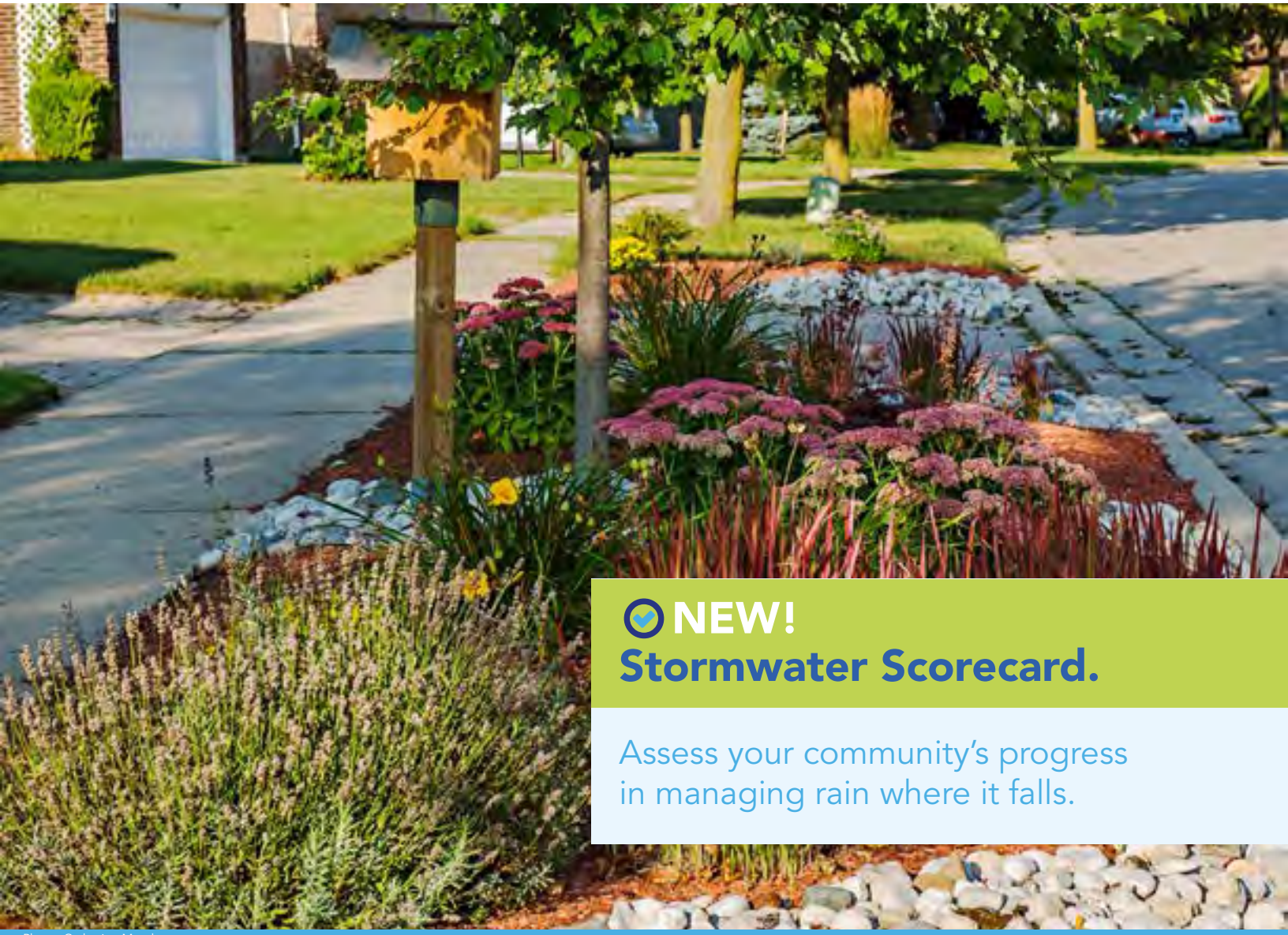
SECOND EDITION

Soak It Up! Toolkit

16 ACTIONS YOUR MUNICIPALITY CAN TAKE TO REDUCE RUNOFF AND RUNOFF POLLUTION.



NEW!
Stormwater Scorecard.

Assess your community's progress in managing rain where it falls.

Photo: Catherine Mombourquette

RAIN COMMUNITY SOLUTIONS

Clara Blakelock and Clifford Maynes, Green Communities Canada
Second Edition, published 2017 | Quote or excerpt with credit
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Credits

The Soak it up! Toolkit was written and researched by Clara Blakelock and Clifford Maynes of Green Communities Canada. See www.greencommunitiescanada.org, and our rain-related websites, including www.raincommunitysolutions.ca and www.depaveparadise.ca. The second edition of the toolkit was published in June 2017. Feel free to quote or excerpt with credit.

Thanks to all those who contributed comments, including Credit Valley Conservation, Lake Simcoe Region Conservation Authority, Lindsay Telfer (Freshwater Alliance), Federation of Canadian Municipalities, Sharmalene Mendis-Millard, Heather Ray (Green UP), Leta van Duin (Alberta Low Impact Development Partnership), and Sheila Boudreau and Patrick Cheung (City of Toronto). Thanks also for input from those who attended our in-person workshops in December 2015. Green Communities Canada retains sole responsibility for the content.

We enthusiastically welcome further comments and suggestions, in particular examples from across Canada. Email info@raincommunitysolutions.ca. To keep in touch, subscribe to our Umbrella Stormwater Bulletin and contribute your updates.

This publication was made possible with funding from the Ontario Trillium Foundation. 2017 updates and the Stormwater Scorecard were made possible by collaboration with the Our Living Waters Network and the Canadian Freshwater Alliance, with funding from Tides Canada and Mountain Equipment Coop.

Our Vision:

to transform the urban landscape so that runoff and runoff pollution are minimized, and most of the rain that falls is returned to soils, vegetation, and the atmosphere.

In our vision of the near future, rain is no longer stormwater runoff, a damaging by-product of urban development, but a resource, managed as close as possible to where it falls. Precipitation is returned to groundwater aquifers, the atmosphere, and waterbodies, similar to an undeveloped watershed.

In many areas, this means that 90% of annual rainfall is permanently retained onsite through infiltration, harvesting and reuse, and evapotranspiration. Only the heaviest rainfalls result in runoff, and even these events are reduced in volume and peak. Flooding is minimal, beaches remain open, aquatic life is healthy, and drinking water is protected.

Green infrastructure is a tool for achieving these goals and restoring the natural water balance in urban areas. Green infrastructure includes rain gardens, bioswales, permeable pavement, infiltration galleries, green roofs, the urban forest canopy, and rainwater harvesting and reuse.

GET EXPERT HELP

We're community engagement experts, who work with local partners to achieve resilient communities where rain is valued as a resource.

Learn more at www.raincommunitysolutions.ca.

Contact us at info@raincommunitysolutions.ca to discuss a customized strategy for your community.

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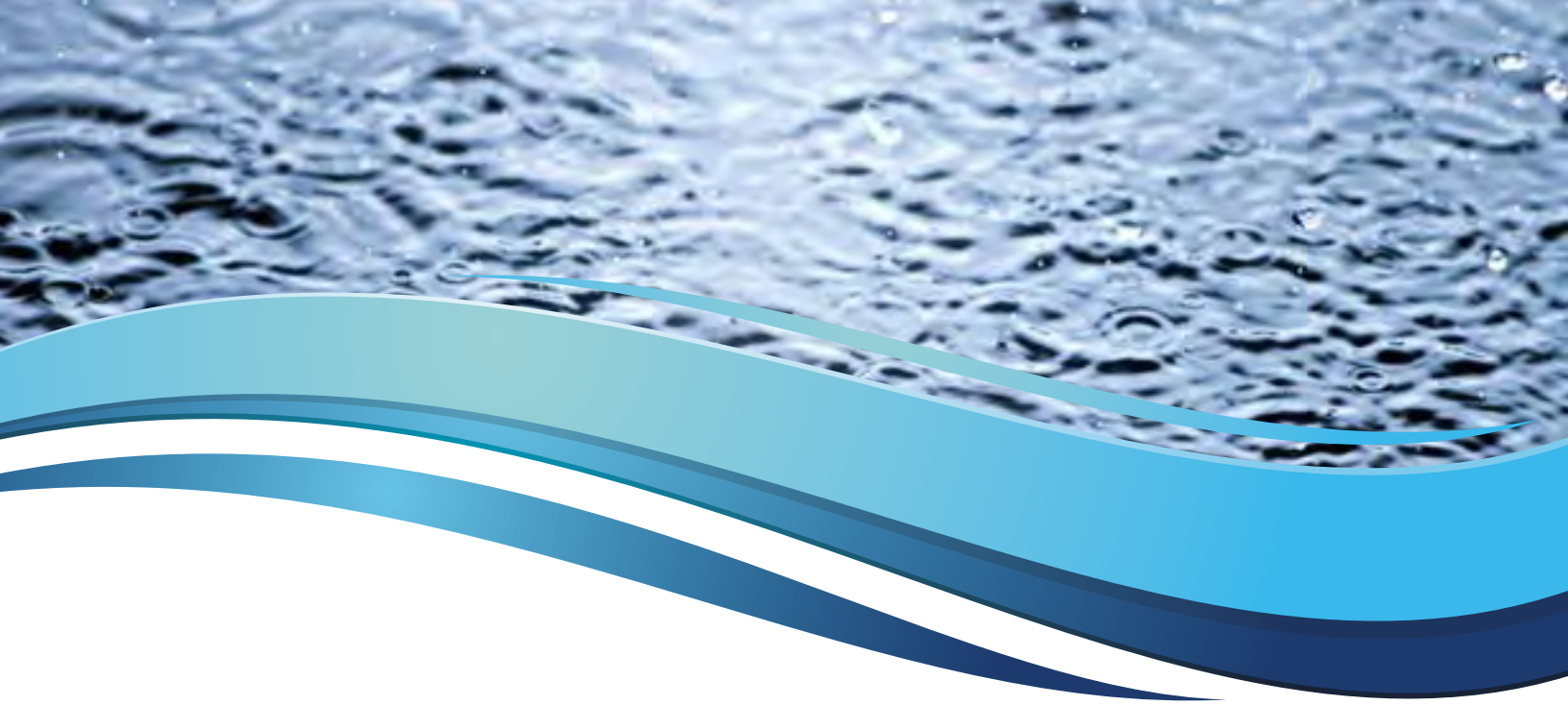


0 Introduction: Transforming the urban landscape

In a forest, most of the rain that falls is intercepted by trees and other vegetation or soaked into the ground. Very little—less than ten per cent—runs off into rivers and streams. But when a forest turns into a city, everything changes. With the loss of vegetation and the increase in impervious surfaces—buildings, roads, parking lots, shallow soils—a majority (if not most) of the rain that falls rapidly becomes stormwater runoff, a polluted and sometimes destructive urban waste product.

The huge increase in runoff volumes often overwhelms the capacity of existing stormwater management infrastructure, particularly in older urban areas not built to modern standards.

Climate change is expected to worsen the runoff problem and impacts like flooding by increasing the frequency and severity of extreme weather events.

Consequences of these combined factors include flooding, business interruptions, infrastructure damage, erosion, runoff pollution, sewage system overflows, sewer backup, closed beaches, damage to aquatic habitats, increased reliance on treated water for irrigation, and loss of groundwater recharge. Vulnerable and lower income households in frequently flooded areas are especially hard hit.

Conventional stormwater and flood management solutions on their own are unable to keep ahead of these problems. In densely populated urban areas, space is limited and land is prohibitively expensive.

For these reasons many communities—including a number of Canadian and northern U.S. cities—are turning to green infrastructure as a complement to conventional "grey" infrastructure for managing rain. They are taking steps to maintain, restore, and imitate natural ecosystem services, including infiltration and evapotranspiration. In short, they are making the modern city landscape more like a natural landscape, reducing runoff volumes and pollution, and protecting property and the environment.

Green infrastructure measures include rain gardens, bioswales, permeable pavement, infiltration galleries, green roofs, the urban forest canopy, and rainwater harvesting and reuse. These proven effective technologies manage rain where it falls and heal the urban water cycle.

Benefits include:

- flood-risk reduction, climate change adaptation
- water quality protection (natural filtration is restored, sewer overflows are reduced)
- infrastructure savings (green infrastructure combined with grey is cheaper than grey on its own)
- improved tourism and recreation
- increased public health, livability, walk friendly communities
- increased property values
- urban heat island mitigation

Historically, drainage was the primary aim of municipal stormwater management. However, in recent years leading jurisdictions have reversed this paradigm, with the aim of minimizing runoff by returning rain to natural pathways, including soil, vegetation, and the atmosphere.

Since about 2008, the US EPA has been an enthusiastic champion of green infrastructure, and a number of states and cities have joined in, sometimes budgeting hundreds of millions or even billions of dollars.

Since 2002, British Columbia has been promoting managing rain where it falls, to ensure groundwater protection and stream health. The Partnership for Water Sustainability in B.C. is funded by the provincial government to provide resources to municipalities implementing green infrastructure.

In Ontario, green infrastructure is supported by provincial land-use policies (including 2017 amendments to the Toronto- and Hamilton-area growth plan), the Great Lakes Strategy, and the province's Climate Action Strategy. In 2017, Ontario's Ministry of Environment and Climate Change will release a Low Impact Development Guidance document that includes stormwater volume reduction targets, i.e., specific requirements for reducing stormwater runoff through onsite infiltration and other measures.

Meanwhile, responsibility and authority for implementing green stormwater infrastructure remains largely municipal. The Soak it Up! Toolkit and Stormwater Scorecard are designed to help communities meet the challenge of effective local implementation.

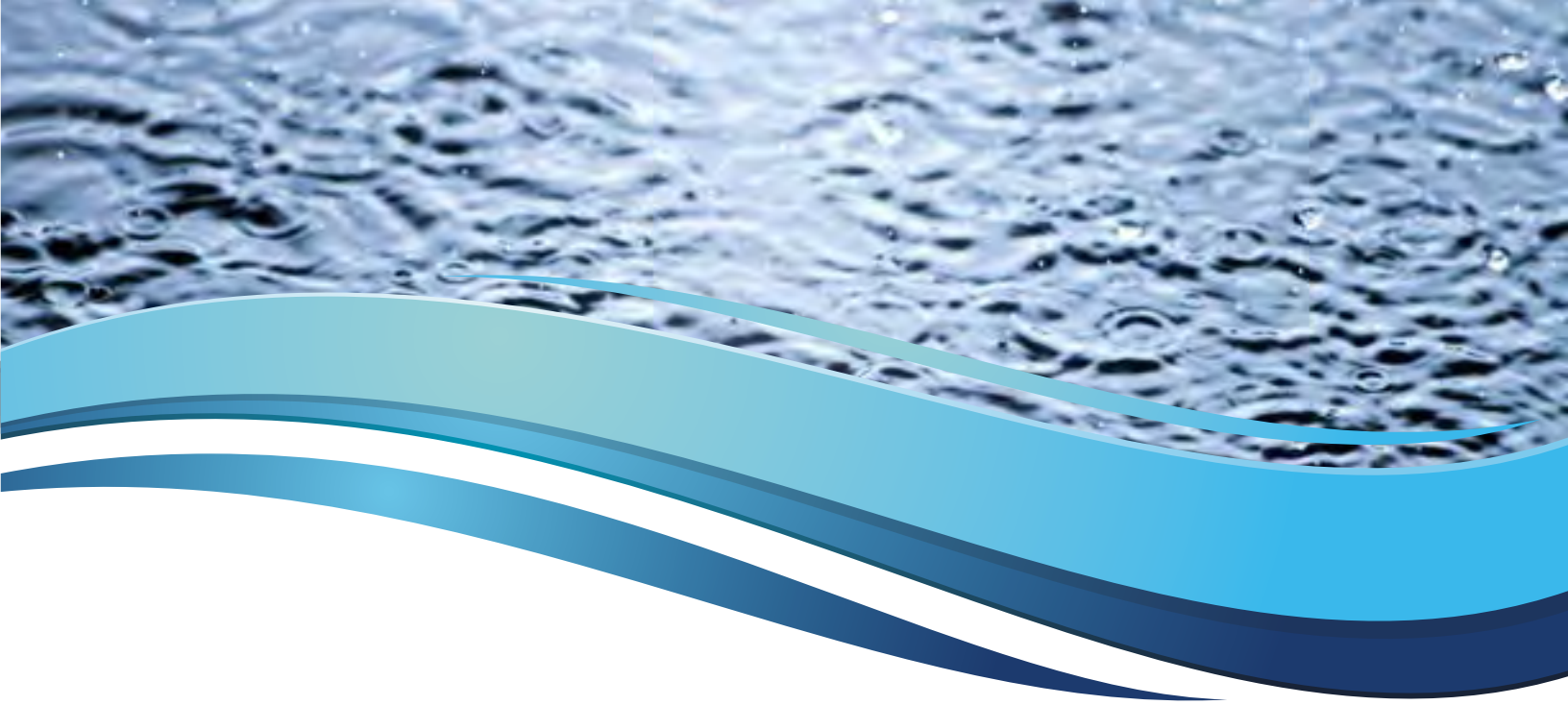
Stormwater Scorecard.

