage no RCA08-08-001

**Year:** 2016

**Policy Details:** All flat and low-pitched roofs, and flat and low-pitched roof sections must be covered in vegetation or covered in materials with a solar reflective index (SRI). A permit will be required for the installation and replacement of any roof cladding for a flat or slow-pitched roof (under 2:12) or for a section of a flat or slow-pitched roof. Only the following types of materials are authorized to cover a flat roof or a low-pitched roof:

- Green roof (vegetated).
- Light roof covered with white gravel.
- Light roof covered with a material with a Solar Reflectance Index (SRI) of at least 78, as attested by the manufacturer or a professional.

**Link:** [http://ville.montreal.qc.ca/pls/portal/docs/PAGE/ARROND\\_SLA\\_EN/MEDIA/DOCUMENTS/2018%20TOITPLAT%20ANG.PDF](http://ville.montreal.qc.ca/pls/portal/docs/PAGE/ARROND_SLA_EN/MEDIA/DOCUMENTS/2018%20TOITPLAT%20ANG.PDF)

## San Francisco, California

**Policy Name:** Better Roofs Ordinance

**Year:** 2017

**Policy Details:** New buildings are required to have 15% of the roof space as solar panels or 30% of the roof space as a Living (green) Roof. The ordinance applies to buildings that are: non-residential buildings with a gross floor area of 2000 square feet or residential buildings of any size, and the buildings have 10 or fewer occupied floors. The growing media should be at least 4 inches deep. The vegetation must have a high species diversity, include native species, and be low water use and use low maintenance plants.

**Link:** [http://default.sfplanning.org/publications\\_reports/ZAB\\_11\\_Better%20Roofs\\_051517.pdf](http://default.sfplanning.org/publications_reports/ZAB_11_Better%20Roofs_051517.pdf)

# APPENDIX 3 - MANDATORY GREEN ROOF REQUIREMENTS

**Policy Name:** Central SOMA Plan Living Roof and Solar Requirement

**Year:** 2019

**Policy Details:** New buildings are required to have 15% of the roof space as solar panels and 50% of the roof space as a Living (green) Roof. The ordinance applies to buildings that are: on a lot 5000 square feet or larger with a building height 160' in height or less.

## Seattle, Washington

**Policy name:** Green Factor

**Year:** 2007

**Policy Details:** Minimum Green Factor scores must be met for areas requiring landscaping. There are different scores required depending on the zoning of the development. Under the Seattle Green Factor, varying landscape elements are assigned a multiplier value (or a score). The Green Factor is calculated by multiplying the square feet of a landscape element by its score. The landscape elements include green roofs and walls along with other types of green infrastructure. Green roofs must have at least 2 inches of growing medium, and have a higher score if they have over 4 inches of growing medium.

**Link:** [https://library.municode.com/wa/seattle/codes/municipal\\_code?nodeId=TIT23LAUSCO\\_SUBTITLE\\_IVAD\\_CH23.86ME\\_23.86.019GRFAME](https://library.municode.com/wa/seattle/codes/municipal_code?nodeId=TIT23LAUSCO_SUBTITLE_IVAD_CH23.86ME_23.86.019GRFAME)

**Policy name:** RainWise Program

**Year:** 2009

**Policy Details:** Rebates available for property owners in selected combined sewer basin to install rain gardens and cisterns using trained RainWise Contractors.

**Link:** <http://www.seattle.gov/Documents/Departments/SPU/EnvironmentConservation/RainWise%209-2018%20with%20Rebates%20links%20added-low-res-for-web.pdf>

## Toronto, Ontario

**Policy name:** Green Roof Bylaw

**Year:** 2009

**Policy Details:** New commercial, institutional and residential developments with a minimum gross floor area of 2000 metres squared are required to have green roofs. The city has developed detailed construction standards. The plant selection and design must cover at least 80% of the green roof within 3 years of planting. The growing

medium must be at least 4 inches to help ensure winter plant survival. There are guidelines for biodiverse green roofs that describe best practices to create habitat and promote biodiversity.

