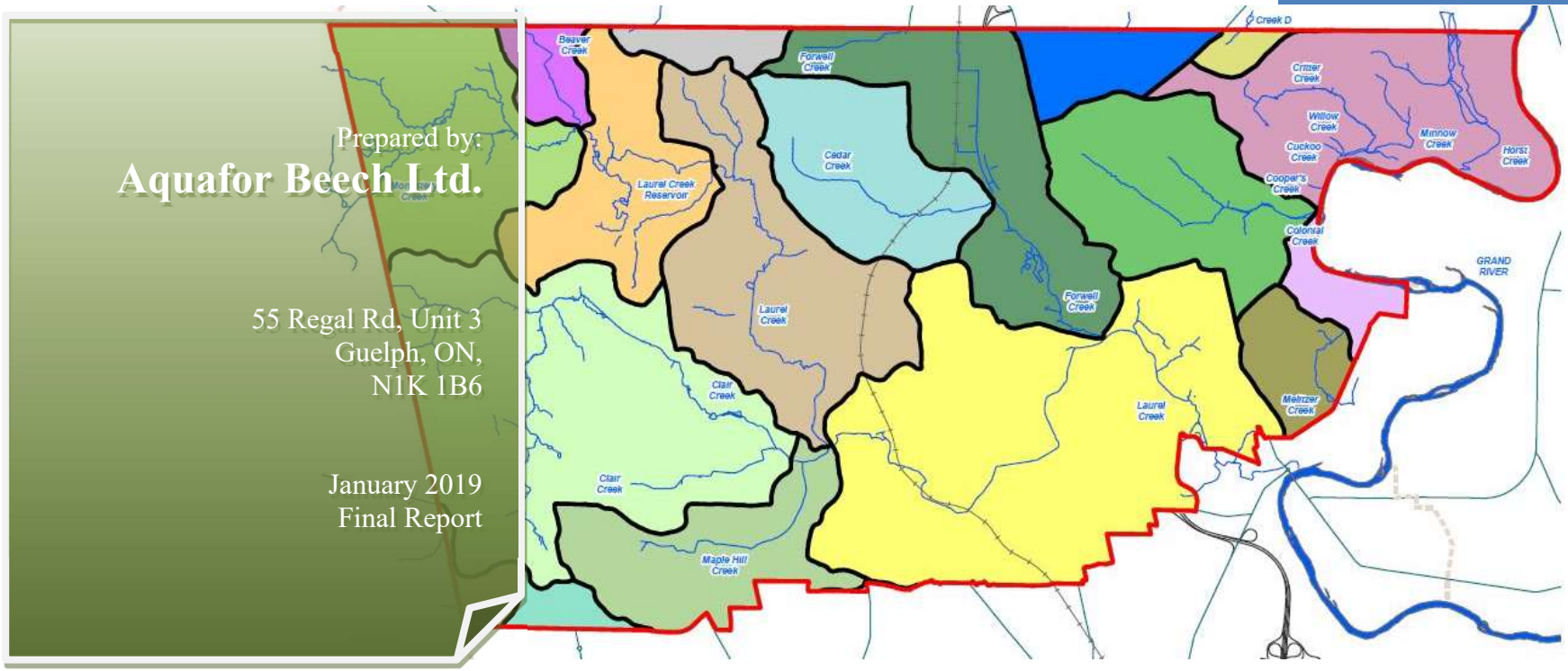
Prepared for:
City of Waterloo

STORMWATER MANAGEMENT MASTER PLAN:
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Leading Jurisdictions Summary



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Final Report

Waterloo SWM Master Plan: Leading jurisdictions (2019)

CANADA			
Province	**Regulation/Incentive**	**City**	**Regulation/Program**
Ontario	**Stormwater Credit Program**	Mississauga 2016	**Stormwater Charge Added in 2016:** (New Stormwater By-Law put into effect by the City of Mississauga on January 1, 2016.) The calculation for the stormwater charge is the same for all properties. Stormwater charges are calculated by multiplying the stormwater rate ($104 for 2018) by the number of stormwater billing units assessed for that property. A billing unit (267m2) represents the average hard surface area on a single detached residential property in Mississauga. The rate is subject to approval by Council and will be reviewed each year as part of the City's annual business planning and budget process. http://www7.mississauga.ca/Departments/Marketing/stormwater/stormwater-charge/docs/UnderstandingYourStormwaterCharge-2018.pdf **Stormwater Credit Program:** The program allows multi-residential and non-residential properties an opportunity to reduce the stormwater charge through the implementation of best practices. Best practices are divided into peak flow reduction, water quality treatment, runoff volume reduction and pollution prevention. A maximum credit percentage can be achieved for each of the five categories, with an overall maximum discount of 50 per cent. Stormwater credits are valid for five years and need to be renewed at that point. https://www.mississauga.ca/portal/services/credit-program **CBC News Article, August, 2018:** In 2015, the City of Mississauga successfully introduced a stormwater charge. It's projected to bring in $42.5 million this year, with $2.3 million of that being directed back to property owners who install green roofs, permeable pavement or take other measures to reduce storm runoff. https://www.cbc.ca/news/canada/toronto/storms-bring-big-questions-for-toronto-politicians-1.4781412

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Province	Regulation/Incentive	City	Regulation/Program
Nova Scotia	**Non-Residential Customers Stormwater Credit Program**	Halifax 2017	**Stormwater Charges:** Charges are separated into two segments: **Site Related Flow Charge**: Effective July 1, 2017 residential properties are billed based on the actual amount of impervious area, with properties placed in tiers. **Stormwater Right-of-Way Charge:** On September 5, 2017, Regional Council approved a new billing approach for the municipality's Right of Way (ROW) Stormwater charge and set a flat annual rate for all properties receiving stormwater service from Halifax Water (both residential and commercial inside the Halifax Water stormwater boundary). Effective July 1, 2018 the annual charge is $40. https://www.halifax.ca/home-property/halifax-water/stormwater-services **Stormwater Credit Program:** In order to qualify for the credit program, the private stormwater management system for the property must match the post-development peak flow rate with the pre-development peak flow rate for, at minimum, the 1:5 year storm event. Non-Residential Customers that demonstrate their Site Related Flows are detained on their property or an adjacent property, as part of an overall stormwater management plan, are eligible to receive a credit. Stormwater credits are renewed annually and are contingent upon maintenance of the site. Eligible credits (30-50%) are applied against stormwater bills. https://www.halifax.ca/sites/default/files/documents/home-property/water/Non_Residential_Customer_Stormwater_Credit_Manual_%20July_1_2017.pdf