Your community, your local water issues, and your community's commitment to green infrastructure

ADDITIONAL RESOURCES

To learn more about the urban water cycle and green infrastructure:

- The story of stormwater by RAIN Community Solutions for more information on the urban water cycle and stormwater management practices
- An Introduction to Green Infrastructure Practices by Rutgers University Extension provides an overview of types of green infrastructure and some of the benefits they provide
- Green infrastructure FAQ by RAIN Community Solutions provides re sponses to some common concerns
- Advancing low impact development as a smart solution to stormwater management by Credit Valley Conservation for a good, brief overview of the advantages of green infrastructure (LID) in a Canadian context.
- The USEPA provides a range of resources on green infrastructure costs and benefits
- Ontario Ministry of Environment and Climate Change Low Impact Development Guidance Manual (forthcoming 2017) for more on the rationale for runoff volume control, green infrastructure methods, and additional resources and how to guides
- Resources from Credit Valley Conservation and Toronto and Region Conservation Authority on planning, design, construction, and maintenance of low impact development in different contexts



1 Incorporate green infrastructure in plans, policies

Municipalities and other local water-related bodies (e.g., Ontario's conservation authorities) should adopt a high-level policy commitment to reducing runoff and runoff pollution at source as a top priority for stormwater management. Detailed policy commitments and targets should be outlined wherever appropriate. (See box below for more on targets.)

A high-level policy commitment sends a clear message to everyone concerned— municipal departments, developers, landscapers, property owners— that minimizing runoff is "the new normal." It sets the stage for cross-departmental cooperation and community partnerships.

This commitment can be framed and expressed in a number ways.

- Climate adaptation: creating a resilient community that can withstand future extreme weather.
- Sustainability: envisioning a blue-green city that integrates water, nature and the urban landscape.
- Economics: saving money by using green infrastructure to extend the life of existing grey infrastructure and reduce flood risk, at the same time creating green jobs.

TARGETS FOR REDUCING RUNOFF

Cities use different ways to determine how much rainfall to manage with green infrastructure when setting targets for their plans and visions. Types of targets include:

- volume of rainfall managed with green infrastructure—annually, or per storm event, by geographic area, watershed, or subwatershed
- area or percentage of impervious surface in a city that has its runoff (up to a certain level of storm) managed with green infrastructure
- total annual runoff or pollutant loadings to streams and lakes

Throughout North America, targets typically require that a specified volume of rainfall – say the first inch/25 mm or more – be captured onsite. Draft targets being developed in Ontario range from 23mm to 32mm depending on the local rainfall regime throughout the province. The targets give priority to measures that permanently retain rain onsite through infiltration, evapotranspiration, harvesting and release. Capture, treatment, and release is proposed as a secondary option where necessary.

Clifford Skarstedt, Peterborough Examiner

Commitments to runoff reduction, green stormwater infrastructure and implementation strategies should be incorporated where there are opportunities, in municipal and related documents such as the following:

Stormwater management master plans. These plans should identify implementation sites and strategies. For example, Thunder Bay's stormwater master plan identifies 600 sites for possible LID installations. The Town of Okotoks, AB Stormwater Management Master Plan and Flood Mitigation Plan identifies the potential for LID despite low-infiltration soils. Vancouver's Integrated Rainwater Management Plan is heavily focused on green infrastructure.

Green infrastructure strategies. Strategies focused on green infrastructure implementation can identify and value existing green infrastructure, and set out a plan to do more. See examples from Milwaukee, New York, and Seattle. See London U.K. task force recommendation for a Commissioner of Green Infrastructure.

Infrastructure plans and asset management. Green stormwater infrastructure should be incorporated into infrastructure capital investment and maintenance plans. See Credit Valley Conservation's guide to optimizing municipal assets and reducing risk.

Official land-use plans. See Markham's commitment to green infrastructure as part of its requirement for stormwater management in all development and redevelopment. Calgary's 2009 Municipal Development Plan also includes a commitment to Low Impact Development (now being implemented on the ground).

ONE WATER

Most municipalities manage drinking water, wastewater, and stormwater as three distinct systems. However, a "one water" approach (integrated watershed management) recognizes that all three systems, along with the natural systems they draw from and discharge to, are part of the same water cycle. For example, wastewater and stormwater both discharge into waterbodies that are drinking water sources (often for other communities downstream); stormwater can recharge aquifers for drinking water if it is absorbed; rainwater can be harvested for irrigation to conserve potable water; and stormwater runoff reduction helps keep combined sewers from exceeding capacity. Integrated planning and management of all three systems enables local governments to work together to deliver clean, safe drinking water, prevent flooding, and protect aquatic habitats, and achieve money-saving synergies.

Watershed plans. See for example the Lynde Creek Watershed Plan, which directs the creation of an urban stormwater retrofit LID plan and an imperviousness report card. (See box ONE WATER below.)

Source water protection plans. Contaminants in stormwater runoff are a threat to source water for drinking. Sudbury's source water protection plan calls for green infrastructure to reduce runoff pollution.

Water conservation and efficiency plans. Green infrastructure, including harvesting and reuse, reduces consumption of treated potable water for irrigation. Further, communities that depend on groundwater for drinking water need green infrastructure to facilitate groundwater recharge. The City of Orillia subsidizes rain barrels as part of its water efficiency plan.

Flood reduction plans. The City of Peterborough's recommends disconnecting downspouts and foundation drains from the sewer system. The City of Toronto recommends green infrastructure be considered as part of basement flooding environmental assessments.

Sustainability plans. Green stormwater infrastructure addresses all dimensions of sustainability - environmental, economic, health, social - and should feture prominently in sustainability/healthy community plans. See for example Imagine Calgary, which sets a target to reduce impervious areas to 30% of total land area, or the City of Mississauga Living Green Master Plan, which includes a commitment to incorporate LID into all existing and new city projects.

Climate adaptation plans. Damaging increases in stormwater volumes and peaks are a major impact of climate change. Green stormwater infrastructure can help to reduce strain on existing municipal systems during extreme events. Nova Scotia provides a guide for municipalities to assist in climate adaptation planning. Adapt-action is an online tool providing resources for Alberta municipalities to adapt to flooding and water scarcity.

WHAT'S HAPPENING?

VANCOUVER

In 2016, Vancouver council approved a long term target to manage 90% of annual rainfall using green infrastructure.

An integrated rainwater management plan directs creation of a green infrastructure implementation strategy by December 2017, to move beyond pilot projects to "ensure citywide adoption of green infrastructure best practices"

SEATTLE

In 2013, Seattle council resolved to manage 2.6 million m³ (700 million gallons) of runoff annually by 2025 through green infrastructure—the culmination of years of work in implementing successful projects.

A 2015 draft strategy identified opportunities to accelerate green infrastructure retrofits, classifying them by type, and setting an interim goal of managing 1.5 million m³ (400 million gallons) of runoff annually by 2020.

MILWAUKEE

In 2010, the Milwaukee Metropolitan Sewerage District established a vision for 2035 of zero combined sewer overflows, zero basement sewer backup, and improved stormwater management. The goal is to capture the first 1.27 cm (half inch) of rainfall across the district, or 2.8 million m3 (740 million gallons) of water with every rainfall.

In 2013, a regional green infrastructure plan classified impervious areas by type across seven watersheds, and identified targets for the volume of rainwater to be managed by each type of green infrastructure technology.

The plan uses a Green Infrastructure Portfolio Standard, an approach borrowed from the world of renewable energy, in which annual targets are established for each watershed or geographic area. The aim is to gradually ramp up installation capacity without creating bottlenecks or price escalation.

NEW YORK CITY

The 2010 NYC Green Infrastructure Plan sets a goal of managing 10% of runoff from impervious areas in the combined sewer region through infiltration and on-site detention by 2030. Progress is reported annually.

Elements include priorities for green infrastructure implementation, grant programs, a co-benefits calculator, and standard designs for GSI in rights-of-way.

BRITISH COLUMBIA

The Stormwater Planning Guidebook recommends municipalities set watershed targets to capture 90% of annual rainfall in order to maintain pre-development hydrology.

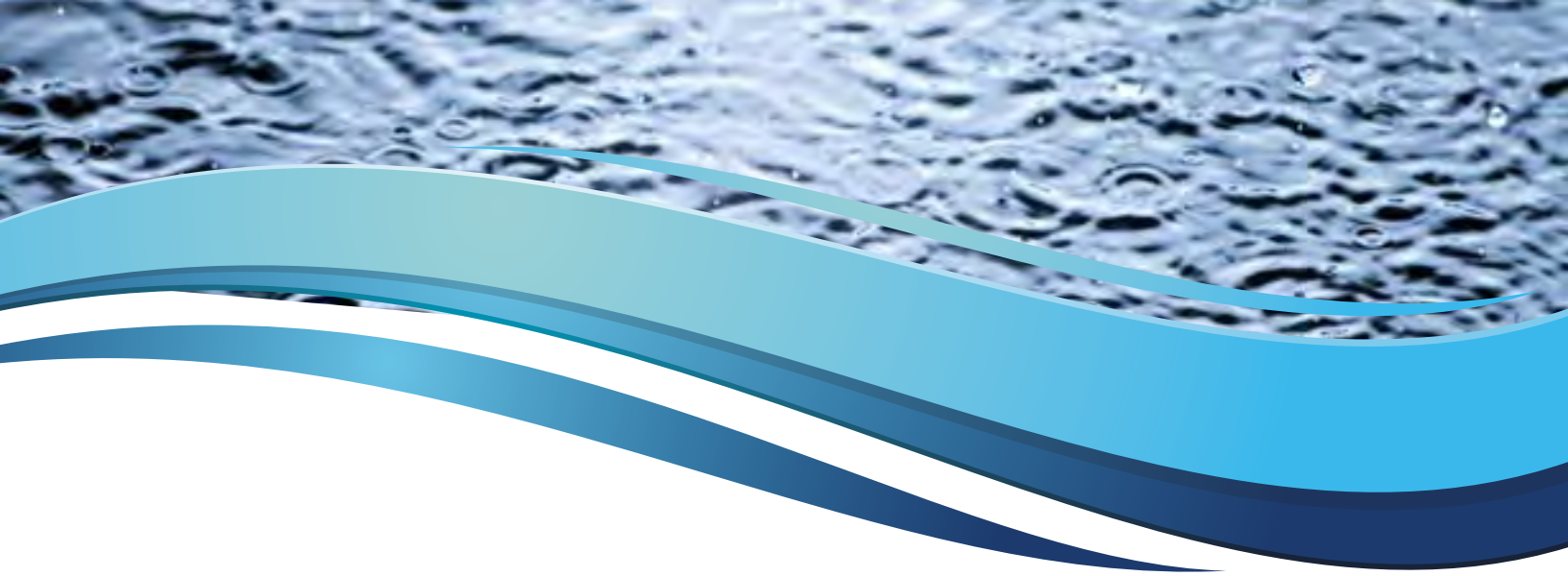
The Partnership for Watershed Sustainability publishes the "Beyond the guidebook" series providing examples and advice for local implementation.

TAKE AWAY

- When communicating your vision, put practical benefits front and centre, e.g., reduce runoff to reduce flood-risk and water quality issues and save money on infrastructure. Tie into local priorities.
- Feature and quantify co-benefits. Milwaukee estimated property value increases of $667 million after full implementation of the plan. New York developed a co-benefit calculator for individual projects.
- Form an interdepartmental task force to help ensure implementation. The City of London, UK established a Green Infrastructure Task Force | following the publication of its infrastructure plan.
- Adopt specific targets and requirements to give teeth to general commitments.
- Once commitments are made, a review of local bylaws and regulations may be required to remove barriers to green infrastructure. See this U.S.guide for a workbook on auditing local regulations.

Stormwater Scorecard.

How your community plans for green infrastructure



2 Build community support, participation

Property owners need to be engaged to build awareness, buy-in, and participation in implementing green stormwater infrastructure. They need to understand the true cost of stormwater management, damaging impacts, their contribution, and what they can do to reduce their "stormwater footprint."

Effective engagement reaches out to property owners through trusted channels, where they live and work, helps them understand personal risks, and provides practical guidance and assistance in taking action.

How to deliver successful community engagement:

- Partnerships. Work with community organizations, faith communities, employers, and others.
- Accessible information. Offer videos, fact sheets, brochures, websites, and social media with plain language information about stormwater problems, solutions, and available programs.
- Demonstration projects. Install rain gardens, permeable paving, or other green infrastructure projects in high profile locations with interpretive signage. Involve volunteers in construction and maintenance.
- Site-specific advice. Offer one-on-one home or commercial/institutional visits with property owners to help them understand the path of runoff on their properties and opportunities to solve drainage problems such as wet basements, and ponding. See examples–Riversmart Homes in Washington D.C. the RAIN Home Visit and Greening Corporate Grounds.
- Depaving. Partner with property owners to organize community projects in which unused pavement is torn up by hand and replaced with green space—a highly effective way to draw attention to the issue of urban runoff and impervious surfaces.
- Community outreach. Offer presentations, tables, and workshops that teach community members how to install and operate rain barrels,

design, and build rain gardens, build pet waste composters, landscape with native plants, etc.

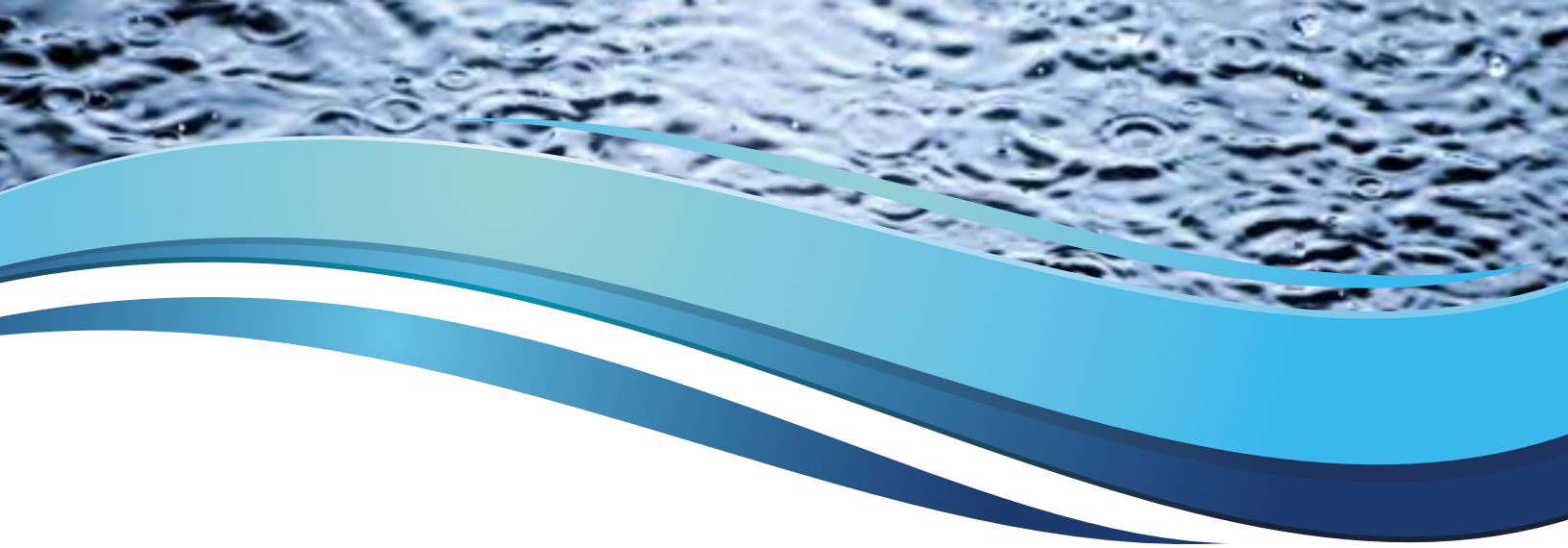
- Recognition. Give awards to property owners who demonstrate green stormwater management. Recognize them through public ceremonies, online profiles, lawn signs, etc.
- Incentives. Attract early adopters by providing small rebates to property owners who install rain gardens, rain barrels, or other green infrastructure. The City of Thunder Bay gives rebates of $500 to homeowners who attend a training session and install a rain garden. Many cities provide free or discounted rain barrels. For widespread management of storm water on private property, larger grants or rebates will be required. See Mobilizing action on private property.
- Online tools. Offer tools to help property owners see how green in frastructure could fit onto their property and how much rainwater it would capture. If credits are available, use the tool to show available savings/incentives. See Philadelphia's Credits Explorer or Victoria's Rainwater Management Planner. Note: other online tools are more suitable for design professionals (see the Water Balance tool, the Minimal Impact Design Standards tool from Minnesota or the USEPA National Stormwater Calculator).
- Design competitions. Elicit submissions from design teams of professionals or students for retrofits of specific sites. Offer cash prizes and the chance to see designs become reality. Examples: EPA Campus Rainworks Challenge, and the Soak it up! Green infrastructure design competition.
- Tours and maps. Highlight existing green infrastructure by offering organized or self-guided tours of project sites. See examples of tours in Portland, Oregon, and maps produced by Credit Valley Conservation and the Toronto and Region Conservation Authority.
- Consultation. Engage community members in developing the policies and programs cited elsewhere in this toolkit. Invite suggestions and feedback about potential projects.