The coverage requirements for the green roof bylaw are graduated. Buildings with larger gross floor area are required to cover more from 20% at the low end to 60% at the high end. 20% of available roof space if gross floor area is >4,999m<sup>2</sup>, 30% of available roof area if gross floor area is 5,000-9,999 m<sup>2</sup>, 40% of available roof area if gross floor area is 10,000-14,999m<sup>2</sup>, 50% of the available roof space if gross floor area is 15,000-19,999m<sup>2</sup> and 60% of the available roof space if gross floor area is 20,000m<sup>2</sup>+. Developers can provide cash-in-lieu for reduced green roof area, or to avoid implementing a green roof at a cost of \$200/metre squared. This money goes to fund the Ecoroof Incentive Program, which provides grants to existing building owners of up to \$100/metre squared for green roof installations. To date, more than 500,000 square metres (5.4 million square feet) of green roofs have been implemented in Toronto through this policy over than past nine years.

**Link:** <https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/green-roofs/green-roof-overview/>

## Washington, DC

**Policy Name:** Green Area Ratio

**Year:** 2017

**Policy Details:** All new buildings that require a Certificate of Occupancy must meet the appropriate Green Area Ratio (GAR) based on the zoning district. The GAR is the ratio of the weighted value of landscape elements to land area. The score of landscape elements is calculated by multiplying the area of each element by its multiplier value and adding the scores together. Landscape elements include: soil and amendments, bioretention, new and existing planting, trees, vegetated walls and roofs, and more. Vegetated roofs must have a minimum of 5-7 species and no more than 20% of the total vegetated roof can be individual native species. Plants should achieve minimum 80% coverage after 2 years. There must be minimum 2 succulent plugs/square foot or 10 lbs of cuttings/100 square feet. Designs must include supplemental water. Green walls must include 1 cubic foot of soil/10 square feet of green façade.

**Link:** <https://doee.dc.gov/node/619622>



# APPENDIX 4 - INCENTIVE PROGRAMS

## Austin, Texas

**Policy Name:** Downtown Density Bonus Program

**Year:** 2014

**Policy Details:** Developments may achieve bonus area for buildings by providing green roofs. The green roofs must be built to the Vegetated Roof Performance Standards. For 30-49% coverage of green roof (which is calculated as a portion of total roof area excluding mechanical equipment), 2 bonus square feet are granted; and for 50% or greater coverage of green roof, 3 square feet are granted. 2 additional bonus square feet can be achieved if the roofs are publicly accessible and 2 additional bonus square feet can be achieved if the roof meets the Downtown Public Plaza Standards. The green roofs must be 90% native species or adapted species with no invasive species.

**Link:** <http://www.austintexas.gov/edims/document.cfm?id=206958>

## Chicago, Illinois

**Policy Name:** Green Permit Program

**Year:** 2014

**Policy Details:** Projects that include green technologies, including green roofs, can receive an expedited permit process (fewer than 30 days) and possibly a reduction of the permit fees. Projects which meet the most stringent sustainability guidelines may qualify for a waiver of consultant code fees (\$25,000).

**Link:** [https://www.chicago.gov/city/en/depts/bldgs/supp\\_info/overview\\_of\\_the\\_greenpermitprogram.html](https://www.chicago.gov/city/en/depts/bldgs/supp_info/overview_of_the_greenpermitprogram.html)

**Policy Name:** Floor Area Bonus

**Year:** 2015

**Policy Details:** The floor area ratio is the total square footage of the building divided by the lot area. Developers can build on extra (bonus) floor area in downtown mixed-use districts if they have green roofs that cover more than 50% of the net area of the roof.

**Link:** <https://secondcityzoning.org/resources/Chicago-Zoning-Ordinance.pdf>

## Guelph, Ontario

**Policy Name:** Stormwater Credit and Rebate Program

**Year:** 2017

**Policy Details:** All non-residential or multi-residential property owners are eligible for a credit off their stormwater fee for reducing peak flow, reducing runoff volume,

water quality treatment and operations, and education. The maximum available credit is 50 per cent. The best management practices that can achieve this include green roofs.