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UNITED STATES			
State	**Regulation/Incentive**	**City**	**Regulation/Program**
New York State	**Non-Residential Stormwater Incentives - Grant Programs**	Onondaga County, Syracuse	**Save The Rain Green Improvement Fund (GIF):** GIF grant funding offers assistance to applicants installing GI technologies as an aspect of the development, redevelopment, and/or retrofitting of certain classes of privately-owned properties (commercial, business, and not-for-profit owned properties) in specific geographical locations. Since its inception (2010), GIF has provided over $11.2 million in funding to local green infrastructure projects on private property. **2018 Program Details:** http://savetherain.us/wp-content/uploads/2018/06/2018_GIFApplication_051618.pdf **Suburban Green Infrastructure Program (SGIP)** The purpose is to support the development of green infrastructure and stormwater mitigation techniques on public property within the Onondaga County sanitary sewer district but outside of the City of Syracuse. Funding is aimed at municipal entities within Onondaga County that are planning projects to reduce inflow and infiltration to the sanitary sewer system. All eligible projects must be on municipally-owned property within the Onondaga County sewer system. http://savetherain.us/sgip/ **Rain Barrel, Tree Planting and Vacant Lot Programs are also available.** http://savetherain.us/vacant-lot-program/ **Onondaga County's Save the Rain Program - Background** https://www.dec.ny.gov/chemical/112591.html
New York	**Green Infrastructure Grant Program**	New York City 2011	Applicable for private property owners in combined sewer areas of New York City. The program provides funding for green infrastructure projects that manage the first inch of rainfall, including blue roofs, rain gardens, green roofs, porous pavement and rainwater harvesting. Private property owners in combined sewer areas are eligible for the grants of up to $5 million. In order to ensure that the green infrastructure is well-maintained, grantees must sign a covenant that requires twenty years of maintenance. Since its introduction in 2011, the Grant Program has sought to strengthen public-private partnerships and public engagement in regards to the design, construction and maintenance of green infrastructure on private property. As of 2016, the Grant Program has committed more than $13 million to 33 private property owners to build green infrastructure projects in combined sewer areas. https://www1.nyc.gov/html/dep/html/stormwater/nyc_green_infrastructure_grant_program.shtml

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New York	**Green Roof Policy and Tax Abatement**	New York City 2019	**Green Roof Policy Bill Proposed for NYC** On January 28th, 2019 City Council held a hearing to decide on two pieces of proposed green roof legislation: whether green roofs and solar panels should be mandatory on certain New York City roofs, and, if the green roof tax abatement should be increased from $5.23 per square foot to $15 per square foot (60% of most med-large NYC green roof installations). https://www.urbanstrong.com/nyc-green-roof-policy-bill-proposed/ **Prior to March 2018:** NYC offered a property tax abatement to building owners to install green roofs. The one-time abatement was initially $4.50/SqFt but then in 2013 was increased to $5.23/SqFt and is limited to the lesser of $200,000 or the building's annual tax. The program was suspended in 2018. https://www.urbanstrong.com/financial-incentives-solar-green-roofs-nyc/ The original Green Roof Program: https://www1.nyc.gov/assets/buildings/pdf/green_roof_tax_abatement_info.pdf **EXPANDING GREEN ROOFS IN NEW YORK CITY: TOWARDS A LOCATION-SPECIFIC TAX INCENTIVE:** a 2018 paper that examines the failure of New York's Tax abatement program and suggests a different strategy: In this Article, we suggest a strategy to help get around the budgetary dispute. Specifically, we propose that New York City increase the size of the tax abatement offered to property owners in targeted areas where green roofs are deemed most advantageous- perhaps those neighborhoods that are most vulnerable to the effects of stormwater runoff – while decreasing, or even eliminating, the abatement offered to properties located elsewhere. Moving towards a location-specific subsidy of this sort would allow the City to increase the impact of the tax incentive without increasing the total funding allocated to the program. Not only would the higher rate likely encourage increased utilization of the funding that has already been allocated to the program, but the roofs that are subsidized would be located in areas where they confer greater societal value. https://www.nyuelj.org/wp-content/uploads/2018/06/Spiegel-Feld-Sherman-Green-Roofs-Draft-Final.pdf

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Pennsylvania	**New Stormwater Regulations Take Effect in Philadelphia (non-residential)**	Philadelphia 2015	**Philadelphia began following updated stormwater regulations July 1, 2015.** New developments are now required to handle more water, slow stormwater more effectively, and improve pollutant reduction. New, specific requirements for water quality and water quantity are identified in a chart on the following link: http://www.phillywatersheds.org/stormwaterregulations
Pennsylvania	**Non-Residential Stormwater Incentives -** **Expedited Reviews**	Philadelphia 2016	**Expedited Reviews:** provide flexibility for obtaining stormwater approvals. Two types of reviews are available: **Disconnection Green Review:** (Formerly named Green Project Review) Redevelopment projects exempt from the Channel Protection and Flood Control requirements are eligible for Disconnection Green Review. Projects must disconnect 95% or more of the post-construction impervious area within the project's limits of disturbance (LOD)using DIC to comply with PCSM Requirements. **Surface Green Review:** New Development and Redevelopment projects that can demonstrate that 100% of post-construction impervious area within the project's LOD is managed by DIC and/or bio infiltration/bioretention SMPs to comply with PCSM Requirements are eligible. http://www.phillywatersheds.org/doc/Expedited%20Review%20Handout_20150706.pdf
Pennsylvania	**Non-Residential Stormwater Incentives –** **Impervious Area Reductions Credits**	Philadelphia	**Impervious Area Reductions Credit**: Customers on a Non-residential or Condominium parcel with at least five-hundred (500) square feet of gross area are eligible to apply for credits in the following five categories: Tree Canopy Cover Roof Leader/Downspout Disconnections Pavement Disconnections Green Roofs Porous Pavement To be eligible for IA Credit, the customer must demonstrate applicable management of the first inch of runoff from impervious areas on a property via infiltration and/or detention & slow release and/or volume reduction and filtration. https://rrstormwater.com/city-philadelphia **Impervious Area Reduction Exemption:** Applicants having difficulty meeting the Channel Protection and/or Flood Control requirements using only DIC and bioinfiltration/bioretention SMPs should investigate options to achieve a 20% reduction in impervious area from predevelopment to post development conditions, which exempts projects from both requirements. http://www.phillywatersheds.org/doc/Expedited%20Review%20Handout_20150706.pdf