TAKE AWAY

- High visibility demonstration projects get attention from media, politicians, and residents. They showcase possibilities and inspire further action.
- In Kitchener and Waterloo, there was less success with door-to-door campaigns (cold calls). Engage people when they show an interest, e.g., at community events.

Stormwater Scorecard.

How does your community engage the public about stormwater?



3 Bring practitioners and decision-makers up to speed

Planners, approvals staff, engineering consultants, builders, contractors, landscapers, gardeners, and others often lack practical knowledge and experience in the implementation of green infrastructure. It is outside their comfort zone.

To help make green infrastructure "the new normal"—as a complement to grey infrastructure—decision-makers and practitioners involved with rainwater management need to be engaged, oriented, and trained. Private contractors need to see green stormwater infrastructure as a business opportunity.

For some types of green infrastructure, like green roofs and permeable pavement, there are recognized training and certification systems. Less so for other landscape-based solutions like bioswales and rain gardens, although there may be local programs.

There is a need for more standardization of training programs across the country. Meanwhile, local solutions must be found to close the gap.

WHAT'S HAPPENING?

ONTARIO

The Toronto and Region Conservation Authority, Lake Simcoe Region Conservation Authority, and Credit Valley Conservation Authority offer training programs in LID design, construction and maintenance, in-person and online. These trainings are also available outside Ontario.

Landscape Ontario offers training in rain garden design and construction for landscape professionals.

Green Communities Canada also offers training in rain garden design and construction.

GAIA COLLEGE, BC

An online course on living green infrastructure targets planners, policy makers and developers.

JOB CREATION AND GREEN INFRASTRUCTURE

Studies, like this one from New York City, have found that green infrastructure is less expensive than grey and less energy intensive, but more labour-intensive. That's good news for job creation. Green infrastructure maintenance can be a viable career opportunity for low-or semi-skilled workers. See training programs in Ohio and New York. See Green for All report.

WASHTENAW COUNTY, MICHIGAN

The Master Rain Gardener program run by Washtenaw County trains volunteers in the design and construction of rain gardens.

Participants attend five classroom sessions and design a rain garden to achieve certification. Community members share knowledge with their neighbours.

UNIVERSITY OF WASHINGTON

Online course and certificate in Green Stormwater Infrastructure Design and Management targets engineers, planners, landscape architects and other professionals interested in green infrastructure.

UNITED STATES

A National Green Infrastructure Certification Program was launched in 2016 to provide certification to skilled workers in the construction, inspection, and maintenance of green infrastructure.

TAKE AWAY

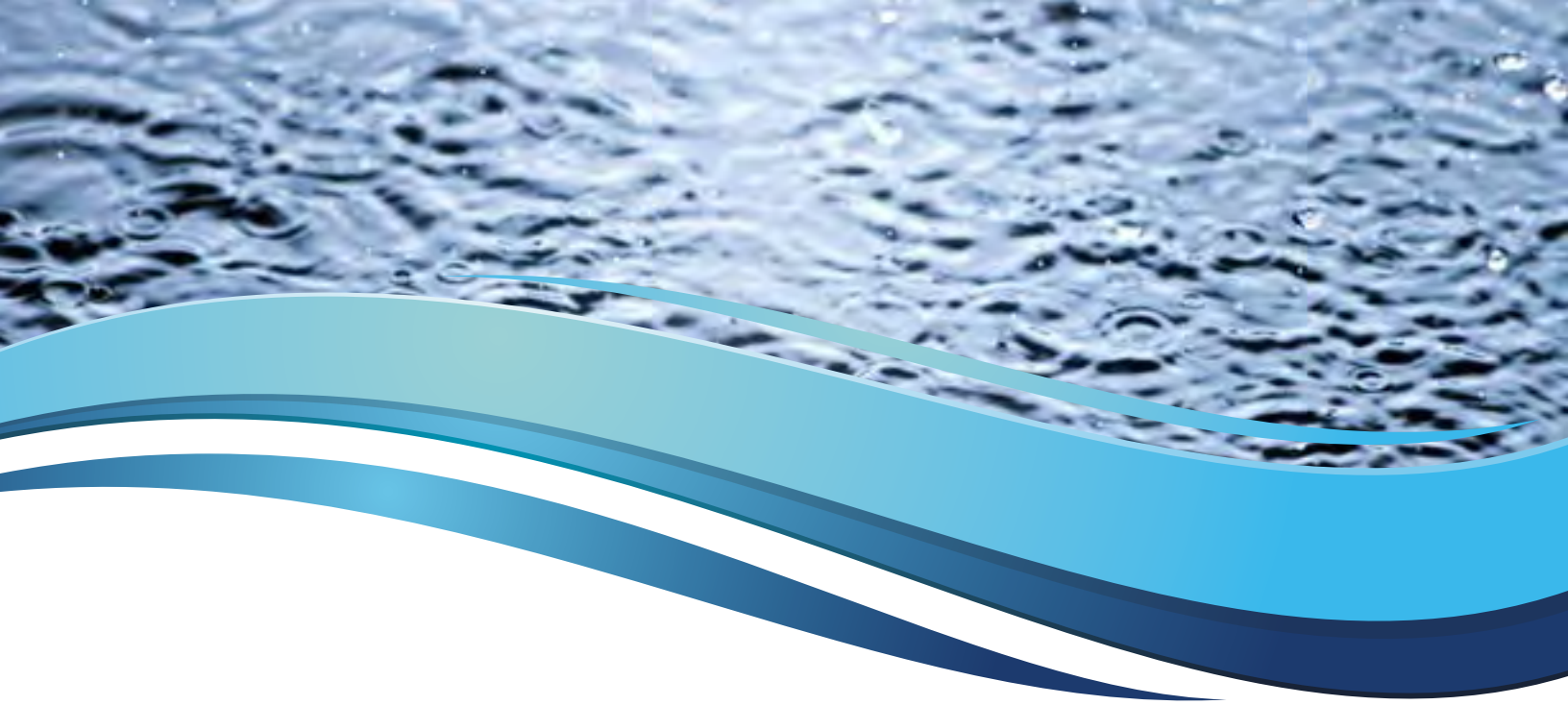
- "Stackable" certifications allow people to progress from basic to advanced levels.
- Some agencies offer training but exempt experienced contractors—see the Rainscaping program of Lake Simcoe Region Conservation Authority. Others require all contractors to be certified, for example, Seattle's Rainwise.

SIMPLIFIED HOW-TO GUIDES

Cities can provide guidance to contractors and property owners who are installing green infrastructure on private lands. This is essential where green infrastructure is required or incentivized. While every site is different, guides can provide simplified instructions for less complex projects that do not require the involvement of consulting firms or project engineers. See the City of Victoria's Rainwater Management Standards or the City of Atlanta's guides for green infrastructure at single family residences or small commercial developments.

Stormwater Scorecard.

Bringing practitioners and descision-makers up to speed.



4 New build—create a shining example

New development and redevelopment projects must meet standards in any municipality. This is an opportunity to ensure that these properties lead the way by managing stormwater onsite.

Policies differ in the amount of rainfall that must be retained or infiltrated, the size of project covered, and the primary objective—reducing peak flows or volumes.

WHAT'S HAPPENING?

WASHINGTON, D.C.

Development and redevelopment projects trigger a requirement to manage either the 38mm (1.2 inch) or 20mm (0.8 inch) storm, depending on project specifications. Generally, projects that create more than 465m2 (5,000 ft2) of impervious area, or disturb an area of this size, must manage stormwater onsite—through infiltration, harvesting, or evapotranspiration.

Once they have met 50% of the requirement for managing rainfall onsite, property owners can meet the rest of the requirement by paying a fee in lieu or purchasing privately traded Stormwater Retention Credits (SRCs—see more).

ATLANTA

Development projects must treat the first 25mm (1 inch) of rainfall with green infrastructure. Additions or disturbances of more than 93m2 (1000 ft2) for single family homes must also meet the stormwater management requirement. Simplified guides are provided for installation on residential and small commercial properties.

TORONTO

The Toronto Green Standard requires 5mm (¼ inch) of infiltration in all new development. However, projects that meet a voluntary stretch target under the Green Standard (10 mm infiltration) are eligible for a refund of some development charges.

LAKE SIMCOE REGION CONSERVATION AUTHORITY

A model by-law and guidelines, adapted from Minnesota's Minimum Impact Design Standards, have been developed for use by local municipalities. Goals are to preserve and restore open space, reduce impervious cover, distribute and minimize runoff, reuse runoff, and control erosion and sedimentation during construction. Guidelines recommend management of the first 25mm (1") of runoff on-site for any major development project that creates or reconstructs 0.5 hectares of new impervious surface. They include flexible treatment options for sites with restrictions.

ONTARIO

A runoff volume control target (to be released 2017) will require that new development and redevelopment projects manage 90% of annual rainfall through infiltration, evapotranspiration and rainwater harvesting.

NOSE CREEK, ALBERTA

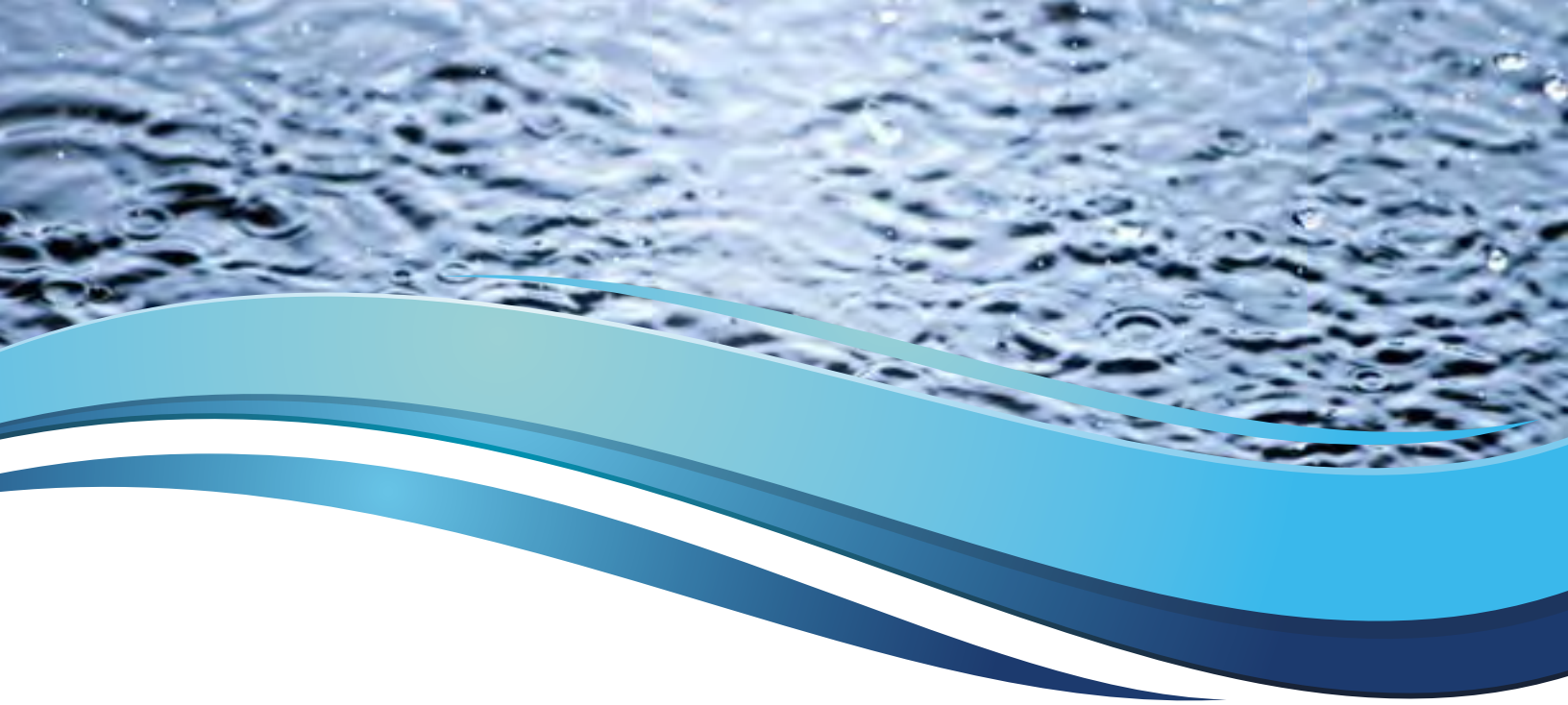
Nose Creek was the first watershed in Alberta to institute runoff volume control targets. New development must imitate the natural water balance and allow no more than 10% of annual rainfall as runoff.

TAKE AWAY

- Offer flexibility for properties that can't meet targets onsite—including payments in lieu or off-site installations. However, onsite infiltration is preferred and should be required to the extent possible.
- Ensure approvals staff are trained in innovative stormwater management.
- Adjust infiltration standards according to soil conditions—minimum standards for soils with poor drainage, and higher standards where con ditions are more favourable to infiltration.

Stormwater Scorecard.

Your community's requirements for new development



5 Make green infrastructure attractive for developers

Some cities provide incentives to developers to manage stormwater using green infrastructure. Incentives may be used instead of regulations, or in addition to them. Incentives can help developers overcome lack of familiarity and reluctance, until they become familiar with the benefits, which include a reduction or elimination of ponds and a corresponding increase in land available for building lots.

See Harvesting the value of water: stormwater green infrastructure and real estate and New Jersey developers' green infrastructure guide for more on the benefits of green infrastructure for developers.

Development incentives can take the form of:

- design consultation between city staff and developers focusing on green infrastructure and its advantages
- accelerated approvals processes
- floor-area bonuses

WHAT'S HAPPENING?

YORK REGION

The Region piloted an accelerated approvals process for a project in the Town of Newmarket. To qualify, the project had to meet stormwater requirement (25 mm infiltration) and other targets beyond current standards. Review agency staff and project consultants met regularly as part of an integrated design process designed to expedite approvals.

The development (completed in 2017) includes rain gardens, bioswales, exfiltration systems, improved soil management practices, and an engineered wetland along with an underground storage tank instead of a traditional stormwater pond.

LAKE SIMCOE REGION CONSERVATION AUTHORITY

The LSRCA offers early consultation in the form of a design charrette (see Rainscaping) with developers to assist them in defining objectives, opportunities and constraints for LID implementation.

TAKE AWAY

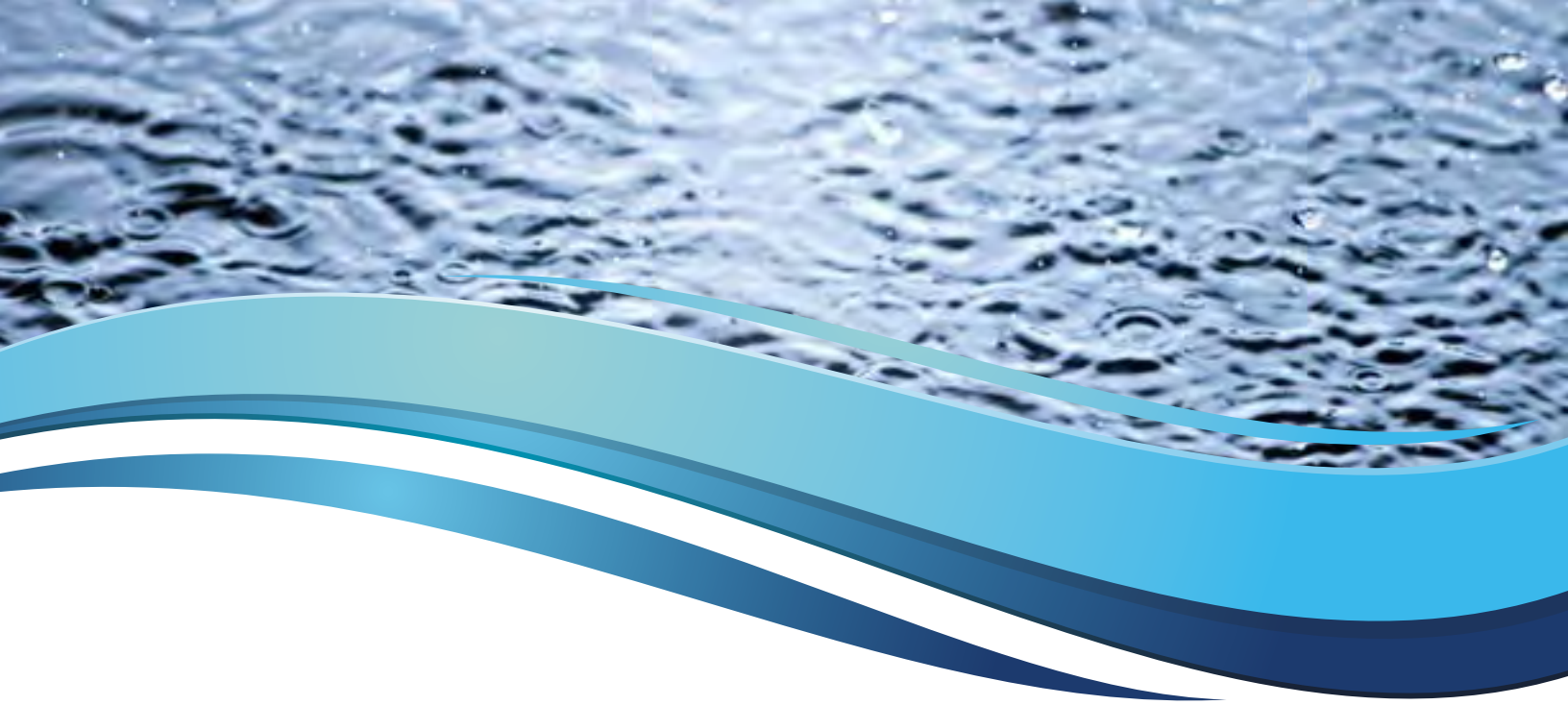
- Developers are focused on the bottom line. Incentives that save time in the approvals process and/or increase land available for development will be taken seriously.
- Developers are learning that green infrastructure like rain gardens can boost property values and curb appeal.
- Early adopters of the LSRCA's design charrette process found that it reduced the number of submissions required to reach final draft plan approval.