**Link:** <https://guelph.ca/wp-content/uploads/StormwaterFeesorChargesCreditApplicationGuidanceManual.pdf>

## Hoboken, New Jersey

**Policy Name:** Green Infrastructure Bonus Standards for Impervious Coverage

**Year:** 2018

**Policy Details:** For new construction or existing building expansion beyond the maximum base allowed, at least two mitigation strategies must be implemented. The strategies include green roofs and rain gardens.

**Link:** [http://hobokennj.ig2.com/Citizens/Detail\\_LegiFile.aspx?ID=1542&highlightTerms=green%20roof](http://hobokennj.ig2.com/Citizens/Detail_LegiFile.aspx?ID=1542&highlightTerms=green%20roof)

## Marion County, Indianapolis

**Policy Name:** Stormwater Credit

**Year:** 2016

**Policy Details:** Individual residential properties can receive a credit up to 25% for implementing best management practices. Multi-residence, industrial and private properties can receive credits up to 50% for practices that reduce stormwater quantity and improve its quality. Approved best management practices are rain gardens, on-site stormwater storage and vegetated filter strips. The rain garden must cover at least 50% of the roof, or an equivalent amount of impervious area must drain into the rain garden. Additionally, non-residential properties can receive a credit for using Green Infiltrative Infrastructure, and educational facilities can receive an education credit for educating students on stewardship of water resources.

**Link:** <https://citybase-cms-prod.s3.amazonaws.com/515488394718481f85d7c98d231aa959.pdf>

## Milwaukee, Wisconsin

**Policy Name:** Green Infrastructure Partnership

**Year:** 2019

**Policy Details:** The program offers incentive funding on a per-gallon captured, reimbursement basis for a host of green infrastructure strategies designed to capture and clean water where it falls. The eligible strategies include green roofs.

**Link:** <https://www.mmsd.com/application/>

# APPENDIX 4 - INCENTIVE PROGRAMS

files/5615/4696/0544/18-009\_Funding\_Natural\_SolutionsWEB.PDF

## Minneapolis, Minnesota

**Policy Name:** Stormwater Utility Fee Credit

**Year:** 2017

**Policy Details:** Property owners can receive credits against their stormwater utility fee for installing a green roof. There are two categories of credits for constructed stormwater management practices: Category 1: Stormwater quality credits: The amount of the quality credit (up to 50 percent of the stormwater utility fee) is based on the percentage of the total impervious area on the parcel treated by BMPs. Category 2: Stormwater quantity-reduction credits: Property owners who can demonstrate that all stormwater is retained onsite without discharge during the 10-year design storm (50% credit) or the 100-year design storm (100% credit), may be eligible for a stormwater quantity reduction credit.

**Link:** <http://www.minneapolismn.gov/www/groups/public/@publicworks/documents/webcontent/wcmstp-205493.pdf>

## Montgomery County, Maryland

**Policy Name:** Rainscapes Rewards Rebate Program

**Year:** 2018

**Policy Details:** Residential properties can receive a rebate of \$9/square foot up to a total of \$7,500 for installing a minimum 100 square foot green roof. Green roofs on institutional/commercial properties must be a minimum 200 square feet are eligible for up to \$20,000 in rebates. The green roofs must have at least 4 inches of growing media.

**Link:** <https://www.montgomerycountymd.gov/water/rainscapes/rebates.html>

## Nashville, Tennessee

**Policy Name:** Green Roof Rebate Program

**Year:** 2016

**Policy Details:** Property owners can receive a rebate of up to \$10/square foot of green roof installed. The credit is applied over 5 years. The vegetation must cover 80% of the roof with hardy, drought resistant plants.