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Pennsylvania	**Non-Residential Stormwater Incentives -** **Grant Programs (P'3s)** Philadelphia's Incentive Programs (SMIP & GARP) are explained succinctly in this article: https://stormwater.wef.org/2014/09/innovative-financing/ (about a quarter of the way down in the article)	Philadelphia 2015	**Grant Programs:** The City of Philadelphia, through Philadelphia Water and the Philadelphia Industrial Development Corporation (PIDC), has created two stormwater grant programs, the **Stormwater Management Incentives Program** (SMIP) and the **Greened Acre Retrofit Program** (GARP) to reduce the price for qualified non-residential Philadelphia Water Customers and contractors to design and install stormwater best management practices. Competitive applications limit the request to no more than $100,000 per impervious acre managed. 1. **The Stormwater Management Incentives Program (SMIP**) - grant program providing direct financial assistance to property owners for design and construction of SMPs. 2. **The Greened Acre Retrofit Program (GARP)** provides funding to project aggregators or companies to construct stormwater retrofit projects on private property in the combined sewer area. https://www.pidcphila.com/images/uploads/product/Stormwater_Grants_Manual.9.14.15.pdf **An example of the SMIP: Cardone Industries** Via 3.4 million in grants, there are five new SWM features to ensure that runoff from all areas of the property is managed, including a 530-foot swale and basins, both above and underground. These features allow the 50-acre property to store five million gallons of rain water and help Cardone save an average of $250,000 per year in stormwater fees. http://www.phillywatersheds.org/ribbon-cutting-ceremony-celebrating-cardone-industries-stormwater-management-innovations **The Greened Acre Retrofit Program (GARP),** encourages contractors or design / construction firms to compete for limited public grant funding by aggregating the lowest-cost retrofit opportunities available on private land. The availability of public dollars through GARP is intended to create a competitive green infrastructure market that can help source low-cost stormwater management, while also generating a potentially new line of business for engineering/design/construction firms. Private property owners in Philadelphia also benefit from GARP, as its funding provides a means for private property owners to reduce the impervious area on their parcels and thereby reduce their monthly stormwater management fees. Note: the above paragraph is an excerpt from a 15-page report that examines some of the challenges with adoption of the GARP program, 2016: https://www.nrdc.org/sites/default/files/spurring_entrepreneurship_and_innovation_in_stormwater_markets.pdf **Stormwater Retrofit Guidance Manual** Any property is eligible to pursue and install retrofits; however, only non-residential, condominium, and multi-family properties with more than 4 units are eligible to receive stormwater credits. https://www.phila.gov/water/PDF/SWRetroManual.pdf

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Pennsylvania	**Green Roof Tax Incentive & Density Bonus**	Philadelphia	**Green Roof Business Tax Credits:** provides businesses a rebate for 50% of green roof costs up to $100,000. https://www.phila.gov/services/payments-assistance-taxes/tax-credits/green-roof-tax-credit/ **Green Roof Density Bonus Ordinance:** This ordinance allows for increased density in properties zoned for a low-density multi-family residential and neighborhood commercial corridors if a qualifying green roof covers at least 60% of the building's roof area. https://www.pwdplanreview.org/upload/pdf/Green_Roof_Density_Bonus_Factsheet_20160624.pdf **The Ordinance:** http://planphilly.com/uploads/media_items/brown-green-roof-density-bonus.original.pdf
Pennsylvania	**Innovative Stormwater Estimation Tool for Non-Residential Retrofits**	Philadelphia	**Stormwater Credits Explorer Map:** This tool appears easy to use & provides a generic cost estimate to install GI & the resultant decrease in stormwater charge. The drawing function is a little sticky, but the concept is excellent and provide property owners with a quick estimate of ROI for GI. The application turns any non-residential property into a canvas where a user can sketch out ideas of up to 5 different types of "Stormwater Tools", including Green Roofs and Rain Gardens, Permeable Pavers and different types of storage basins. The tools enable users to lay out potential changes while keeping realistic limits for that given property. As Stormwater Tools are added or removed, the application updates the monthly stormwater charge for that property. Users can rapidly get a sense of the feasibility and effectiveness of adding stormwater infrastructure systems. http://water.phila.gov/swexp/explore/
Pennsylvania	**Community Engagement 2013**	Philadelphia	**Soak it up Adoption Program:** An innovative community level grant program. Grants are available on an annual basis up to $5,000. The amount awarded is contingent on the number of sites adopted as well as the level of public engagement proposed. Program is open to Philadelphia based non-profit organizations representing a specific community. Essentially this program is about engaging citizen participation in the management of GI. Private property is ineligible. https://www.pidcphila.com/product/soak-it-up-adoption-program http://www.phillywatersheds.org/sites/default/files2/SIU%20Adoption_FAQ.pdf