Stormwater Scorecard.

Your community's development incentives

GREEN ROOFS AND BLUE ROOFS—MAKING THEM HAPPEN

Some cities require or incentivize green roofs. Examples include the City of Toronto's Green Roof Bylaw and the City of Portland's Ecoroof floor area ratio bonus. Green roofs can be designed with stormwater management in mind, or with a focus on other co-benefits (reducing urban heat island effect, carbon sequestration, energy savings, improved air quality and increased amenity spaces). Blue roofs incorporate rainwater harvesting. While beneficial in very dense areas with little available land, green roofs are one of the most expensive forms of green infrastructure. They manage runoff only from the roof area, and buildings must be designed to hold the weight of a green roof, making retrofits problematic.



6 Nurture healthy soils to soak up rain

Soil quality and quantity influence how much water is absorbed by the landscape. Topsoil is commonly removed during construction, stored in mounds for six months or more, and then re-applied thinly over highly compacted soils. This results in lawns and other vegetated areas which act like impervious surfaces.

If instead a sufficient depth—approximately 30 cm—of un-compacted compost-amended topsoil is re-applied to disturbed areas during construction and landscaped, vegetated areas are able to retain as much as 50% more runoff than compacted soils. This also improves soil quality for gardening and landscaping, and results in healthier lawns and gardens that require less watering.

Municipalities can enact policies for the treatment of topsoil in their own development projects (parks, municipal buildings, etc.). In new development, cities can regulate topsoil through urban design standards, land use plans, development permits, runoff bylaws, soil renewal bylaws, or landscaping by-laws. See resources for British Columbia and Ontario on topsoil guidelines.

WHAT'S HAPPENING?

TOWN OF OKOTOKS, ALBERTA

The Lot Grading bylaw requires that topsoil depth be at least 30.48 cm (12 inches) on all newly landscaped areas in new developments.

CONSERVATION HALTON

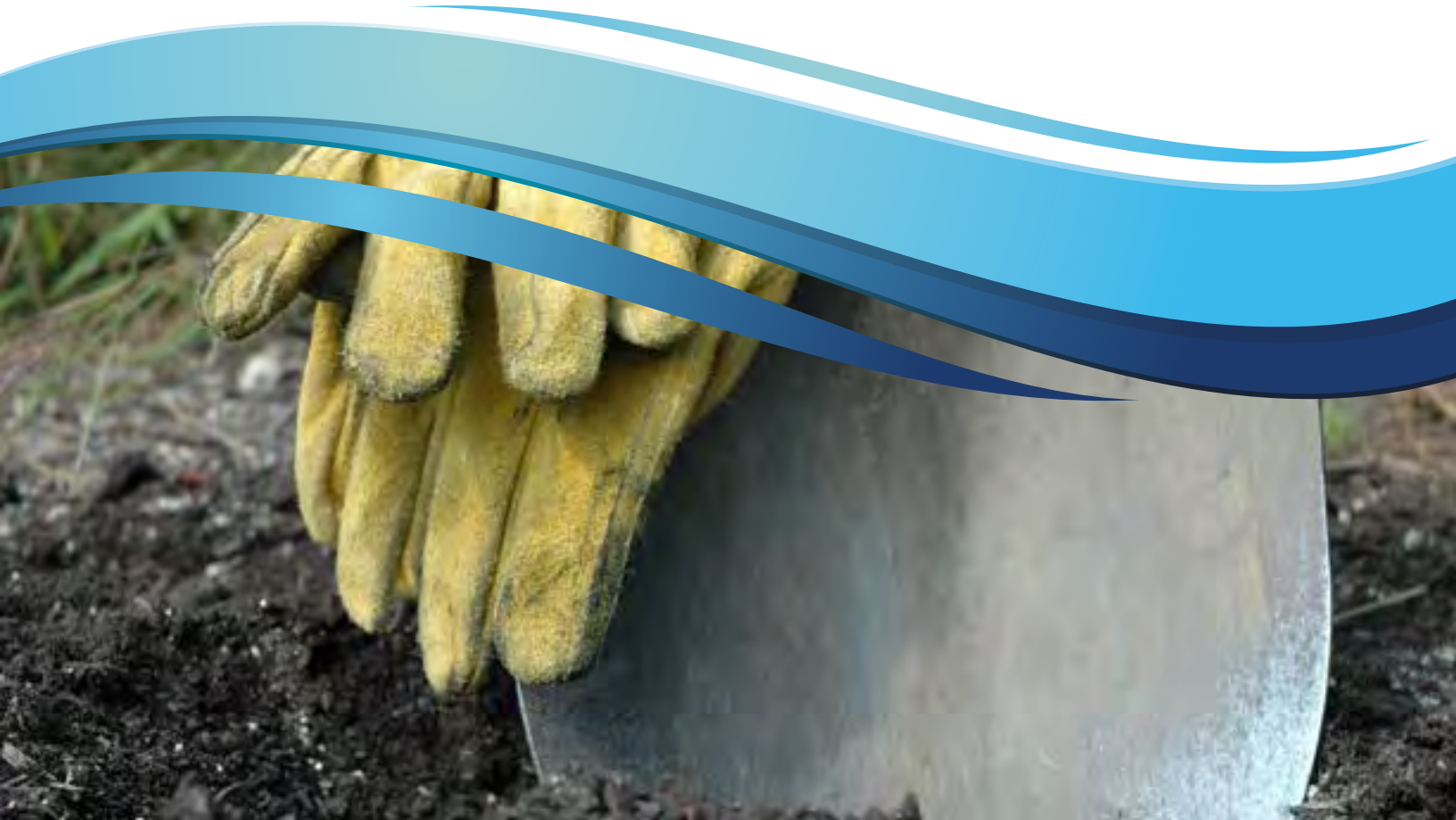
For plans of subdivisions, Halton Conservation requests soil management plans in accordance with the Toronto and Region Conservation Authority's guidelines for topsoil management.

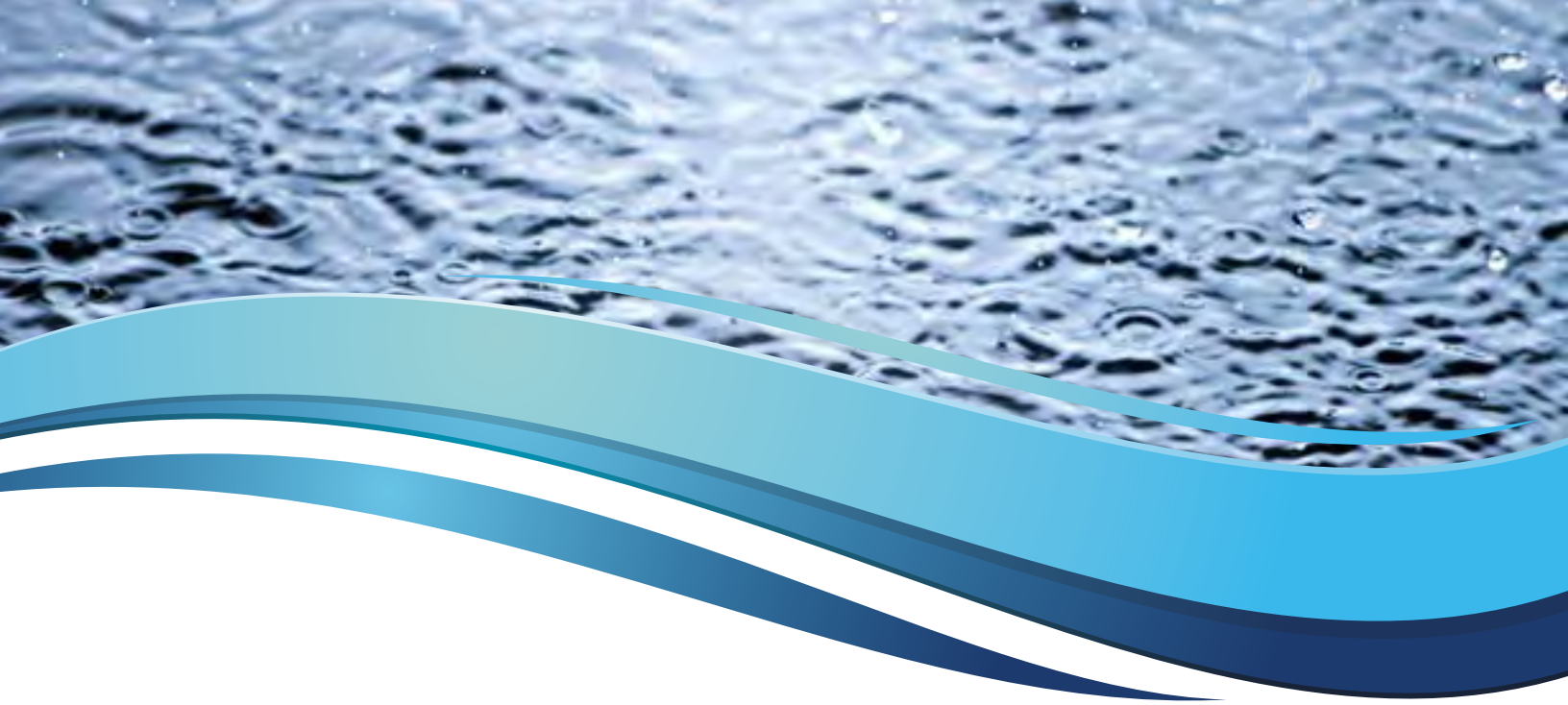
TAKE AWAY

- Deep healthy topsoil is the lowest maintenance form of green stormwater infrastructure.
- The best regulatory option for implementation may be urban design standards governing new build and redevelopment projects.
- Developers normally have to pay to remove topsoil, so they should be happy to consider using more of it on-site.
- Construction plans should address on-site storage, amendment, protection from compaction and contamination, and grading.
- Studies under way by the Toronto and Region Conservation Authority will determine the infiltration capacity of vegetated areas with amended topsoil.

Stormwater Scorecard.

Your community's topsoil management





7 Incorporate green infrastructure in rights-of-way

Roads are leading sources of urban runoff—more than 60% depending on the community, and as much as 80% of stormwater pollution. But roads can also help to solve the problem they create. City-owned rights-of-way provide opportunities to incorporate onsite rainwater management during new construction and reconstruction.

Green Streets policies systematically incorporate green stormwater management practices, including urban trees, permeable paving, bioswales, bioretention, stormwater planter boxes and infiltration galleries.

WHAT'S HAPPENING?

PORTLAND, OREGON

A 2007 policy mandates Green Streets for all city-funded new development and redevelopment street projects. Stormwater must be infiltrated on-site where possible. If not, an off-site project or a management fee is required, which is used to pay for other Green Streets projects. See examples.

WASHINGTON, D.C.

D.C.'s regional transportation planning board adopted a Green Streets resolution in 2014, and promotes adoption of Green Streets policies by member jurisdictions. Regulations require infiltration for all major development and redevelopment projects, including street retrofits. Green Infrastructure Standards apply to all road projects. A 2014 Greening D.C. Streets guide summarizes green infrastructure opportunities and constraints for private as well as public road reconstruction.

MISSISSAUGA, ON

A 2014 City of Mississauga resolution directs city staff to report on the feasibility of low impact development as part of capital road improvement projects.

The resolution followed the success of a pilot project (see Elm Drive case study), which provided major benefits during the July 2013 storm. Peak flows were delayed by 20 minutes, and no damage was sustained by bioretention

TORONTO

Green Streets Technical Guidelines (to be released in 2017) will include an excel-based tool for recommending Green Streets solutions, description of techniques and implementation, performance specifications and construction guidance, operations and maintenance, and monitoring.

Complete Streets Guidelines released in 2017 include a chapter on green infrastructure and integrate with the technical guidelines above.

BOSTON

Complete Streets guidelines address on-site stormwater management, in particular street trees and vegetated stormwater management.

SEATTLE

Right-of-way infrastructure retrofits are funded in areas that drain to uncontrolled combined sewer outflows, or where untreated stormwater discharges directly to small creeks. Projects can be integrated with redevelopment–for example, the Swale on Yale treats stormwater from over 160 hectares (400 acres) of impervious surface that formerly discharged into an urban lake.

One of the city's first green streets, the 2001 Street Edge Alternatives project, reduced impervious surface on a street by 11%, added over 100 trees and 1,100 shrubs, and reduced runoff by 99%.

CALGARY

Calgary's 2014 Complete Streets policy and guide directs that green infrastructure be incorporated "whenever transportation corridors are planned, constructed, repaired or maintained."

Low Impact Development Technical Guidance provides design standards for bioretention and bioswales in rights of way.

TAKE AWAY

- For maximum impact, require Green Streets for all road retrofits and new development. Adopt design guidelines. Consider all right-of-way needs early in the planning process. See Credit Valley Conservation's Guidelines for grey to green road retrofits.
- Require performance standards, e.g., infiltration of the 25mm or 1" storm. Monitor performance.
- When site constraints prevent infiltration, require a fee or off-site projects within the watershed. Ensure on-site infiltration remains the preferred option.
- Integrate Green Streets with Complete Streets, to provide benefits to pedestrians and cyclists in addition to stormwater management, and to enable an integrated approach to implementation.
- Facilitate training and interdepartmental cooperation to build capacity for construction and maintenance of Green Streets.
- Engage neighbouring property owners to assist with maintenance.

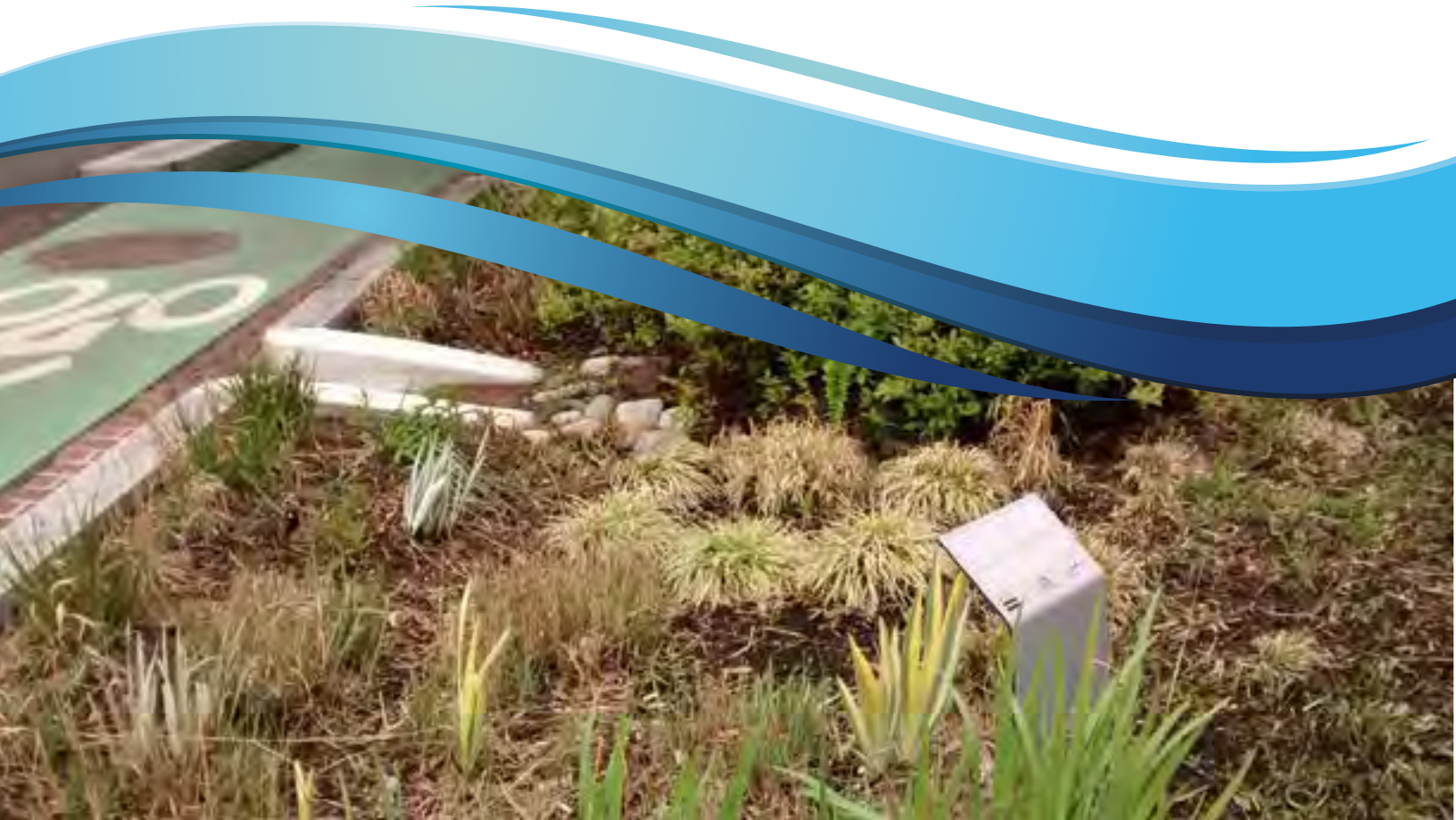
  Develop agreements and funding mechanisms for ongoing maintenance.