**Link:** [https://www.nashville.gov/Portals/0/SiteContent/WaterServices/Stormwater/docs/LID/GR\\_Credit\\_Requirements.pdf](https://www.nashville.gov/Portals/0/SiteContent/WaterServices/Stormwater/docs/LID/GR_Credit_Requirements.pdf)

## New York State

**Policy Name:** Green Roof Property Tax Abatement Program

**Year:** 2008, revised 2013 and 2019

**Policy Details:** Property owners can receive a one-year tax abatement of \$5.23/square foot for the installation of a green roof, and in certain high need areas, as much as \$15 per square foot. At least 50% of the roof must be covered with a vegetation layer. The vegetation layer must be 80% sedum or an equally hardy species. The application must be submitted by a registered architect or licensed engineer. In 2019, New York City Council passed a resolution to call on the state legislature to pass and the governor to sign legislation that would increase the real property tax abatement for the installation of green roofs to \$15/square foot. Details of this abatement are still being worked out at the time of publication.

**Link:** [https://www1.nyc.gov/assets/buildings/pdf/green\\_roof\\_tax\\_abatement\\_info.pdf](https://www1.nyc.gov/assets/buildings/pdf/green_roof_tax_abatement_info.pdf)  
<https://legistar.council.nyc.gov/LegislationDetail.aspx?ID=3331993&GUID=78C453B3-D03B-49C7-AE5E-255E41404254&Options=&Search=>

## New York City, New York

**Policy Name:** Green Infrastructure Grant Program

**Year:** 2011

**Policy Details:** Private property owners can apply for a grant to fund the design and construction of a green roof. The funding is determined based on the area of the green roof and the depth of the soil. Roofs must be between 3500-20,000 square feet. At 1.5-1.99 inches of soil depth, projects receive \$10/square foot; at 2-2.99 inches of soil depth projects receive \$15/square foot; at 3-3.99 inches of soil depth, projects receive \$25/square foot; and at 4+ inches of soil depth, projects receive \$30/square foot. There is a restrictive covenant with the grant stating that projects cannot be destroyed, removed or altered without the city's consent and must be maintained for 20 years. These requirements are under review at the time of publication.

**Link:** [https://www1.nyc.gov/html/dep/html/stormwater/nyc\\_green\\_infrastructure\\_grant\\_program.shtml](https://www1.nyc.gov/html/dep/html/stormwater/nyc_green_infrastructure_grant_program.shtml)

**Policy Name:** Green Roof Information

**Year:** 2019

**Policy Details:** The office of Alternative Energy is required to post and maintain updated information about green roofs and resources for installing green roofing systems.

**Link:** <https://legistar.council.nyc.gov/LegislationDetail>



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aspx?ID=3557664&GUID=9AE78AF4-EEE1-40BE-A1FB-14A3B00EA9C8&Options=&Search=

### Northeast Ohio Regional Sewer District

**Policy Name:** Impervious Area Reduction Credit

**Year:** Revised 2016

**Policy Details:** If a green roof is properly designed and installed, the area of the pervious area will be reduced from the property's impervious area calculation. Property owners must recertify yearly to confirm that the green roof hasn't been removed and that it is being maintained. The current impervious area charges for residential properties are: \$3.09 for less than 2,000 square feet; \$5.15 for 2,000-3,999 square feet; \$9.27 for 4,000 square feet or more; and \$2.07 for any size homestead. The current impervious area charges for non-residential properties are \$5.15 per ERU or 3,000 square feet.

**Link:** [https://www.neorsd.org/l\\_Library.php?SOURCE=library/CreditManual\\_ALL\\_12182012.pdf&a=download\\_file&LIBRARY\\_RECORD\\_ID=4699](https://www.neorsd.org/l_Library.php?SOURCE=library/CreditManual_ALL_12182012.pdf&a=download_file&LIBRARY_RECORD_ID=4699)

### Onandaga County, New York

**Policy Name:** Green Improvement Fund

**Year:** 2018

**Policy Details:** Facility property owners are eligible for grants for the installation of green infrastructure for stormwater management, such as green roofs. Green roofs on high-priority sites can receive up to 30 cents/gallon captured, medium-priority sites can receive up to 20 cents/gallon, and captured low-priority sites can receive up to 10 cents/gallon.