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Pennsylvania	**Residential Stormwater Incentives**	Philadelphia	Residential property owners currently pay a flat stormwater charge and are not eligible for credits. A **Rain Check Program** is available for residential customers. Rain Check includes a free rain barrel giveaway and installation, or a small-scale stormwater intervention for a reduced cost. A downspout planter which usually costs $800 will be installed by PWD for $100, or for a rain garden or permeable pavers, PWD will pay up to $2,000. https://www.pwdraincheck.org/en/stormwater-tools-home
Pennsylvania	**Innovative Partnership** A Partnership between the Philadelphia Water Department (PWD)and Drexel University's Sustainable Water Resource Engineering Lab to regularly monitor (use sensors) green infrastructure in order to utilize city storm water more efficiently.	Philadelphia 2018	**The Green Infrastructure Living Laboratory (GILL)** project collects data from green infrastructure that has been constructed on private property. Philadelphia's Green City, Clean Waters program can only be successful if investments are made in both public and private property. The more information gathered about private systems — in particular, green roofs and cisterns — the better the evaluation of which projects are working and are most effective in capturing stormwater. Through the partnership, the city can weigh in on experimental designs and offer perspective about key needs. The outcomes of experiments and monitoring are used to inform design guidance and policy. "…monitoring data collected by the GILL team from a water reuse cistern at Drexel is a great example. We will use that case study as guidance for designers at PWD. It also demonstrates that there is a capacity for water reuse that can meet our design requirements for stormwater management." The data collected by GILL can serve as a constant feedback loop to the Water Department's green stormwater infrastructure design team. http://www.govtech.com/fs/infrastructure/Real-Time-Data-Helps-Philadelphia-Improve-Green-Design.html

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Washington, DC	**Stormwater Retention Credit Trading (SRC)** Tracy – Washington also issued an Environmental Impact Bond in 2016. I've included that incentive further down in my report. **SRC Price Lock Program & Aggregator Startup Grants**	Washington, DC, 2016 2017	The program allows land-constrained developers to meet part of their mandated stormwater retention requirements by purchasing credits from offsite projects that reduce stormwater runoff, like rain gardens, green roofs, permeable pavement and other green infrastructure practices. Credits can be sold on the open market to those who need them to meet regulatory requirements**.** http://encouragecapital.com/wp-content/uploads/2016/03/DC-Stormwater-Press-Release.pdf Large development projects must install runoff-reducing green infrastructure (GI) if they trigger the District of Columbia's stormwater management regulations. This requirement, called the Stormwater Retention Volume (SWRv), is calculated by determining the volume of stormwater runoff from the regulated site. Projects with high compliance costs may be able to reduce costs by using Stormwater Retention Credits (SRCs). Each project must meet 50% of the required SWRv on-site, but DOEE offers the flexibility to meet the remaining 50% off-site through the use SRCs. **DC's Stormwater Retention Credit Trading Program:** https://doee.dc.gov/src The Washington Retention Credit Program is also discussed in this report. See pg 18: https://www.iisd.org/sites/default/files/publications/stormwater-markets-concepts-applications.pdf **In late 2017, DOEE rolled out two new elements of its SRC program:** **Price Lock Program and Aggregator Startup Grants.** *'This also enables green infrastructure to be installed in watersheds in DC where it is most effective and needed but where development may not be occurring.'* https://www.conservationfinancenetwork.org/2018/08/27/focus-on-investors-boosts-dcs-stormwater-credit-market **Price Lock Program** Eligible SRC generators have the option to sell SRCs to DOEE at fixed prices. SRC generators can participate without losing the option to sell to another buyer. The option to sell to DOEE effectively constitutes a price floor in the SRC market and offers certainty about the revenue from an SRC-generating project. "We generally hear that investors want predictable investments that aren't tied to market swings," (Matthew Espie, Stormwater Program Manager at DOEE. "The main way we're providing confidence to investors is through the reserved money in the Price Lock program" https://doee.dc.gov/service/faq-src-price-lock-program **Aggregator Startup Grants** The Grant provides funds (up to $75,000) to support SRC-generating businesses as they evaluate sites for the feasibility of GI retrofits. https://doee.dc.gov/node/1283461

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Minnesota	**Stormwater in-lieu Fee Program** The primary objective of the Minnesota's In-Lieu Fee program (ILF) is to provide high quality and sustainable mitigation (replacement) to offset the loss of aquatic resource functions resulting from authorized impacts. The ILF will provide high quality mitigation credit through strategic site selection based on a watershed approach that incorporates stakeholder input. http://www.bwsr.state.mn.us/wetlands/in-lieu_fee/In-Lieu_Fee_Program_Prospectus.pdf	St. Paul 2018	The fee-in-lieu project is a research investigation that will inform the design of a shared green infrastructure district. It plans for a model in which, rather than building individual stormwater facilities onsite, property developers would pay a certain fee that would be pooled together by the city to develop district-based green infrastructure. **See Minneapolis – St Paul below for a district-level approach to SWM** http://www.govtech.com/fs/news/St-Paul-Minn-Modernizes-Stormwater-Infrastructure.html
New York	**Stormwater in-lieu Fee Program** An innovative market-based approach to stormwater management funding whereby a municipality or government agency allows the property owner or developer to purchase stormwater credits to satisfy the retention or detention requirements or bank the credits such that they can be used by the same developer on another project. The credits are generated and provided by other property owners who have implemented stormwater runoff mitigation projects that have exceeded the requirements.	Albany, 2017	**Stormwater In-lieu Fee (IL) program:** A feasibility report prepared in 2017 for Albany, New York (and surrounding cities). The report includes: • A review of legal and regulatory considerations for establishing ILF, Credit Banking and Trading programs • Research and survey of existing ILF, Credit Banking and Trading programs. (see tab page 32) • A review of alternatives for establishing ILF, Credit Banking and Trading programs. • Conclusions regarding the technical, organizational and financial aspects of such programs. http://cdrpc.org/wp-content/uploads/2017/12/Stormwater-ILF-and-Credit-Banking-Feasibility-Report.pdf