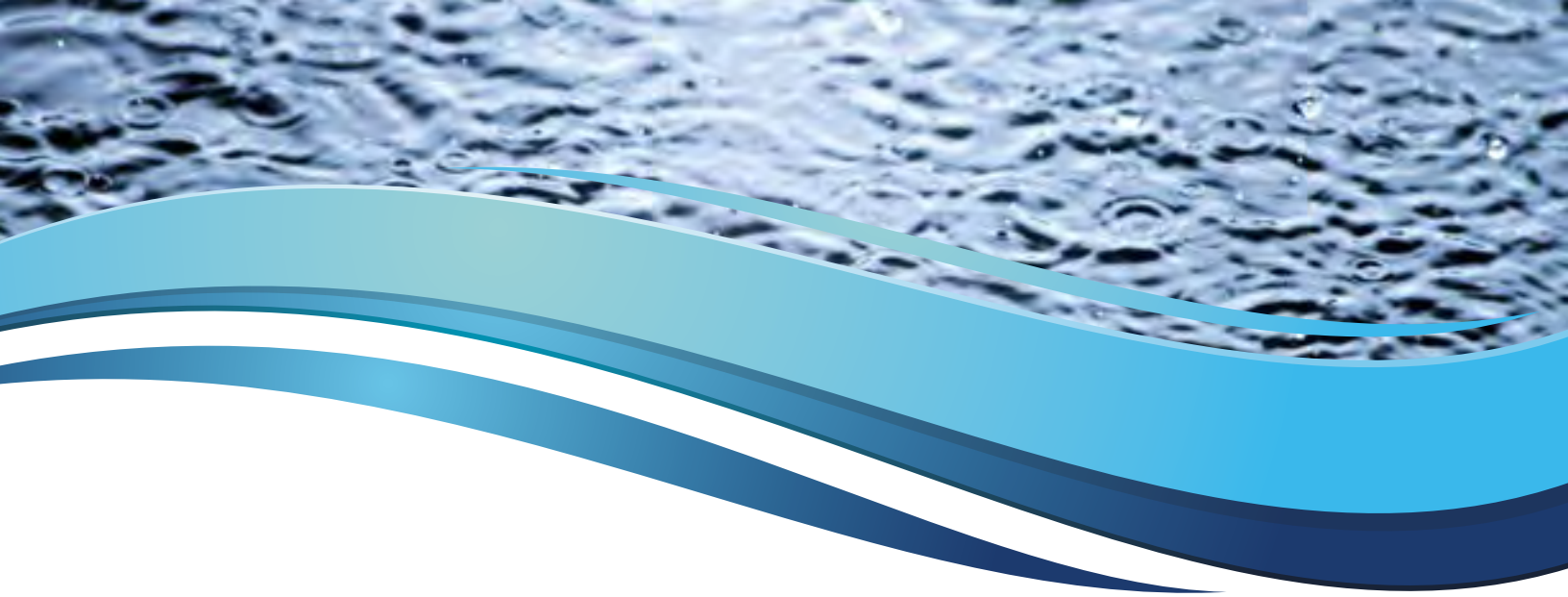
Stormwater Scorecard.

Your community's green streets

INTEGRATING COMPLETE STREETS AND GREEN STREETS

A Complete Street accommodates all users, regardless of age, ability, and mode of travel. This includes cyclists, pedestrians, and transit as well as cars and freight. Green stormwater infrastructure can be integrated with complete streets goals. For example, bump outs intended to slow traffic, making streets safer for pedestrians and cyclists, can also act as bioretention to absorb stormwater.





8 Manage rain in alleys

Many cities have networks of back alleys. Some are used for parking and garbage collection, while others have fallen into disuse. Alleys often lack modern stormwater management and contribute to flooding.

Green Alley programs retrofit alleys to improve stormwater management and provide other community benefits—gathering and play spaces, reduced urban heat island effect, and increased neighbourhood safety, for example. See design guidelines from the U.S. National Association of City Transportation Officials.

One approach is city-driven: implement a coordinated city-wide plan, e.g., as part of a stormwater management plan, a street revitalization plan, or a dedicated green alley plan. The city leads the projects and conducts community outreach with residents.

An alternative approach is citizen-initiated. The city provides funds, design support, and construction for projects requested by residents. Often neighbourhood volunteers commit to maintenance of the projects.

WHAT'S HAPPENING?

MONTREAL

The Ruelle Verte program is community driven: residents apply to the City for a design and retrofit. Volunteers maintain the alleys.

The primary purpose is community-building—allowing residents to reclaim the space in the alleyways and improve urban life, while at the same time solving the problems often faced in alleys, including flooding, illegal dumping, and safety.

346 projects have been completed as of 2016, covering more than 69 km of alleyways. Most consist of removing pavement and replacing the area with gardens and community spaces. Projects are for residential not commercial alleys.

TORONTO

The Laneway Project has been working to create laneway master plans in different neighbourhoods of the city. In 2016 two "laneway puncture" demonstration projects added strips of permeable paving to absorb stormwater in alleys.

CHICAGO

The Green Alley program was started as a pilot in 2006. Since then, over 100 alleys have been retrofitted. Stormwater management includes improved grading and permeable pavement. High albedo pavement mitigates the heat island effect. Whenever an alley is resurfaced, it is transformed into a green alley. Residents are encouraged to install green infrastructure measures on their own properties.

LOS ANGELES

Alleys are included in the Green Streets program. Projects are prioritized to meet stormwater goals. Some projects incorporate community partners with goals beyond stormwater management, and are funded in part by the business improvement district. Most projects address networks of alleys in a neighbourhood.

BERWYN

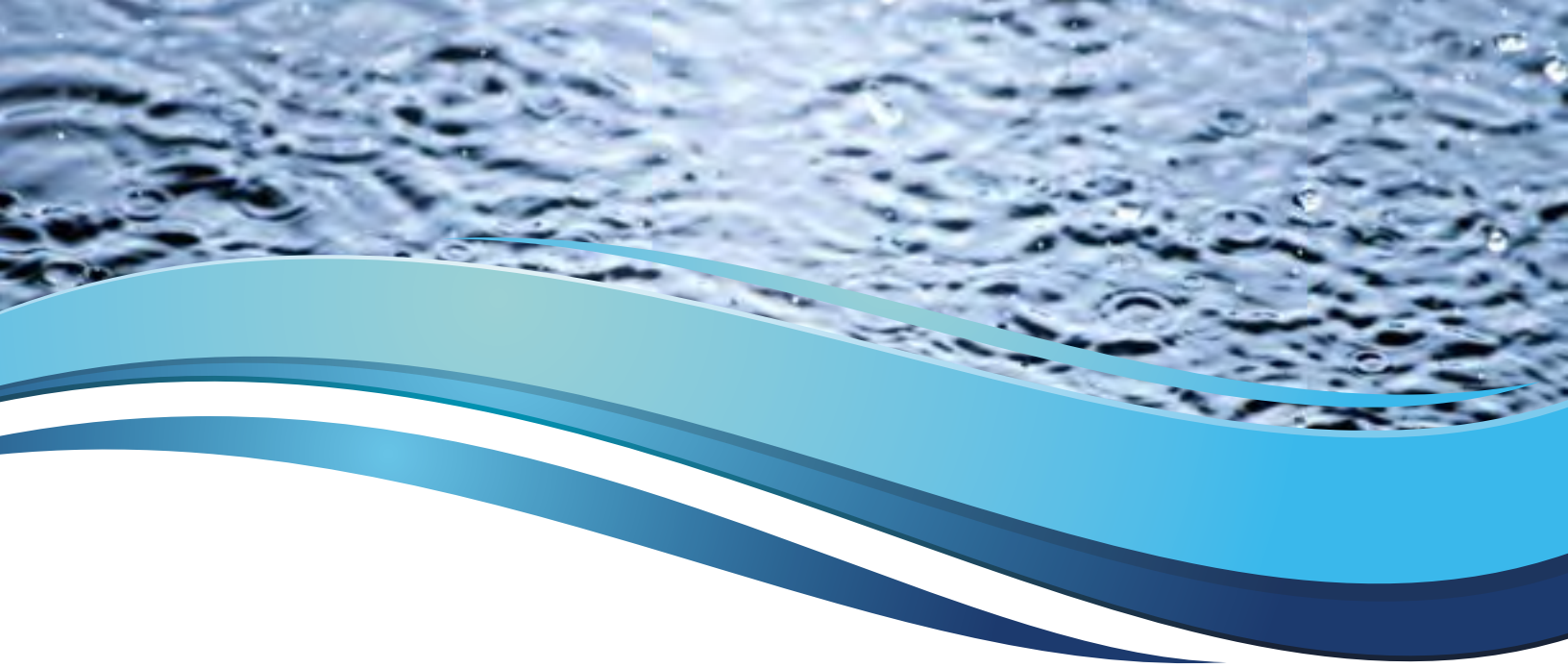
A small city in Illinois (pop. 56,000) is retrofitting alleys with permeable pavement to reduce flooding. Ten alleys are scheduled for construction in 2017.

TAKE AWAY

- Identify goals for alley greening programs, including stormwater management, security, green space, walkability, and urban heat island mitigation.
- Select an approach. City-driven programs can target neighbourhoods with stormwater concerns and create designs to minimize runoff. Community-driven projects maximize neighbourhood buy-in and volunteerism.
- Alleys can be proving grounds for green infrastructure technologies. In Chicago, the green alley program inspired larger projects. It also developed the market for permeable paving, and costs decreased by two-thirds in six months.

Stormwater Scorecard.

How your community uses alleys for green infrastructure



9 Green up those unlovely parking lots

Surface parking lots generate significant runoff and often don't pay their way in managing the runoff they create. Municipalities and private lot owners can "green" new and redeveloped parking lots with policies and practices requiring permeable paving, trees, rain gardens, infiltration trenches, and other measures.

Parking lot makeovers to manage rain onsite can be combined with actions to improve pedestrian safety, facilities for cyclists, beautification, urban heat island mitigation and more. See Naturally Resilient Communities and the USEPA's Green Parking Lot Resource Guide for more information.

WHAT'S HAPPENING?

TORONTO

Design guidelines require surface parking lots to meet standards for on-site stormwater retention. Other requirements include shade, pedestrian and cycling infrastructure, landscaping, and trees. The guidelines apply to new development and redevelopment of city-owned lots. City lots are greened when they come up for reconstruction. Plans are in the works to retrofit 130 lots.

NEW YORK CITY

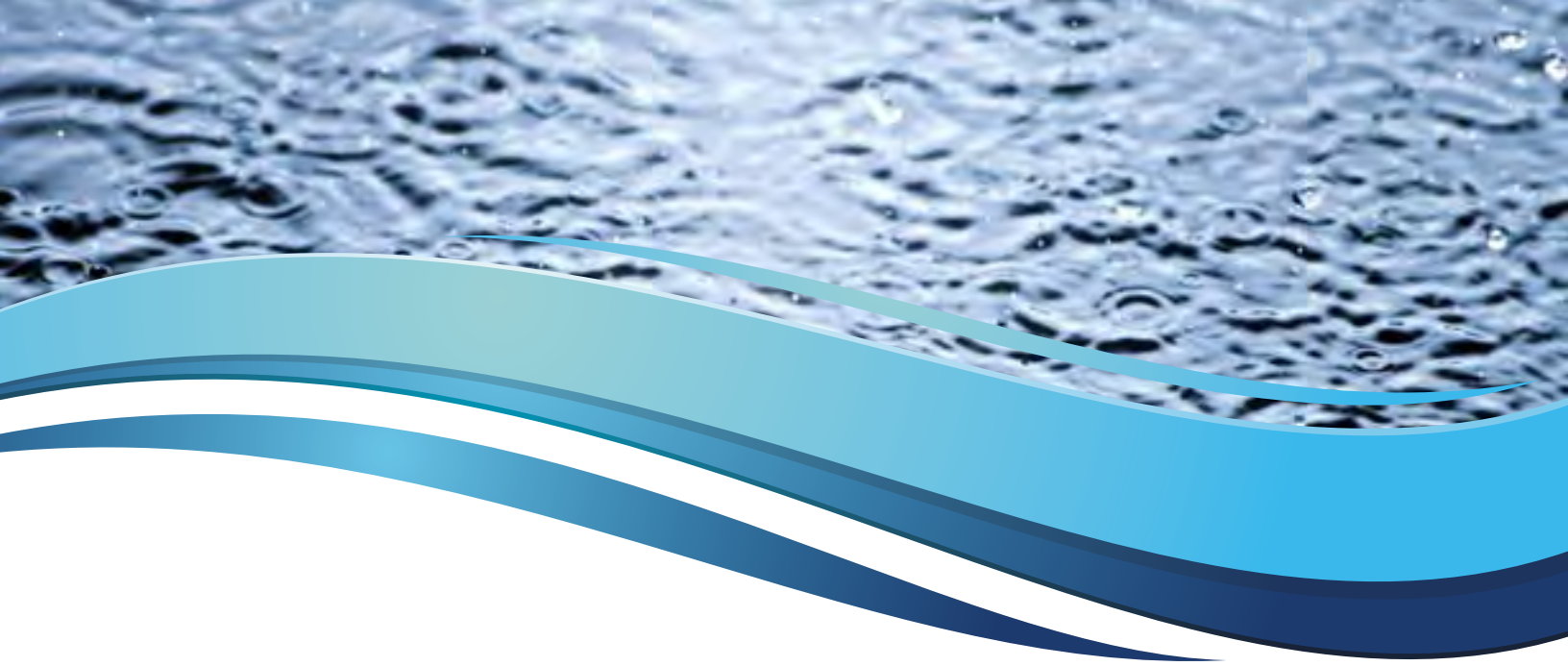
A 2011 program required lots not served by municipal water to pay storm-water management fees or demonstrate on-site management using green infrastructure.

Stormwater Scorecard.

How your community manages stormwater from parking lots

PUBLIC- PRIVATE PARTNERSHIPS

St George's County in Maryland has a unique approach to the installation of green infrastructure on public lands. It has contracted with a private company, Corvias, to manage runoff from 2000 acres of impervious surface. At the same time, the county will also work on managing another 2000 acres of impervious surface using its own staff. The goal is to determine which system is more efficient. In total, the county aims to convert 15,000 acres of impervious surface into land that can absorb and treat runoff.



10 Enhance stormwater services from greenspace

Green parks policies and programs mobilize installation of green stormwater infrastructure in city parks. Parks already include greenspace, which provides some infiltration. Green infrastructure will improve infiltration rates.

Measures include rain gardens, enhancement of the forest canopy, permeable paving in parking lots or recreational facilities like basketball courts, and rainwater harvesting to irrigate sports fields or gardens.

Improving infiltration and rainwater harvesting can also help solve problems in parks like soggy soccer fields and icy pathways. Parks may be able to manage runoff from neighbouring streets and properties. See the Parks section in Credit Valley Conservation's Grey to Green guide for retrofits on public lands.

See also the Trust for Public Land's 2016 report City parks, clean water. This report and case studies show how a process of give and take can lead to net benefits for the aesthetic and recreational value of parks as well as stormwater management function.

Vacant lots are generally seen as a liability, detracting from neighbourhood safety and security and requiring maintenance. However, some municipalities are turning publicly owned vacant lots into community assets—using them to reduce flooding and water quality issues by installing low-cost green infrastructure, and turning them into temporary or permanent community spaces. See guide from Pittsburgh and case studies from across the U.S. for more on greening vacant lots.

WHAT'S HAPPENING?

PHILADELPHIA

The Green Parks program finds opportunities in the City's 3650 hectares (9,000 acres) of parkland to treat runoff from city streets, parking lots, and paved recreation areas. A list of potential Green Parks is maintained with community input. 51 projects have been completed to date. An adopt-a-park program engages volunteer maintenance.

TORONTO

Corktown Common was developed on an abandoned industrial site in a flood protection area, with features such as natural wetlands and native plants. Detailed Organic Maintenance Guidelines and staff training ensure proper maintenance.

MISSISSAUGA

Lakeside Park incorporates several green infrastructure features, including a pervious concrete parking lot, bioswales, and rain gardens. The projects were initiated by and are being monitored by Credit Valley Conservation.

DETROIT

A pilot project in Detroit's Cody Rouge neighbourhood transformed 10 vacant lots with green infrastructure, estimated to reduce runoff by 30%. An online tool by Detroit Future City provides resources and guidance on greening vacant lots.