**Link:** [http://savetherain.us/wp-content/uploads/2018/06/2018\\_GIFApplication\\_051618.pdf](http://savetherain.us/wp-content/uploads/2018/06/2018_GIFApplication_051618.pdf)

### Palo Alto, California

**Policy Name:** Stormwater Measures Rebate Program

**Year:** 2017

**Policy Details:** Property owners can receive a rebate of \$1.50/square foot of a green roof installed. Rebates are also available for the installation of rain barrels, permeable pavement, and cisterns. As of the publishing of this document, green roof rebates are on hold until further notice.

**Link:** <https://www.cityofpaloalto.org/gov/depts/pwd/stormwater/rebates/default.asp>

### Philadelphia, Pennsylvania

**Policy Name:** Green Roof Tax Credit

**Year:** 2007, revised 2016

**Policy Details:** Businesses can apply for a Green Roof Tax Credit for 50% of the cost to construct a green roof, up to \$100,000.

**Link:** <http://www.greenroofshilly.com/incentives.html>

**Policy Name:** Density Bonus

**Year:** 2015

**Policy Details:** In specific zoning districts, applicants may receive an exemption to residential density rules by installing a green roof that covers at least 60% of the rooftop. To be eligible for the bonus, there must be at least 5,000 square feet of earth disturbance. The Water Department's Design Standards require that the vegetation thoroughly cover the growing medium when it is fully established. Invasive plants are not permitted, and the plants must be healthy and able to withstand tough conditions.

**Link:** [http://library.amlegal.com/nxt/gateway.dll/Pennsylvania/philadelphia\\_pa/title14zoningandplanning?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:philadelphia\\_pa](http://library.amlegal.com/nxt/gateway.dll/Pennsylvania/philadelphia_pa/title14zoningandplanning?f=templates$fn=default.htm$3.0$vid=amlegal:philadelphia_pa)

**Policy Name:** Stormwater Grants

**Year:** 2018

**Policy Details:** The goal of the grant program, in addition to stormwater management, is to "add new landscaping, fix drainage problems, ...improve the appearance of... property, and lower stormwater bills." Non-residential properties are eligible to receive a grant to fund the costs of the design and construction of stormwater management projects. The Philadelphia Water Department lists green roofs as a stormwater management method. The Philadelphia Stormwater Management Guidance Manual includes green roof plan standards for the development and construction of green roofs.

**Link:** <https://www.phila.gov/water/wu/Stormwater%20Grant%20Resources/StormwaterGrantsManual.pdf>

**Policy Name:** Stormwater Credits Program and Incentives

**Year:**

**Policy Details:** Non-residential, condo and multi-family residential property owners can reduce their monthly stormwater charge with a credit of up to 80% by installing green roofs to increase pervious surfaces. The area of the green roof should be the largest feasible area. To receive a credit, the green roof must be an extensive green roof, with half of the plants being sedums and at least four

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different species of sedums.

**Link:** <https://www.phila.gov/water/PDF/SWRetro-Manual.pdf>

## Portland, Maine

**Policy Name:** Stormwater Credit

**Year:** 2015

**Policy Details:** The credit structure is focused on structural controls that reduce the impact of the development on the stormwater drainage system. Residential properties can earn a credit of 0.5 SBU (stormwater billing unit) for every whole increment of 600 square feet of impervious area treated, up to a maximum of 0.5 SBU for properties with less than 1800 square feet of impervious area, and 1.0 SBU for properties with 1800 or more square feet of impervious area. A total Basic Credit of up to 60% of the stormwater service charge is available to non-residential properties.

**Link:** [https://www.portlandmaine.gov/DocumentCenter/View/9714/Credit\\_Manual\\_7\\_2015-no-apps?bidId=](https://www.portlandmaine.gov/DocumentCenter/View/9714/Credit_Manual_7_2015-no-apps?bidId=)

## Prince George County, Maryland

**Policy Name:** Rain Check Rebate Program

**Year:** 2013

**Policy Details:** The program reimburses property owners who install stormwater management practices. Residential property owners can be reimbursed up to \$4,000, and larger property owners can be reimbursed up to \$20,000. Stormwater management practices include green roofs with \$10/square foot of green roof reimbursed for at least ¼ of the roof being a green roof for residential properties; and at least \$10/square foot for at least 6 inches of planting material on ¼ of the roof for non-residential properties. Non-residential properties can also receive \$20/square foot for over 6 inches of planting material.