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New York	**Environmental Impact Bonds** 2 short reports outlining the purpose and concerns with environmental bonds.	2018	**Why Environmental Impact Bonds Are Catching On:** They give cities a way to share the risk and learn whether new approaches work. http://www.governing.com/gov-institute/voices/col-environmental-impact-bonds-washington-dc-baltimore-atlanta.html **Storm-Prone Cities Vie for Environmental Impact Bonds:** …Not everyone is so optimistic that tying payments to outcomes will produce better results. Whether a program triggers a bonus payment could have just as much to do with the quality of the lawyers who drew up the contract as it does with its actual performance, Edmiston said. https://www.insurancejournal.com/news/national/2017/08/17/461327.htm
Washington DC	**Environmental Impact Bond**	Washington, DC, 2016	In September 2016, DC Water issued a $25 million Environmental Impact Bond (EIB) to finance the construction of green infrastructure to manage stormwater runoff. http://www.quantifiedventures.com/dc-water/ **The Project:** https://www.dcwater.com/sites/default/files/Green%20Infrastructure%20Executive%20Summary.pdf
Maryland	**Environmental Impact Bond**	Baltimore, 2018	A new EIB project totaling $10 million in green infrastructure is coming to the port city of Baltimore, the Chesapeake Bay Foundation (CBF) announced in a press release. Four million dollars in funding will come from state funds and the collection of city stormwater fees. The introduction of EIBs will allow Baltimore's Department of Public Works to take a bigger bite into green infrastructure. A further six million dollars' worth of infrastructure projects will be funded through EIBs, with Kresge Foundation and other funders yet to be named acting as the private investors. CBF and its partner, impact investment advisor Quantified Ventures (QV), are helping the city to design the plan. https://www.baltimoresun.com/news/maryland/baltimore-city/bs-md-bay-city-green-20180325-story.html The Green Infrastructure Environmental Impact Bond project being conducted by CBF, with our contractor Quantified Ventures, is funded by a generous one-to-one grant from an anonymous donor that is being matched in part by The Kresge Foundation and The Abell Foundation. http://www.cbf.org/how-we-save-the-bay/programs-initiatives/environmental-impact-bonds.html

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Georgia	**Environmental Impact Bond**	Atlanta, 2018	Through a creative financing opportunity won by the Department of Watershed Management (DWM), funding will support the improvement of resilience projects in Westside neighborhoods prone to flooding. Eight green infrastructure projects were proposed for funding at an estimated cost of $12.9 million https://www.prnewswire.com/news-releases/atlantas-department-of-watershed-management-wins-environmental-impact-bond-challenge-for-green-infrastructure-and-resilience-projects-on-the-citys-westside-300619657.html
Georgia	**Environmental Impact Bond** **Technical Brief**	2017	**Environmental Impact Bonds May Not Bear Fruit for Green Investors:** A short article that compares Environmental Bonds to Green Bonds. "Some believe environmental impact bonds could be the next big thing for ethical investment. But there are two important pieces that are often not considered with environmental impact bonds. Compared to a green bond, there is considerably more monitoring and evaluation needed to meet the demands of contracts used to finance these projects. That is, more money needs to be set aside by the implementer to verify the results than would be the case with a green bond. Additionally, the interest rate attached to environmental impact bonds has not necessarily reflected the additional risk to investors. The D.C. Water bond, for example, offered an interest rate that was the same as the interest rate for all other bonds D.C. Water issued." https://www.rand.org/blog/2017/11/environmental-impact-bonds-may-not-bear-fruit-for-green.html

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Maryland	**Community-Based Public-Private Partnership (CBP3)** **(Pay for Performance Business Model)**	Prince George's County, 2015	Prince George's County is the second most populous county in Maryland. It contains more than 300 streams, as well as portions of the Potomac, Anacostia and Patuxent Rivers, all of which flow into the Chesapeake Bay. PG County entered into the 30-year "Clean Water Partnership" with Corvias, which is a pay-for-performance service delivery model that delegates project selection, design, construction and O&M responsibility to the private partner. Under the agreement, the county provides Corvias with funds to retrofit 2,000 acres over a three-year project period, in which the county provides oversight, and Corvias serves as the program manager, handling procurement of subcontractors to ensure projects are executed in line with the scope, schedule and costs. After each project is completed, the Maryland Environmental Service, an independent state agency, inspects and certifies work as completed, and then monitors subsequent O&M work. In this particular case, private sector financing was not the primary driver of the partnership. Following the EPA's Community-Based PPP (CBP3) model, the private sector was engaged to meet regulatory requirements in an economically efficient manner, to bring in expertise in GI design, to transfer knowledge to public sector employees, and to provide additional local economic and community benefits. The overall effort is expected to install 46,000 GI elements – including rain gardens, permeable pavement and green roofs – by 2025. The agreement requires that Corvias meet socioeconomic targets as well, with goals for participation of country residents, and goals of 30–40 percent for subcontracting to local small, minority, veteran, disabled and women-owned businesses. See pg. 32: https://www.preventionweb.net/files/61829_181107engagingtheprivatesectoringi.pdf The Clean Water Partnership is the first-ever CBP3 model to address stormwater management at such a large scale. Under the terms of the 30-year agreement, the county has committed to invest $100 million during the initial three years of the partnership. The funding covers the planning, design and construction of green infrastructure to retrofit 2,000 acres of impervious surfaces. Additionally, there is an option in the partnership to retrofit an additional 2,000 acres after the initial 3-year term if the county is satisfied with the progress of private entity. https://www.epa.gov/G3/prince-georges-county-maryland-clean-water-partnership & https://www.corvias.com/sites/default/files/Insights/Prince_Georges_County_CWP_05-2017.pdf **Prince George's County Clean Water Partnership:** https://thecleanwaterpartnership.com/wp-content/uploads/2016/06/PGC-CBP3-Clean-Water-Partnership.pdf **Master Program Agreement** for the Urban Stormwater Retrofit Program Public-Private Partnership between Prince George's County and Corvias: https://thecleanwaterpartnership.com/wp-content/uploads/2017/10/CR-099-2014-Corvias-MPA-MMA-Legislative-Approval.pdf