VACANT TO VIBRANT

The Cleveland Botanical Garden worked to transform vacant lots in Cleveland, Ohio, Gary, Indiana, and Buffalo, NY. Demonstration projects in each city were completed in 2016, transforming vacant lots into community spaces that also absorb stormwater.

NEW YORK CITY

As part of the Community Parks Initiative, $36 million is committed for green infrastructure in parks in underserved neighbourhoods with combined sewers.

NATIONAL RECREATION AND PARKS ASSOCIATION

The Great Urban Parks Campaign provides funding and support to engage residents in low-income communities in planning, design, and implementation of green infrastructure in city parks. The program is i mplementing large scale green infrastructure projects in parks in Baltimore, Atlanta, Denver and Pittsburgh.

TAKE AWAY

- Engage the community in identifying and designing parks to enhance their contribution to the neighbourhood.
- Coordinate responsibility for design, construction and maintenance between the parks department and the stormwater department. Establish interdepartmental collaboration between parks and engineering through trust-building and rules.
- Be prepared to invest in park improvements (e.g., playgrounds and other new facilities) in order to overcome objections to stormwater management features.
- Vacant lots are generally impervious, since soil is compacted. They are prime targets for green infrastructure.

Stormwater Scorecard.

How your community uses parks and vacant lots for stormwater management

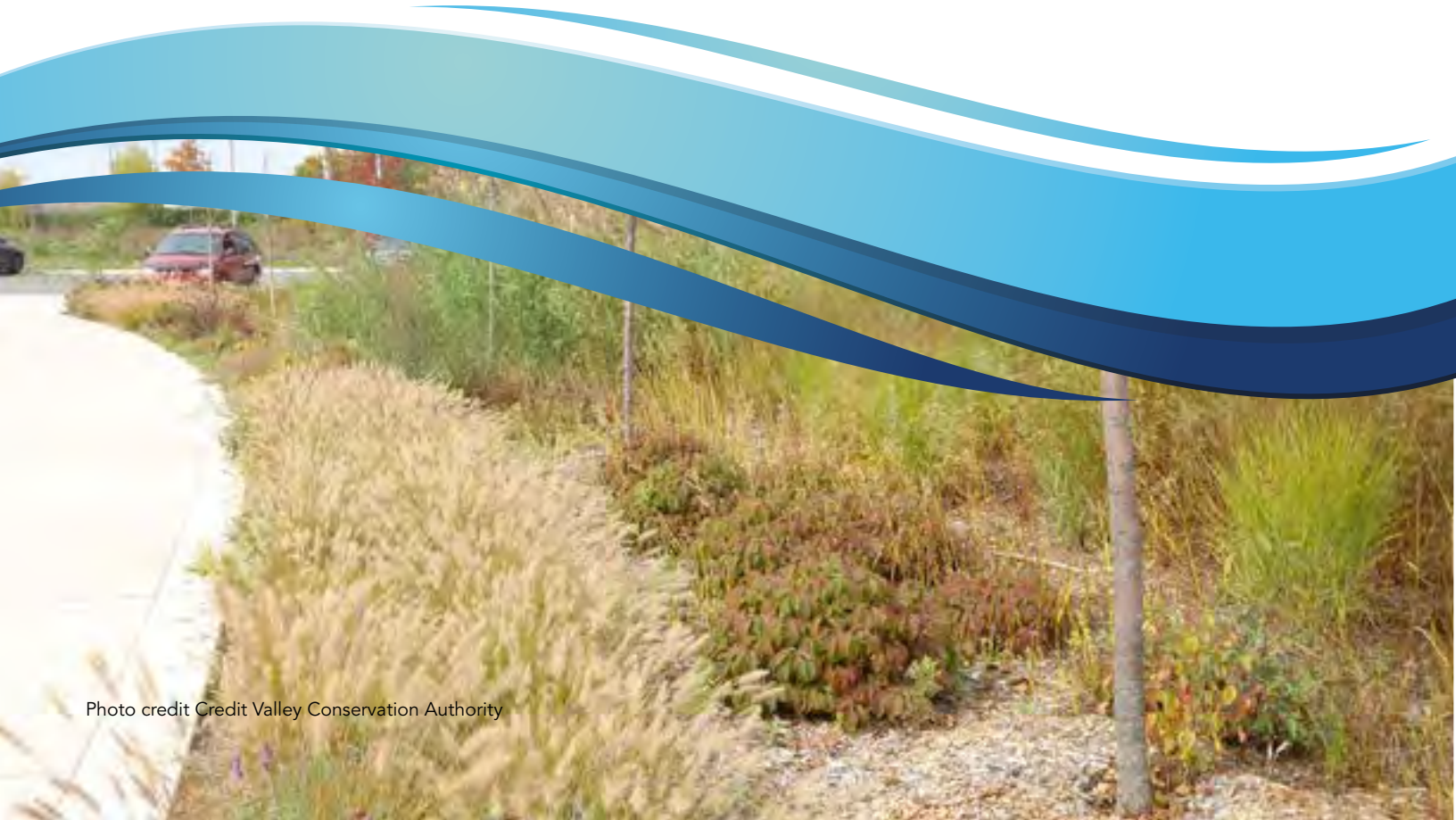
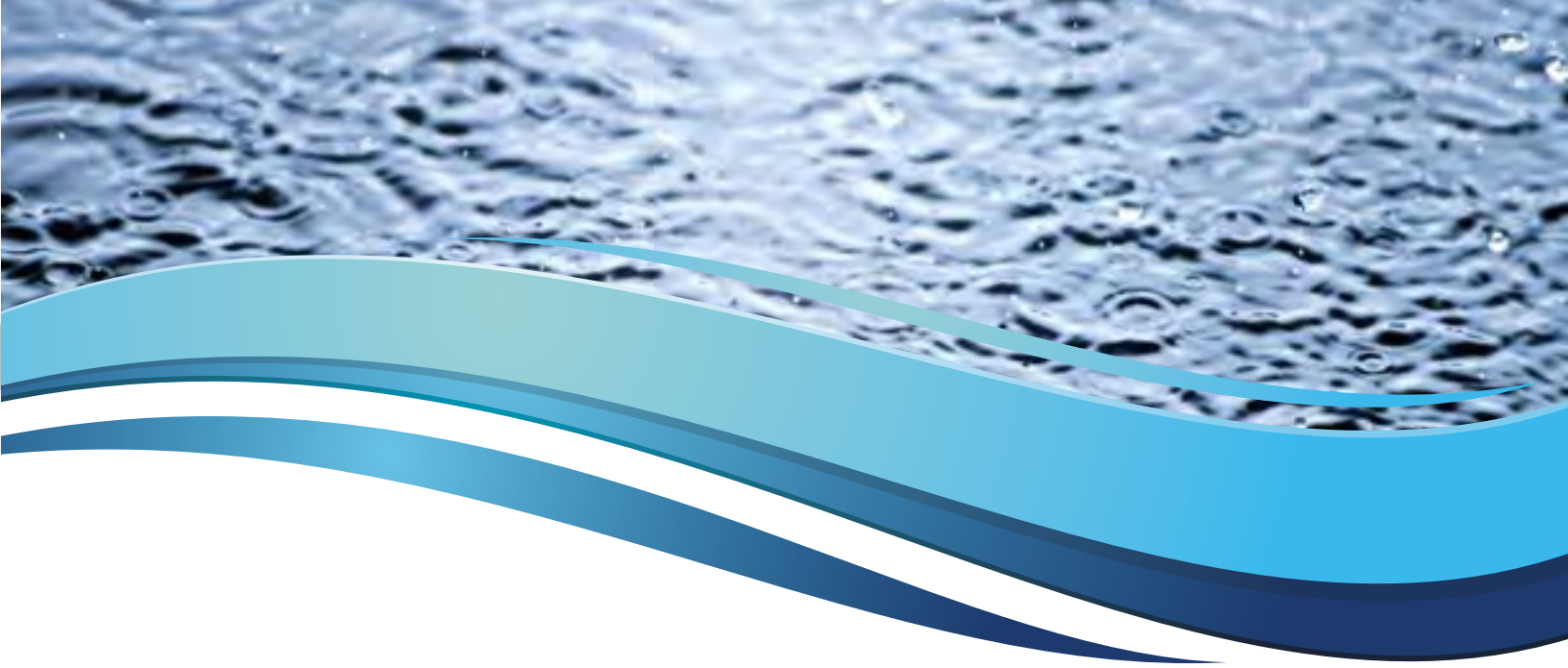


Photo credit Credit Valley Conservation Authority



11

Soak up rain and knowledge in schoolyards

School grounds have often been paved over or compacted, resulting in increased stormwater runoff and hot, unappealing play areas. The solution is to depave and implement infiltration landscaping, reducing runoff while providing educational opportunities for students, parents, and the broader community.

School grounds may provide some of the best opportunities for installing green stormwater infrastructure. See the Chesapeake Bay Foundation's Schoolyard Report Card.

WHAT'S HAPPENING?

EVERGREEN

National non-profit Evergreen provides resources for schoolyard greening, including small grants (up to $3,500), design assistance, and guidance manuals.

Evergreen's 2008 guide Planning and designing green school grounds is designed to help Toronto's Catholic board comply with Toronto's Green Standard. It includes guidance on how to treat rain as a resource and absorb as much runoff as possible.

An Evergreen design guide for full day kindergarten play areas advises on creating naturalized play areas that absorb runoff.

PHILADELPHIA

The Philadelphia Water Department (PWD) collaborates with the school district on green infrastructure/schoolyard greening projects. The program supports projects initiated by the school district, community groups, or the Water Department.

The PWD has also created an urban water curriculum, a guide for transforming schoolyards to increase participation, and videos that showcase completed projects. Educational signage promotes understanding of green infrastructure.

CHICAGO

The Space to Grow program has greened nine schoolyards from 2014-2016, with five more planned in 2017. Asphalt schoolyards are retrofitted with stormwater management infrastructure that also contributes to better play spaces for students and educational opportunities.

NEW YORK CITY

The City has partnered with the Trust for Public Land to green NYC schoolyards, committing $20 million over four years. As of 2016, 12 playgrounds have been completed, with more in the works.

WASHINGTON, D.C.

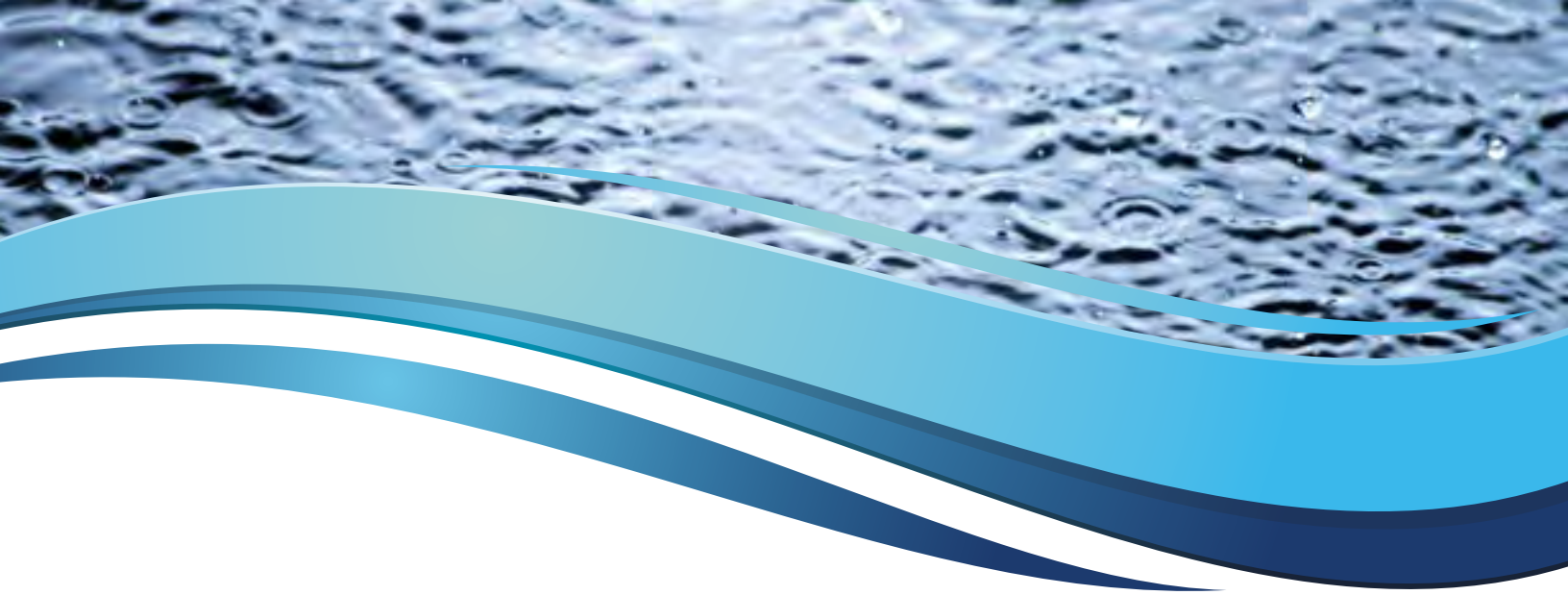
Under the RiverSmart Schools program, schools apply for project funding and outdoor classroom teacher training. Projects feature wildlife habitat, native plants, water conservation, and measures to reduce runoff volumes and pollution.

TAKE AWAY

- Invest time in developing a collaborative relationship with the school board and target schools.
- Plan for maintenance when schools are closed over the summer. Involve parent and community groups to help ensure gardens thrive when school staff are unavailable.

Stormwater Scorecard.

How your community manages stormwater on school grounds



12 Create multiple benefits with healthy trees

A healthy urban forest makes a leading contribution to stormwater management. Trees intercept rainfall, release moisture into the atmosphere through transpiration, and help infiltrate moisture into the soil.

Mature urban trees provide the greatest stormwater benefits. Policies need to include measures to ensure survival to maturity, beyond the first 20 years of life. And trees need adequate soil, space, moisture, etc. to grow to their full size.

Soil volume is often the limiting factor in tree health—trees need at least 0.625 m3 of soil for every square metre of tree canopy. See B.C.'s Tree Toolkit for Communities and Urban Forests: A Climate Adaptation Guide for more on creating a healthy urban forest. See also the 2016 guide from the USDA Forest Service The sustainable urban forest–a step by step approach.

Green Infrastructure Ontario's State of the Urban Forest in the GTA provides more information on the benefits of a healthy urban forest. In Ontario, Bill 68 Modernizing Ontario's Municipal Legislation Act will require all municipalities to have policies to protect and enhance the tree canopy and natural vegetation (in second reading as of spring 2017).

The urban canopy encompasses trees on public and private property. Municipal urban tree policies can include:

- targets, e.g., a 40% tree canopy is appropriate for a climate like Ontario
- planting and maintenance standards, including requirements for uncompacted soil quantities
- tree-cutting bylaws for private trees, and retention during development
- incentives and programs for tree planting and protection on private property

WHAT'S HAPPENING?

OAKVILLE

Oakville is the first Canadian municipality accredited by the Society of Municipal Arborists for its urban forest program. The urban forest management plan includes a private tree removal bylaw, and an urban forest health monitoring program. North Oakville, planned for development in the near future, has its own strategic urban forest management plan that includes soil volume requirements (15m^3 for small trees, 30m^3 for medium trees and 45m^3 for large trees) and a 40% tree cover target.

TORONTO

A strategic forest management plan was released in 2013 with a goal of 40% urban canopy cover, up from current levels of 26.6%-28%. Tree planting is required in all new development—at least one tree for every 66 square meters, or 40% tree cover on each site. Each tree must be provided with at least 30m^3 of high quality soil. The private tree bylaw regulates removal of trees with diameter over 30 cm on private property. Unless the tree is diseased or dying, property owners must apply for a permit and obtain an arborist report.

VANCOUVER

The tree canopy is defined as green infrastructure in Vancouver's urban forest policy. The policy permits tree removal on private property only if trees are hazardous, diseased, or interfering with infrastructure. The policy also limits tree removal for development, creates a framework for retention, and sets a goal of planting 150,000 trees on public and private property to increase the urban canopy from current levels of 18%.

VICTORIA

The 2013 Urban Forest Master Plan recommends actions to improve the urban forest on public and private land over the next 50 years. The value of the urban forest to stormwater management is estimated at over $2 million annually. Additional benefits include energy savings and increased property values.