**Link:** <https://cbtrust.org/grants/prince-georges-county-rain-check-rebate/>

## Seattle, Washington

**Policy Name:** Land Use Code

**Year:**

**Policy Details:** There are height exceptions for elevator penthouses if the elevator provides access to a high-rise rooftop that has a green roof.

**Link:** [https://library.municode.com/wa/seattle/codes/municipal\\_code?nodeId=TIT23LAUSCO\\_](https://library.municode.com/wa/seattle/codes/municipal_code?nodeId=TIT23LAUSCO_)

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## Toronto, Ontario

**Policy Name:** Eco-Roof Incentive Program

**Year:** 2009

**Policy Details:** Existing buildings, new buildings with a gross floor area of less than 2000 sq metres, and new construction projects by schools and non-profits are eligible to receive a grant of \$100/square metre of green roof installed and up to \$1000 for a structural assessment to determine if a green roof is feasible. The roof must be built according to Toronto's detailed Green Roof Construction Standards.

**Link:** <https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives-2/green-your-roof/>

## Washington, DC

**Policy Name:** Stormwater Retention Credit Training Program

**Year:** 2013

**Policy Details:** Property owners can install green infrastructure to reduce stormwater runoff and generate Stormwater Retention Credits. One gallon of stormwater retained in one year is equal to one credit. Credits can be sold to projects that are required to implement stormwater management practices; and credits can be sold to the Department of Environment and Energy if they drain into the District Water Bodies. The purchase price per credit is based on the infrastructure's location in the Municipal Separate Sewer System, with non-tidal credits at \$1.95 and tidal credits at \$1.70. To be eligible for credits, the infrastructure must pass periodic maintenance inspections.

**Link:** <https://doee.dc.gov/src>

**Policy Name:** Riversmart Rewards Program

**Year:** 2013

**Policy Details:** Residents, businesses and property owners can install green infrastructure, including green roofs, to receive a stormwater fee credit. They can receive a discount of up to 55%, and the discount is based on the volume of stormwater that is reduced.

**Link:** <https://doee.dc.gov/riversmartrewards>

**Policy Name:** Clean Rivers Impervious Area Charge Incentive Program



## APPENDIX 4 - INCENTIVE PROGRAMS

**Policy Details:** In conjunction with the Riversmart Rewards Program, property owners can receive up to a 4% discount off their Clean Rivers Impervious Area Charge by installing best management practices, including green roofs.

**Link:** <https://www.dcwater.com/iac-incentive>

**Policy Name:** Riversmart Green Roof Rebate Program

**Year:** 2007, revised 2016

**Policy Details:** Residential, commercial and institutional property owners who voluntarily install a green roof are eligible for a rebate. Within the combined sewer system the rebate is \$10/square foot, and within the municipal storm sewer system the rebate is \$15/square foot. For buildings 2,500 square feet or less there is funding of up to \$250 for a structural assessment. Chosen vegetation should cover at least 50% of the green roof after one year and 80% of the green roof after 2 years for plugs and cuttings; or 90% coverage after one year for sedums.

**Link:** <https://doee.dc.gov/greenroofs>

### Other

**Policy Name:** Property Assessed Clean Energy (PACE) Financing

**Year:** 2018

**Policy Details:** This is a financing program provided by Counterpointe Sustainable Real Estate that provides financing for energy efficiency, renewable projects and disaster resiliency improvements to buildings. These projects include loans for green roof capital and maintenance costs. The loans can be repaid over 5-25 years. Property taxes are increased on the building at an agreed upon rate to finance the programs. The program is available in 20 states and DC.