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Maryland	**Contrary opinion on the merits of public-private partnerships for SWM**		**Public-Private Partnerships for Stormwater: Are We Sacrificing Innovation and Quality for Lower Costs?** This brief article is pertinent to Maryland. https://www.cwp.org/public-private-partnerships-stormwater-sacrificing-innovation-quality-lower-costs
Pennsylvania	**Community-based public-private partnership (CBP3)**	City of Chester, 2017	The Vision is to plan, implement and manage a 350-acre integrated Green Stormwater Infrastructure (GSI) urban retrofit program with $50 million investment, including a long-term (20-30 year) operation and maintenance program. The effort will support greater greening efforts in the region, generating hundreds of jobs and significant small business growth for this historically impoverished, overly burdened, urbanized community. https://www.corvias.com/news/cbp3-drive-economic-growth & http://www.chestercity.com/wp-content/uploads/2017/05/Chester_CCBP3_Announce_FactSheet_v5.pdf **Initial implementation has been a bit rocky….** 'This system will destroy the city of Chester' https://www.delcotimes.com/news/this-system-will-destroy-the-city-of-chester/article_cb9769b4-4f03-5da7-90a8-f0e7c7307cd8.html & http://www.delconewsnetwork.com/news/region/chester-stormwater-authority-receives-m-in-loans/article_dcb241e4-b24a-5a6b-8122-da6eac99798c.html
Washington State	**Feasibility study for Stormwater Community-based Public Private Partnership (CBP3).**	Washington State, 2018	The project will explore the feasibility of establishing a Stormwater community-based pubic private partnership pilot program in Washington. The effort will conduct an analysis to examine the legislative feasibility of a pilot program, assess potential barriers and risks, and propose potential solutions to overcome those risks. https://enviroincentives.com/products/environmental-incentives-leading-stormwater-public-private-partnership-feasibility-study/ & http://www.commerce.wa.gov/wp-content/uploads/2018/06/PP-for-RFQQ-preproposal.pdf

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North Carolina	**Reverse Auction** Pilot Project	Durham	**Rain Catchers 2.0 Program**: CONTRACT: SP-2017-02 The pilot project involves the furnishing of all materials, labor, equipment, tools, etc. unless otherwise specified, for the complete installation of rain gardens and cisterns at various site locations throughout the City of Durham. https://durhamnc.gov/3048/Rain-Catchers-20 **Bidding Documents, Contract Documents and technical specifications** for CONTRACT: SP-2017-02 https://durhamnc.gov/DocumentCenter/View/20438/SP-2017-02_RainCatchers2_ProjectManual_2018mar02?bidId= Contract SP-2017-02 **Bid Tabulation**: https://durhamnc.gov/DocumentCenter/View/17861/SP-2017-02_Bid_Tabulation_Sheet_2017dec13?bidId= **Award of Bid**: https://durhamnc.gov/DocumentCenter/View/20266/NoticeToProceed_RainstormSolutions_12Feb2018?bidId=
Indiana	**Reverse Auction**	Valparaiso 2011	In all, 38 property owners submitted a bid for one or more rain barrels. The average household bid $59 for one rain barrel, and $48 per rain barrel if they submitted for multiple barrels; the maximum bid was $250. In total, 60 rain barrels were delivered, 58 were installed, and only $20 of the bids was unpaid. Of the total $20,500 spent to install all rain barrels, property owners provided $3,428, and the grant provided $17,072. https://www.metroplanning.org/chicagolandh2o/blog/2012/03/05/reverse-auction-in-valparaiso-ind-neighborhood-helps-reduce-flooding/index.html
Minnesota	**Reverse Auction**	The Ramsey-Washington Metro Watershed District	**Snail Lake Restoration Project, 2019**: an ambitious shoreline restoration project to be funded through the Stewardship Grant Program over the next two years. In all, 34 sites and nearly 68,000 square feet around the lake will be improved with native vegetation and erosion management practices. The plan is to put the project out to bid and hire a single contractor to complete the work. https://www.rwmwd.org/stewardship-grants-program-caps-off-successful-year-exciting-projects-in-store-for-2019/

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Minnesota	**Special Property Tax Levy to fund Green Infrastructure**	The Ramsey-Washington Metro Watershed District	The Ramsey-Washington Metro Watershed District (RWMWD) is located in the Eastern Twin Cities metropolitan area. The watershed encompasses approximately 41,600 acres and includes 18 lakes, 5 streams, and hundreds of wetlands. Land use in the watershed is generally developed, and includes industrial, commercial, and residential land. Green Infrastructure funding has come from a special property tax on all properties within the watershed. The EFC has worked with RWMWD to share their approach and successes with state water bankers from across the country interested in lending funds for these types of programs. Not surprisingly, the bankers were interested in how they will be paid back and were impressed with the stability and capacity of the watershed improvement tax. http://efc.web.unc.edu/2014/10/08/bottom-financing-options-green-infrastructure-will-approach/ Approximately 95 percent of the District's funds for implementing capital projects, programs, and other operations are raised through a property tax levy. This tax is an ad valorem tax (a tax on all taxable parcels in the District, based on property value). As a guiding principle, the District intends to restrict its annual levy to a property tax rate of approximately 0.025 percent, or about $25 per $100,000 of property value. From 2006 through 2015, the District's annual levy ranged from approximately $3 to $6million. This tax rate will allow the District's levy to grow at approximately the same rate as the increase in property values. See tab page 26: https://www.rwmwd.org/wp-content/uploads/RWMWD-Strategic-Overview.pdf The RWMWD is currently focusing much of its efforts on reducing dissolved Phosphorus as well as chlorides from road salt. Reduction in imperviousness is essential in achieving these goals. Green infrastructure is being used to retrofits streets, parking lots and site drainage. The District is working on pooling funds in order to take advantage of financing opportunities. Options being investigated include an "Impervious Surface Reduction Opportunities Fund" or a "Distributed Green Infrastructure Fund." State Revolving Fund (SRF) money has successfully been used for partial funding of previous District projects. Opportunities to expand this role of the SRF are being explored. https://efc.sog.unc.edu/sites/default/files/RWMWD_MN_GI%20Case%20Study.pdf