MINNESOTA

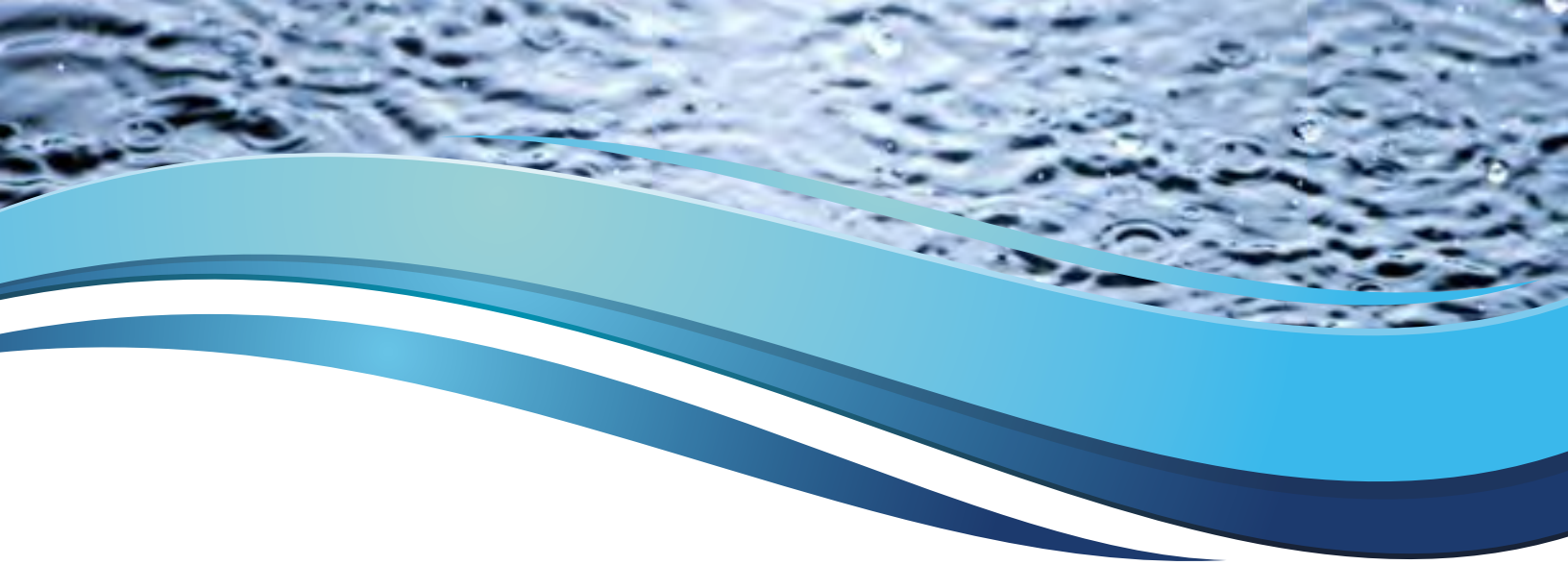
The stormwater manual designates best practices for tree planting, incentivizing the higher cost by allocating stormwater credits for properly planted trees.

TAKE AWAY

- In addition to stormwater management, promote tree benefits such as air quality, property values, beautification, tourism, heat island mitigation, energy savings, shade, and carbon sequestration.
- Emphasize the value of tree health, which is more important than the sheer number of trees planted.
- Avoid monoculture to reduce tree loss due to blight.
- Direct runoff to street trees to provide free irrigation and stormwater management.
- Use tree trenches and soil cells to ensure that trees have adequate access to uncompacted soil. Products include Silva Cells manufactured by Deep Root and Strata Cells manufactured by City Green.

Stormwater Scorecard.

Your community's urban forest policy



13

Preserve undeveloped lands and restore rivers

While constructed and engineered green infrastructure is essential in dense, built up urban areas, the ecological services provided by natural systems in and around urban areas should not be ignored, and policies should be put in place to protect and enhance them. These include urban and near-urban creeks and streams, as well as wetlands, woodlots, meadows, and other undeveloped lands. Urban waterways are discharge points for stormwater systems, while natural areas, particularly in areas upstream from densely developed urban centres, provide essential flood control (along with many other ecosystem services).

Portions of many urban streams have been channeled underground into concrete tunnels under city streets and buildings. With the increased runoff caused by development, and the straightening of formerly meandering waterways, large volumes of water travel quickly through these channels, picking up speed and sediment and sometimes exceeding the system capacity. Some cities are working to "daylight" urban streams, restoring them to their natural pathways to slow down the water and provide more natural filtration.

Land use changes are the number one reason that runoff volumes are increasing. By carefully controlling where development can occur and preserving the natural functions of undeveloped lands around urban areas, cities can save on the municipal services they have to provide.

WHAT'S HAPPENING?

MILWAUKEE

Under the Greenseams program, the Milwaukee Metropolitan Sewerage District purchases and preserves undeveloped land in the urban watershed as a way to reduce flooding and water pollution in the city. The program is currently protecting 3400 acres of land.

GIBSONS, BC

Gibsons is one of the first municipalities in Canada to begin valuing its natural assets, including green space, creeks, and foreshore area, for the services they provide (stormwater management and flood control, among others). The Town is developing accounting principles for valuing its natural capital as infrastructure.

KITCHENER

The City completed a project to naturalize 1.8 km of Filsinger creek, formerly confined in a concrete channel. The aim was to reduce sediment and improve water quality of the discharge into Victoria Park Lake.

ALUS

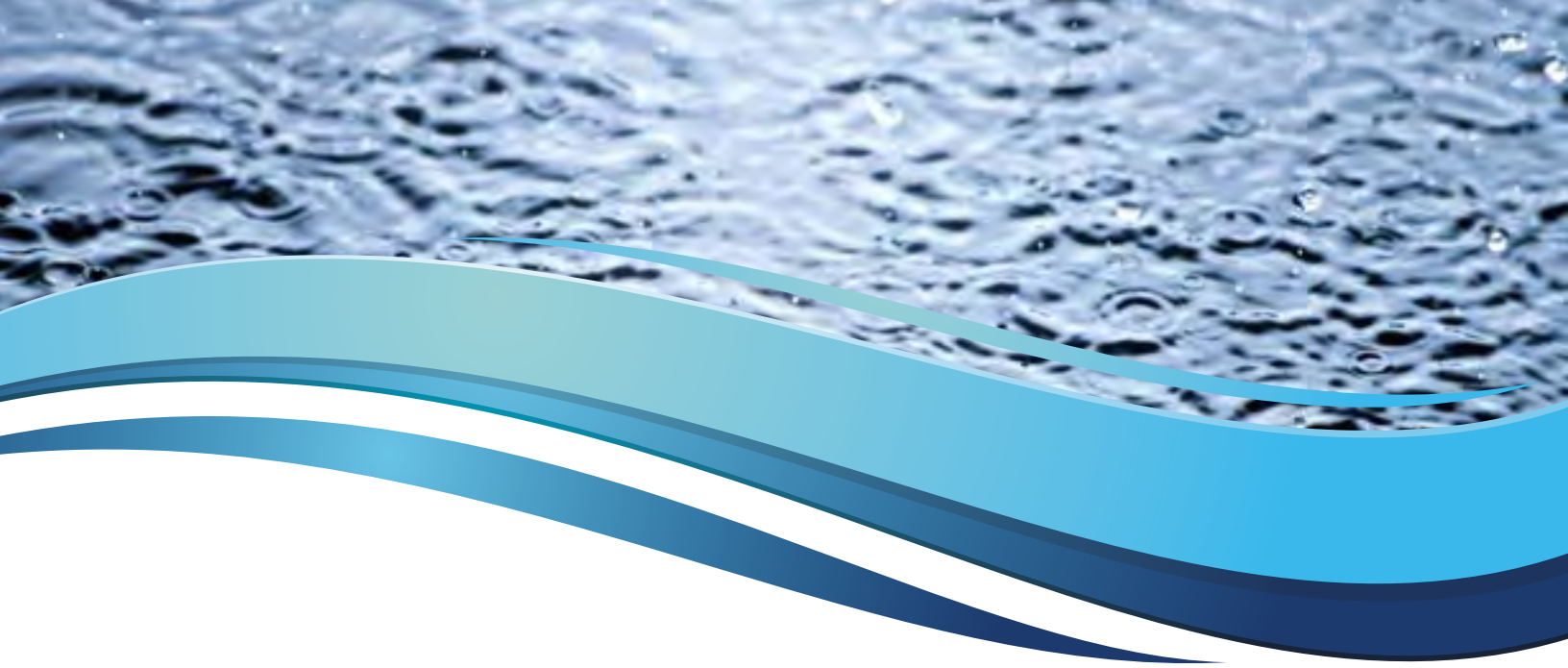
ALUS Canada is a program which pays farmers and ranchers for the ecosystem services their lands provide when they are restored to wetlands, grasslands, and forests. These services include urban flood control, among many others.

NETHERLANDS

A Dutch program makes "room for the river" by naturalizing areas in flood plains to allow rivers to flood safely without causing extensive damage to built up areas.

Stormwater Scorecard.

Your community's natural areas



14 Match stormwater fees to runoff volumes

Stormwater user fees based on runoff volumes are a powerful tool for implementing rainwater management on private property. They follow the user pay principle: what you pay depends on the impervious surface on your property (buildings, roads, parking, etc.) and therefore the volume of runoff you contribute and the cost of managing that runoff. User fees send a clear message to property owners about the cost of managing stormwater from their property.

Further, municipalities can provide incentives to property owners who take action to reduce runoff by managing rainfall at the source.

User fees tied to impervious area and stormwater volumes are much fairer and more transparent than paying for stormwater management out of general property tax revenues, or from fees tied to potable water consumption. In practice, the amount of runoff created by, say, a large parking lot attached to a warehouse bears no relation to the taxes on the property or the water consumption. Stormwater user fees are more equitable. A compelling benefit for stormwater managers is that user fees create a predictable and sustainable funding source for stormwater management. See Smart Prosperity's 2016 report on stormwater user fees New Solutions for Sustainable Stormwater Management in Canada. See also resources that describe different approaches cities take to financing stormwater and green infrastructure.

WHAT'S HAPPENING?

KITCHENER AND WATERLOO

Kitchener and Waterloo have implemented user fees to address the infrastructure funding deficit for creek rehabilitation, sediment removal from stormwater ponds, and replacement of storm sewer pipes. Charges are based on impervious areas on the property. See background reports to council (Kitchener) for more details on rate structure. The cities provide credits to residential and commercial property owners.

MISSISSAUGA

A stormwater charge rolled out in 2016, based on impervious area. The city offers credits for non-residential and multi-residential properties, but not for single family residential properties, up to a maximum of 50% of the charge based on peak flow control, water quality treatment, runoff reduction, and pollution prevention.

PORTLAND, OREGON

The City of Portland has charged a stormwater management fee since 1977. The Clean Rivers Rewards program provides a discount of up to 100% of the stormwater charge based on managing rainfall on-site, for residential and commercial properties

OTHER EXAMPLES:

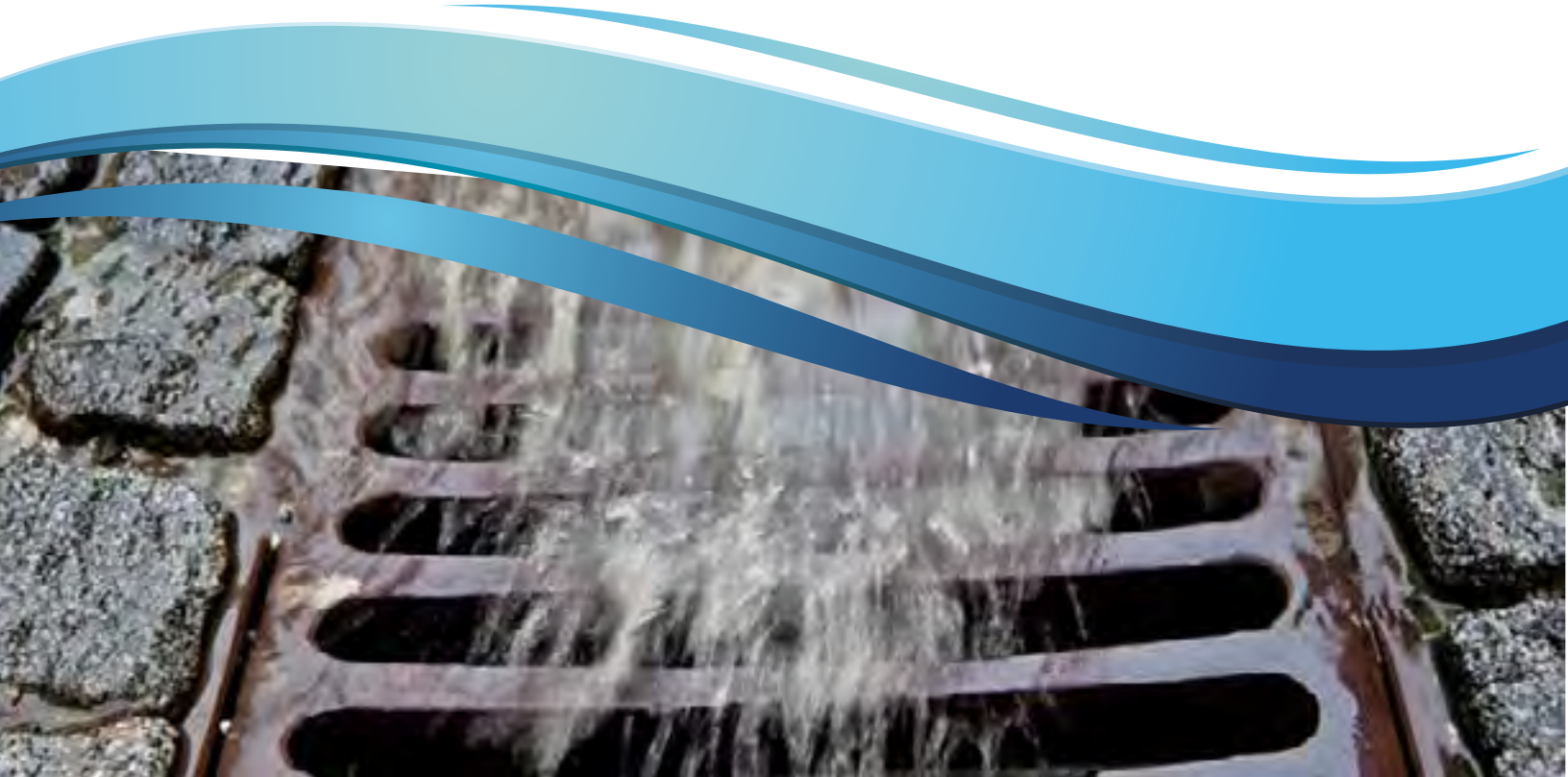
Halifax, Philadelphia, Seattle, Victoria, Saskatoon.

TAKE AWAY

- Some municipalities embrace the stormwater user fee model without incorporating incentives or credits for runoff reduction. This is a missed opportunity to reduce flooding and other damage, and reduce stormwater management costs.
- Funds collected through stormwater fees should be used for a combination of grey and green infrastructure, including grant programs.
- Some municipalities provide credits to the industrial-commercial-institutional sector, and exclude the single-family residential sector. The concern is "bang for the buck": small lots individually have relatively small potential for runoff reduction. On the other hand the total runoff contribution of residential properties is high, and in less dense, suburban neighbourhoods there may be high potential. Also, residential credits are fair and have public education benefits. One option is to start with an ICI
- Volume-based user fees combined with credits and incentives are a step in the right direction, but inadequate on their own to mobilize city-wide action. The incentives are generally not high enough to pay for the full cost of implementing green stormwater infrastructure. See the mechanisms to spur action used by cities such as Philadelphia and Washington in Mobilizing action on private property.

Stormwater Scorecard.

How your community funds stormwater

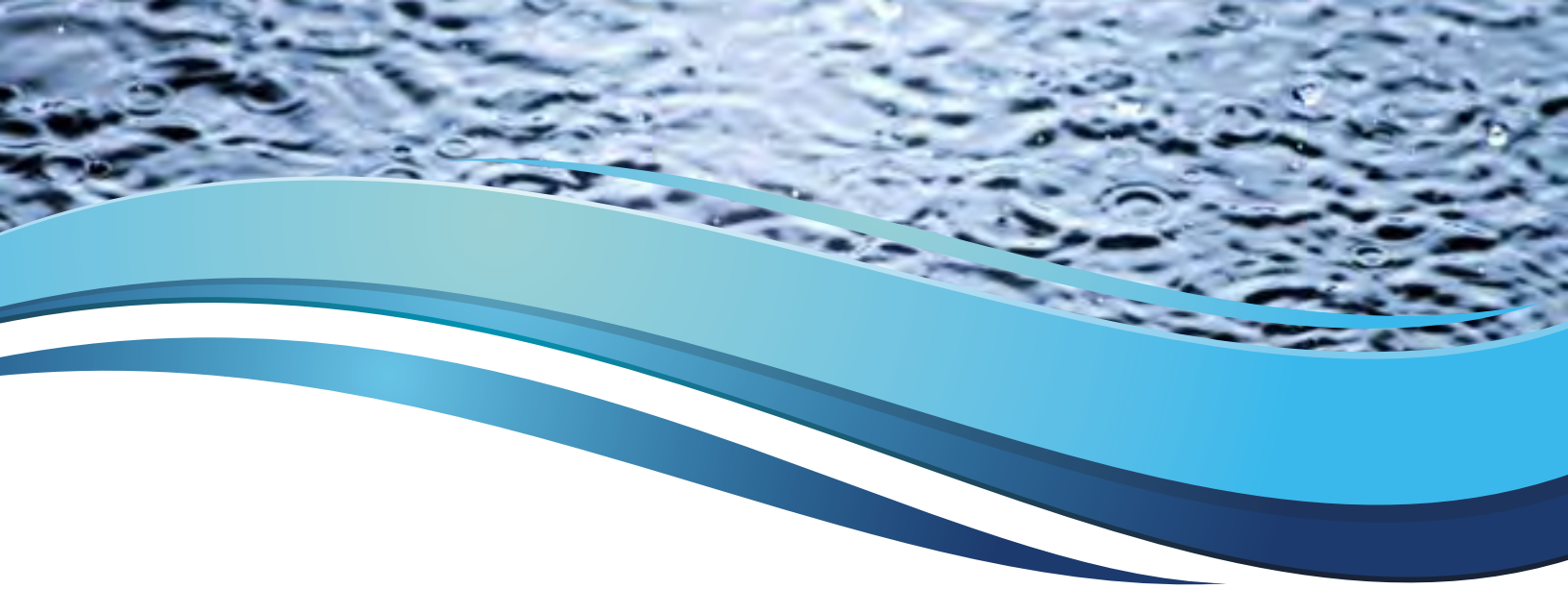


MYTH-BUSTING THE "RAIN TAX"

EXPECT OPPONENTS to campaign against proposed stormwater user fees as a "rain tax." Here are the counter-arguments to this well-worn gambit:

1. User fees are not a new charge—just a new way of paying. We already pay for stormwater management through our property taxes or waterrates.
2. User fees aren't a tax. They are a payment for services.
3. User fees are fairer because they reflect the actual cost of managing stormwater from a property. Homeowners generally pay less than previously and those with large paved areas pay more.
4. If credits/incentives are provided, property owners can reduce what they pay by managing rain on-site.
5. User fees encourage actions that will reduce the damaging impacts of stormwater, including flooding, closed beaches, algae, and damage to sport fishery.
6. User fees save money by encouraging more efficient use of existing infrastructure (just like paying the true cost of energy or water encourages conservation).
7. User fees provide a stable revenue stream that enables more business-like management of stormwater infrastructure. It's the responsible solution.