**Link:** <https://www.counterpointesre.com/green-programs>

## APPENDIX 5 - OTHER STORMWATER MANAGEMENT POLICIES

### Adams County, Colorado

**Policy Name:** Stormwater Utility Credit

**Year:** 2014

**Link:** <http://www.adcogov.org/sites/default/files/5708.pdf>

### Baltimore, Maryland

**Policy Name:** Stormwater Fee Credit

**Year:** 2013

**Link:** <https://publicworks.baltimorecity.gov/sites/default/files/SFP%20Stormwater%20Guidance%20Document.pdf>

### Fort Wayne, Indiana

**Policy Name:** Catching Rain Green Infrastructure Initiative

**Year:** 2018

**Link:** <http://www.catchingrainfw.org/incentive-program>

### Kitchener, Ontario

**Policy name:** Stormwater Credit Policy

**Year:** 2012

**Link:** [https://www.kitchener.ca/en/resourcesGeneral/Documents/DSD\\_ENG\\_Stormwater\\_Policy\\_FinalCredit-Bylaw.pdf](https://www.kitchener.ca/en/resourcesGeneral/Documents/DSD_ENG_Stormwater_Policy_FinalCredit-Bylaw.pdf)

### Seattle, Washington

**Policy Name:** Stormwater Facility Credit

**Year:** ---

**Link:** <http://www.seattle.gov/util/ForBusinesses/DrainageSewerBusinesses/StormwaterFacilityCredit/index.htm>

**Policy Name:** Rainwise Program

**Year:** 2009

**Link:** <https://www.700milliongallons.org/rainwise/>

### Washington, DC

**Policy Name:** RiverSmart Landscaping Rebates

**Year:** 2018

**Link:** <https://doee.dc.gov/publication/riversmart-landscaping-rebates>

# APPENDIX 6 - LIVING ARCHITECTURE PERFORMANCE TOOL

The Living Architecture Performance Tool (LAPT) is a rating system and resource for green roofs and walls. The primary goal of the Living Architecture Performance Tool is to certify that green roof and wall projects are planned to achieve certain measurable and replicable performance benefits, so that they can be funded,

designed, installed, and maintained with a much higher degree of confidence. The system is currently in its pilot phase, and features 30 credits in 8 performance areas, with a potential total of 110 points. A list of credits and performance areas is below. To learn more or for a copy of the LAPT, visit [greeninfrastructurefoundation.org/lapt](http://greeninfrastructurefoundation.org/lapt)

<b>Performance Areas and Credit Summary</b>	
<b>Performance Area/Credit</b>	<b>Points</b>
<b>1. Process</b>	<b>5</b>
1.1 Integrated Design Process	Prerequisite
1.2 Stakeholder and Community Engagement	3
1.3 Living Systems Expertise	2
<b>2. Water Management</b>	<b>25</b>
2.1 Stormwater Management	Prerequisite + 16
2.3 Irrigation	5
2.4 Water Balance	4
<b>3. Energy Conservation</b>	<b>14</b>
3.1 Envelope Thermal Moderation	5
3.2 Urban Heat Island Reduction	4
3.3 Renewable Energy	2
3.4 HVAC Integration	3
<b>4. Habitat and Biodiversity</b>	<b>11</b>
4.1 Plants	4
4.2 Growing Media Depth and Composition	2
4.3 Habitat Elements	2
4.4 Biomass	3
<b>5. Health and Well-Being</b>	<b>21</b>
5.1 Biophilic Design – Visibility	2
5.2 Biophilic Design – Accessibility	4
5.3 Food Production	10
5.4 Air Quality Improvements	3
5.5 Acoustics	2

<b>Performance Areas and Credit Summary</b>	
<b>Performance Area/Credit</b>	<b>Points</b>
<b>6. Materials and Construction</b>	<b>14</b>
6.1 Structural Soundness	Prerequisite
6.2 Environmentally Sensitive Materials	3
6.3 Sustainable Materials	3
6.4 Construction Waste Management	2
6.5 Equity-Focused Sourcing and Hiring	3
6.6 Bird-Friendly Glass	3
<b>7. Post-Construction</b>	<b>10</b>
7.1 Operations and Maintenance	Prerequisite + 2
7.2 Fertilizer and Pesticide Use	2
7.3 Monitoring	3
7.4 Education	3
<b>8. Innovation</b>	<b>10</b>
8.1 New Approaches or Strategies	10
8.2 Exemplary Performance	
<b>TOTAL</b>	<b>110</b>