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Minnesota	**Stewardship Grants** Residential/Commercial	The Ramsey-Washington Metro Watershed District	Stewardship Grants are available to install and maintain a variety of BMP's designed to filter and reduce runoff, protect groundwater, restore native ecosystems, prevent flooding and lessen the effects of drought. **Installation Grants** of up to $15,000 for homeowners or $100,000 for ICI. Funding covers 50-100 percent of the project, depending on type and location. **Maintenance:** For new projects, they will reimburse up to 50 percent of annual maintenance costs with a maximum of $5,000 over five years. https://www.rwmwd.org/get-involved/stewardship-grants/
Minneapolis	**District Stormwater System** **Public Private Partnership**	St. Paul 2016 - ongoing	**Towerside District Stormwater:** A New Model of Green Infrastructure Towerside is the region's first designated innovation district. This 370-acre area is envisioned as a high-intensity, high density mixes of places and spaces where working, living and innovation come together. A coalition of public, private and nonprofit partners is working to establish Towerside as a replicable model for sustainable urban redevelopment. Key to this model is the use of district-wide systems for stormwater management, energy, parking, parks and other amenities. This "first-of-its-kind district stormwater system" is the result of a voluntary agreement between four private developers (owning adjacent properties) to manage stormwater runoff jointly rather than separately. This shared "district" approach to stormwater management will save the property owners money while creating more effective, cost-efficient and eco-friendly stormwater treatments. The MWMO facilitated the agreement between the landowners and is providing $1.3 million to supplement the owners' investment in stormwater infrastructure. The district system design integrates infrastructure to facilitate sustainability and resilience for the community while adding new public amenities like green space. The stormwater system is also a component of the larger redevelopment of Fourth Street, which is known as "Green Fourth." The result of this effort is the Towerside District Stormwater System, which comprises a pair of biofiltration basins connected to a 206,575-gallon underground storage tank. Together, these features capture, treat and hold stormwater runoff from an approximately 8-acre area so that the water can be reused. https://www.mwmo.org/management/planning/towerside-district-stormwater-management/ & https://www.mwmo.org/projects/towerside-district-stormwater-system/
Minneapolis	**District Project**	St. Paul 2018	**Minneapolis neighborhood could be heated with sewage:** Planners designing the Towerside District in Minneapolis want to heat buildings with sewage flowing deep beneath the streets. It would be one of the largest applications of a burgeoning technology that draws energy from wastewater. http://www.startribune.com/minneapolis-neighborhood-could-be-heated-with-sewage/468218893/

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Maryland	**Residential/Commercial Rebate Program for Stormwater Control**	Montgomery County	The Montgomery County Department of Environmental Protection's **RainScapes Program**: for residential, commercial and institutional property owners who implement efforts to help control stormwater runoff. The maximum per property rebate has been increased to $7,500 per residential property, and $20,000 for properties owned by commercial entities, institutions, homeowner associations or nonprofit organizations. Once a RainScapes project is installed, residents can apply for a reduction to their property tax bill in the form of a credit for maintaining their project. Since the launch of the RainScapes Rewards Rebate Program 11 years ago, 987 rebates have been distributed totaling $511,481.63. **Types of projects (ie green roof, permeable pavers etc) can be found here along with rebate amounts for each project type.** https://www.montgomerycountymd.gov/water/Resources/Files/rainscapes/Rebate-Table.pdf **The program:** https://www.montgomerycountymd.gov/water/rainscapes/rebates.html
Maryland	**Stormwater Credit Programs**	Baltimore	**Single-family property owners** can receive a credit on their stormwater fee by installing and maintaining stormwater treatment practices and/or for volunteering in hands-on activities. (For every 4 hours, there is a credit of $10/yr for a maximum of $30 within a 12-month time frame. Customers who exceed the $30/year maximum can donate certificates to another person. https://publicworks.baltimorecity.gov/sites/default/files/SFP%20Stormwater%20Guidance%20Document.pdf **Non-Single-Family Property owners**: a wide range of credits are available https://publicworks.baltimorecity.gov/sites/default/files/Non_SFP%20Stormwater%20Guidance%20Document.pdf **Green Roof Rebate Program:** Rebates up to $2 per square foot of green roof. Incentive awarded will not exceed 50% of total project cost. https://www.bluewaterbaltimore.org/wp-content/uploads/Green-Roof-BMP-Fact-Sheet-2013.pdf
New York State & Pennsylvania	**Interactive Green Infrastructure Maps** **(Community/Business/Residential Incentive)**	Onondaga County Philadelphia	**Onondaga County's Save the Rain Program - Green Projects and Streets:** A new GIS map tool to familiarize the community with green infrastructure projects that have been constructed. https://socpa.maps.arcgis.com/apps/Shortlist/index.html?appid=a797dbe56ce745c2920e3c9e7d827d2b **New Big Green Map Captures Scale of Philly's Growing Green Infrastructure Network:** http://phl-water.maps.arcgis.com/apps/webappviewer/index.html?id=c5d43ba5291441dabbee5573a3f981d2

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Other Relevant Reports	**The P3 Great Lakes Initiative Report**	2017	**Public Private Partnerships and Finance of Large-scale Green Infrastructure in the Great Lakes** This report attempts to assess the market size for large-scale adoption of green infrastructure in the Great Lakes Basin. By "large-scale", the report assumes at least $50 million in green infrastructure investment. A set of regulatory and other drivers are identified, and a decision tree is presented that can be used to answer two questions: 1) what conditions enable a community to look to the private sector for the delivery or finance of their green infrastructure needs, and 2) which communities can attract private sector interest. http://www.ectinc.com/wp-content/uploads/2017/03/Public-Private-Partnerships-and-Private-Finance-of-Large-Scale-Green-Infrastructure-In-Great-Lakes-Report.pdf
	Report	2018	**Environmental Policy Innovation Center, 2018 Report:** The report, **"Stormwater innovation,"** looks at how two of the leading local governments in the country are succeeding or failing in work to deliver effective stormwater projects on public and private land. Montgomery County, Maryland, was once a national leader in running an effective stormwater program, but has fallen behind on permit requirements and progress in dealing with polluted stormwater runoff. Meanwhile nearby Prince George's County, once lagging on stormwater treatment progress, is quickly catching up. This paper reviews innovations and lessons learned in stormwater programs in Prince George's County and the District of Columbia and goes in depth to look at Montgomery County's current approach. We provide a detailed analysis of Montgomery County's 2018 proposal for new contracts with private restoration businesses. http://policyinnovation.org/wp-content/uploads/2018/11/StormwaterInnovation.pdf
	Report	2017	**Stormwater P3s & Alternative Delivery Approaches: Myths & Realities:** P3s or alternative delivery approaches are often touted as solutions to the funding "gap," or as a tool to stretch public sector budgets. While it may be true that a P3 can help with budget issues, the real potential value is as a tool to improve the chance of realizing anticipated outcomes. A P3 delivery mechanism is a performance-based, solution approach to procurement. A "next generation" P3 integrates initial planning, design and construction with the life cycle of activities of the asset, post-commissioning, to share the risks of delivery with the private operator. https://waterfm.com/stormwater-p3-myths-realities/

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	Article	2018	**What is a CBP3?** **A New Model for Stormwater: Community Based P3s** A CBP3 is a partnership between a local government and a private partner that agrees to a performance-based approach to build infrastructure and deliver on broader policy goals and objectives, such as established community-centered metrics, incentivized redevelopment and workforce development initiatives. Employing a CBP3 approach enables local governments to incentivize a greater volume of shovel-ready projects to the marketplace to access a greater array of tax-exempt and/or taxable capital sources; however, the CBP3 in and of itself does not represent a new source of funding, but instead the framework to aggregate projects for greater scale. It better leverages existing available funding to maximize the amount of infrastructure and community impact delivered and does so through a turnkey delivery model whereby the partnership can efficiently deliver projects, inspection services, maintenance services or other infrastructure installations in a timely manner. A CBP3 delivers community benefits through agreed performance outcomes, with greater risk transfer than traditional design-bid-build (DBB) approaches. Based on Esri economic development models, communities that have employed a CBP3 have almost tripled the amount of each dollar invested to reflect over $2.5 billion dollars returned in economic stimulus in the community. https://www.bv.com/insights/expert-perspectives/new-model-stormwater-community-based-p3s
	Technical Brief		**Pay for Performance Contract Mechanisms for Stormwater Management**: This report describes approaches to using pay for performance contract mechanisms in stormwater management to link payment to the delivery of verified pollutant load reductions. Pay-for-performance contracts (P3's), green bonds and credit trading are examined. https://enviroincentives.com/wp-content/uploads/2017/05/Pay-for-Performance-Contract-Mechanisms-for-Stormwater.pdf
	Report United States Agency for International Development	2018	**Engaging the Private Sector in Green Infrastructure Development and Financing:** This report provides recommendations for steps that city officials and the donor community can take to engage private sector partners in green infrastructure development and financing. Page 25 highlights mechanisms to promote GI https://www.preventionweb.net/files/61829_181107engagingtheprivatesectoringi.pdf

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	Report	2018	**Why Environmental Impact Bonds Are Catching On:** They give cities a way to share the risk and learn whether new approaches work. "EIBs are not the best tool for every issue and geography." But when cities want to try unproven approaches, scale up solutions that have been tested on a small scale, or share financing costs with other entities that may benefit from projects, the monitoring and evaluation requirement "is a feature, not a bug," Cohen says. Evaluation is essential to make sure that taxpayers are not on the hook for projects that don't work, while providing investors -- who often have a social or environmental impact mandate -- with an assessment of the outcomes their dollars are creating. "EIBs are a powerful new tool in the municipal toolbox," http://www.governing.com/gov-institute/voices/col-environmental-impact-bonds-washington-dc-baltimore-atlanta.html
	Report **Center for Watershed Protection**	2019	**Constructing Stormwater Retrofits in Maryland: Challenges & Recommendations for Cost Estimation:** The primary finding of this study was that many organizations working on stormwater retrofit implementation do not track the project expenses and details needed to be able to compare costs and cost-effectiveness across projects and determine how these costs vary with project type, location, site conditions or design features. The key recommendation for funding agencies is to consider changes to grantee reporting requirements to collect this information. For example, water quality volume, the single most reliable predictor of project cost, is not currently reported to funders. The study also recommends that funding agencies provide guidance and resources on stormwater retrofit cost estimation and a simple tool that lower-tech applicants and grantees can use estimate pollutant reductions and water quality volume. https://www.cwp.org/constructing-stormwater-retrofits-in-maryland-challenges-recommendations-for-cost-estimation/
	Journal of Great Lakes Research, 2016	2016	**Reverse Auctions for Agricultural Watersheds:** A paper that examines improving voluntary conservation programs in agricultural watersheds. https://www.sciencedirect.com/science/article/pii/S0380133016301447

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	Philadelphia is the site of the U.S.'s largest program to construct rain gardens, wetlands, roof gardens and other green infrastructure projects to sharply reduce polluted stormwater runoff. The 25-year project aims to use public-private partnerships to create 10,000 "greened acres" by 2035.	Philadelphia 2018	**With a Green Makeover, Philadelphia Is Tackling Its Stormwater Problem** Rather than spending an estimated $9.6 billion on a "gray" infrastructure program of ever-larger tunnels, the city is investing an estimated $2.4 billion in public funds — to be augmented by large expenditures from the private sector — to create a citywide mosaic of green stormwater infrastructure. In the end, Philadelphia hopes by the mid-2030s to create the largest green stormwater infrastructure in the United States. Of the 1,073 greened acres completed in Philadelphia by the end of 2017, 226 were on public property and 847 on private property; nearly 500 of the privately converted acres were "greened" through redevelopment of the properties or a program of incentivized stormwater retrofits. The report states that Philadelphia's approach "…takes the problem of stormwater and turns it into an amenity." https://e360.yale.edu/features/with-a-green-makeover-philadelphia-tackles-its-stormwater-problem
	Study	Philadelphia, 2015	**Study Shows Evidence of "Triple Bottom Line" Effects of Green Stormwater Infrastructure** The Study looked at 52 green stormwater projects in Philadelphia over a 12-year period and found consistent and statistically significant reductions in narcotic possession and manufacture, as well as burglaries near those sites. http://www.phillywatersheds.org/study-shows-evidence-%E2%80%9Ctriple-bottom-line%E2%80%9D-effects-green-stormwater-infrastructure
	Report	2016	**New Solutions for Sustainable Stormwater Management in Canada:** The goal of this report is to provide all Canadian local governments with an introduction to stormwater user fees and to the various other tools that they can implement to take an integrated approach to better urban stormwater management through the use of green infrastructure. Kitchener & Waterloo are cited as a case study in this report.
	Thesis	Philadelphia, 2018	**Stormwater Management in Philadelphia: The Importance of Green Stormwater Infrastructure and Community Involvement in Greater Citywide Sustainability.** A 2018 thesis that examines and makes recommendations for greater community involvement in GI initiatives. https://digitalcommons.humboldt.edu/cgi/viewcontent.cgi?article=1153&context=etd