There needs to be informed, organized, and vocal community support for stormwater user fees done right. Voices should include economic as well as environmental interests.



15 Keep rain out of sewer systems

In many older developments, downspouts and foundation drains were connected to storm sewers, combined sewers, or sanitary sewers. While newer building codes do not allow this, existing connected downspouts, weeping tiles, and sump pumps may be a major source of input to sewer systems during rain events. Sewers can be overwhelmed by the volume, resulting in street flooding, sewer backups, or combined sewer overflows.

Property owners should be required and/or encouraged to disconnect their downspouts and weeping tiles from the sanitary, storm, or combined sewer system, and to redirect flows to a permeable area on their property.

Programs can be implemented through some combination of incentives and mandatory bylaws.

WHAT'S HAPPENING?

TORONTO

Toronto's mandatory downspout disconnect bylaw, phased in over several years, came into full effect in December 2016. The City provided videos and resources but no incentives or individual assistance to property owners disconnecting their downspouts.

Through the Basement Flooding Protection Subsidy Program, the City offers subsidies of 80% of the cost of weeping tile disconnection and capping, up to $400. It also provides subsidies for sewer backflow prevention and sump pump installation.

MARKHAM

The City requires downspout disconnection from sanitary sewers (not storm sewers).

Markham has conducted smoke testing to identify which downspouts need to be disconnected, and will provide rebates of up to 80% of the cost up to $500, and 100% reimbursement for the cost of a rain barrel.

REGION OF PEEL

The Region offers rebates of $25 per downspout for one or two downspouts disconnected, and $100 for three or more downspouts disconnected from the sewer system (storm or sanitary). The open sewer line must be capped and downspouts redirected to a permeable area away from the foundation.

PORTLAND, OREGON

Portland disconnected over 56,000 downspouts between 1993 and 2011, offering free work and incentives. The program closed after all downspouts in the combined sewer area were disconnected.

LONDON, ONTARIO

A pilot program in the City of London disconnected weeping tiles from the sanitary sewer system in a flood-prone neighbourhood.

The City covered the entire cost of the work and gave property owners $1,000 to pay for ongoing maintenance. The project resulted in far lower inputs to the sanitary sewer system during extreme rain events and none of the retrofitted homes experienced sewer backup.

The City now offers grants for a number of basement flooding protection measures, up to 75% of the cost.

HALIFAX, NOVA SCOTIA

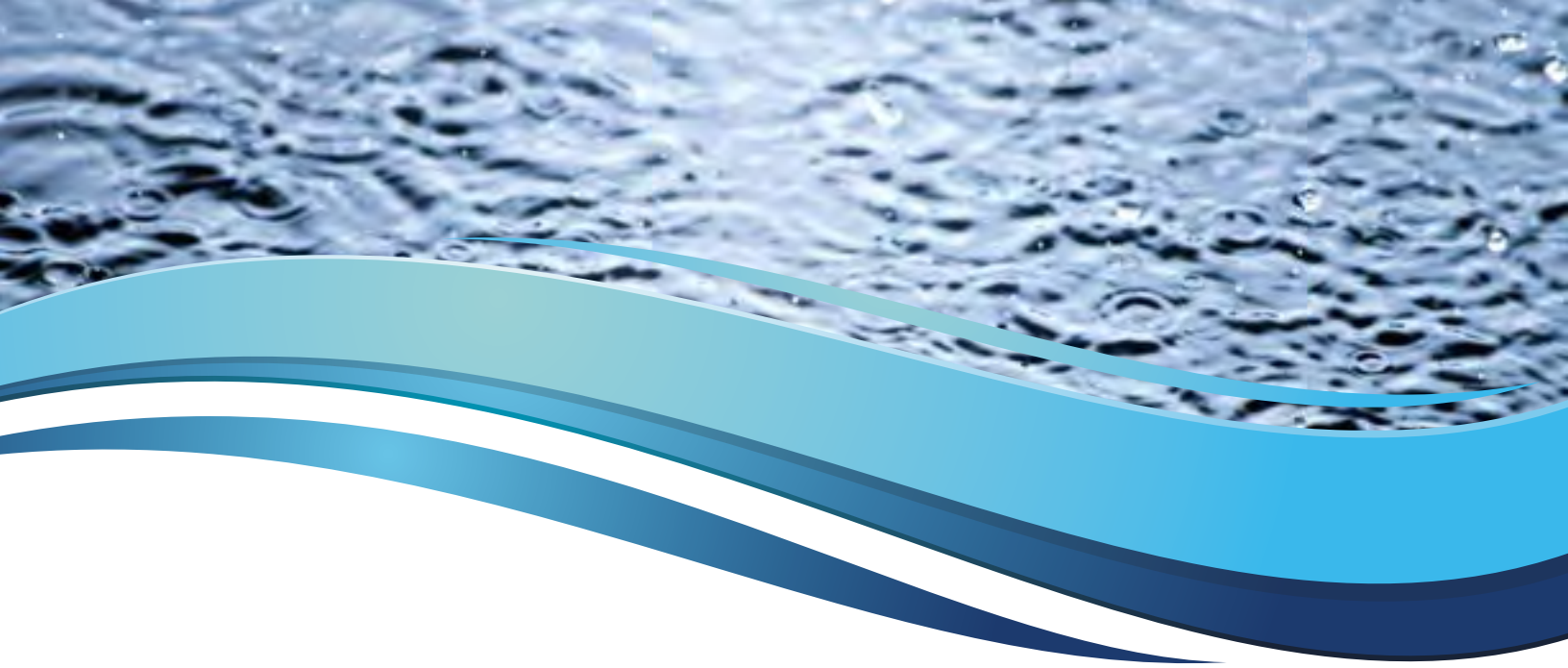
The Stormwater Inflow Reduction Program requires property owners in certain areas of the city to be inspected to see if they are discharging illegally to the wastewater system (downspouts, sump pumps). If violations are found, property owners are responsible for fixing the sources of discharge.

TAKE AWAY

- Disconnecting downspouts may be one of the lowest cost, most accessible methods of decreasing runoff volumes in areas with many connected downspouts—especially in less dense areas with available permeable areas.
- Disconnecting downspouts can also be part of a public engagement campaign to encourage water conservation through rain barrel installation.
- Limiting programs to only those downspouts connected to the sanitary or combined sewer system will have a less widespread impact. Because of crossed connections and leaking pipes, even downspouts connected to the storm sewer system contribute to system overloading.
- Contractor training is very important to ensure that downspouts are redirected to permeable areas—redirecting to hard surfaces defeats the purpose.

Stormwater Scorecard.

Your community's downspout and foundation drain disconnect policies



16 Mobilize action on private property

Private property accounts for most of the land in an urban community, and must be included in a community-wide initiative to change the way rain is managed. In addition to targeted programs, municipalities should consider incentives for green infrastructure retrofits that reduce runoff volumes.

Incentives for retrofit action on private property make particularly good sense in densely developed neighbourhoods where land is expensive and there are limited opportunities for stormwater management on public property.

In all cases, green infrastructure constructed on private property needs to be treated as infrastructure, subject to municipal maintenance or an enforceable agreement requiring owners to be responsible for maintenance.

Types of green infrastructure incentives include:

- Grants. Grants can be awarded to property owners directly, or to contractors who amalgamate a portfolio of projects (see Philadelphia example below).
- Post-construction rebates. Instead of providing up-front grants, municipali ties can provide rebates for installed green infrastructure. The city may inspect the completed construction and require proof of maintenance.
- Stormwater user fee credits. Municipalities that have implemented impervious-area based charges for stormwater allow property owners to lower their rates through the installation of green infrastructure and/ or pollution prevention activities.
- Tradable stormwater retention credits (see more). Allowing properties that trigger infiltration standards for development or redevelopment to purchase credits from green infrastructure projects on private lands.

WHAT'S HAPPENING?

PHILADELPHIA

The Stormwater Management Incentive Program (SMIP) provides grants for installing green infrastructure projects on non-residential properties. Grants to applicants may cover all or some of construction costs. Projects must absorb at least the first inch of rain. Projects that absorb more get preference.

The Greened Acre Retrofit Program (GARP) relies on contractors to aggregate and install projects on multiple private non-residential properties. This eliminates the high cost for municipalities to market and manage multiple smaller-scale projects. It harnesses the business interests of contractors to get paid for building and maintaining the projects. The city pays the contractor up to $100,000 per "greened acre" —an acre of land on which an inch of rainfall can be managed on-site.

In both SMIP and GARP, property owners sign 45-year maintenance agreements tied to the deed of the property. Installations are inspected annually. Philadelphia also offers credits against its stormwater fees for reductions in impervious area, and for the installation of green infrastructure practices, for non-residential properties. Managing runoff from one acre of impervious surface will save a property owner approximately $4350 annually.

SEATTLE

Seattle's Rainwise program offers property owners in combined sewer areas rebates for installing rain gardens and cisterns, up to the full cost of construction, with rebates averaging $4,000. Most property owners pay around 15-20% of the cost of the installation. Rain gardens and cisterns are installed by trained private contractors and inspected by Rainwise before rebates are issued. There is no reduction in stormwater fees for the installation of green infrastructure.

The requirement for property owners to pay upfront costs was identified as a barrier to adoption. A current pilot provides loans to cover these costs.

LAKE SIMCOE REGION CONSERVATION AUTHORITY

In a pilot program in 2014-2015, the authority funded 75% of the cost of installing rain gardens up to $10,000 under the Landowner Environmental Assistance Program. Participants were required to agree to be demonstration sites and have their gardens featured in photos and tours. In 2016, the amount was lowered to 60% of cost up to $5,000, and the demonstration requirement removed. Demand for the gardens did not decrease, and quotes for installation became more reasonable. 25 rain gardens were completed in total.

GUELPH

For seasonal outdoor systems the City offers a rainwater harvesting rebate of 10 cents a litre harvested (up to $400). For all-season indoor/outdoor systems the maximum is $2000.

KITCHENER AND WATERLOO

Credits (Kitchener, Waterloo) are provided to residential and commercial property owners of up to 45% of the stormwater fee for the installation of measures on private property. Residential property owners can apply online and receive a credit depending on the amount of water they manage on-site. They must agree to inspections. Industrial and commercial properties receive a credit based on water quantity control, water quality control and education of employees (up to 45%). Also subject to inspection.

The RAIN outreach program in partnership with REEP Green Solutions uses a community-based social marketing approach to educate the public about stormwater issues and increase uptake of the credits.

WASHINGTON D.C.

Riversmart rebates are offered for the installation of rain barrels, trees, and infiltration landscaping elements on residential properties. Rebate values vary based on the amount of rainfall treated.

Non-residential properties are offered grants of up to 60% of project costs, or full costs for projects in priority areas.

STORMWATER RETENTION CREDIT TRADING

In order to achieve runoff reductions across a watershed, some cities turn to the market to help find efficient solutions. Washington D.C. requires runoff volume reductions through source controls when properties are developed or redeveloped. Property owners who find it difficult or expensive to meet the entire requirement onsite have the option of making up the difference by purchasing Stormwater Retention Credits (SRCs) from others in the same watershed. Each credit is equivalent to managing one gallon of runoff for a year. This system creates a business opportunity for other property owners who can more cost-effectively absorb rainfall onsite, above and beyond requirements. Prices for SRCs are determined by the market and can be monitored online. A rain garden managing 42,000 litres of stormwater (11,000 gallons) would bring in about $25,000 in annual revenue.

Photo credit Credit Valley Conservation

TAKE AWAY

- Grants that cover construction costs get best uptake in areas that also have stormwater user fees and credits—so property owners do not need to cover costs up front for construction, and still benefit from credits over time. Credits or construction grants alone get less uptake.
- Targeting contractors and construction companies (e.g., GARP) creates the potential for economies of scale in construction, maintenance, and administration.
- Maintenance is as important as construction. Educate property owners and managers about maintenance to ensure continued performance.
- Combine outreach and engagement with incentive programs in order to ensure uptake. Partner with community groups, including gardening and horticultural societies.
- If there is a shortage of skilled contractors, consider training and certification (see Bringing practictioners and decision-makers up to speed).
- Clearly define program goals. For example, residential rebate programs may not manage large volumes of stormwater but help to build public understanding and acceptance for green infrastructure.

Stormwater Scorecard.

Your community's incentives for green infrastructure on private property

Stormwater Scorecard

The Stormwater Scorecard is a new tool to help assess the current state of green stormwater infrastructure programs, policies, and plans in your community, and to identify priorities for further action.

The Scorecard is designed as a companion to the toolkit, which outlines available actions.

Your local action plan to reduce runoff and runoff pollution for your community should be based on local issues and priorities, where your community is at, where you are headed, and a rough timeline for getting there. Each section in the Toolkit is linked to a section of the Stormwater Scorecard, where you can identify which policies and programs your community has in place, and how effectively they are being implemented.

Depending on your level of expertise, you may need to interview some key informants in order to complete the Scorecard – these may include stormwater managers, sustainability officers, conservation authority, and watershed staff.

Based on the results of your Stormwater Scorecard assessment, you can develop an action plan for next steps and beyond. Your plan will likely need to be multi-layered, promoting change from multiple angles, responding to opportunities as they arise.

Towards a rain-friendly community

Here is a list of the defining characteristics of a municipality that has implemented strategies to reduce runoff and runoff pollution, and return most rain to soils, vegetation, and the atmosphere. Fill out the scorecard to see how your community measures up.

❶ Policy and plans

- Municipal policies and plans (stormwater management, land use, climate adaptation, sustainability, asset management, etc.) give priority to managing rain where it falls.
- A green stormwater infrastructure strategy sets an ambitious target and implementation plan.

❷ Capacity

- Local capacity exists in both the private and public sectors for the design, construction and maintenance of green infrastructure
- Local standards for design, construction and maintenance have been adopted

❸ Implementation

- Green infrastructure is part of regular municipal operations.
- Projects are regularly constructed on the ground on public lands (rights of way, parks, schools, municipal buildings etc.)
- Incentives and other supports are in place to install green infrastructure on private property as part of the municipal stormwater management system.

❹ New development

- New development and redevelopment projects are held to a high standard (e.g. 90% of rainfall) to manage rain onsite via infiltration, harvesting, and evapotranspiration.

❺ Community engagement

- Members of the community are well-informed about stormwater management and green infrastructure via a far-reaching engagement campaign (online information, workshops, community events, presentations, demonstration projects, site-specific advice, etc.)
- Community supports green infrastructure including significant uptake of incentives for installation on private property

STORMWATER SCORECARD

Your community's water issues

Toolkit: Transforming the urban landscape

Community: _____

Population: _____

Source of drinking water:

- ☐ Groundwater
- ☐ Surface water
- ☐ Other: _____

How would you rate the importance of the following rainwater-related issues in your community?

5 Very Important	4 Important	3 Somewhat Important	2 Slightly Important	1 Not Important	
☐	☐	☐	☐	☐	Drinking quality water
☐	☐	☐	☐	☐	Recreational water quality (swimming)
☐	☐	☐	☐	☐	Protecting fish habitats
☐	☐	☐	☐	☐	Maintaining lake/stream water levels
☐	☐	☐	☐	☐	Groundwater quality
☐	☐	☐	☐	☐	Groundwater quantity
☐	☐	☐	☐	☐	Flooding
☐	☐	☐	☐	☐	Combined sewer overflows
☐	☐	☐	☐	☐	Water conservation
☐	☐	☐	☐	☐	Erosion and sedimentation
☐	☐	☐	☐	☐	Infrastructure capital and operating deficits
☐	☐	☐	☐	☐	Other issue: _____

Describe your key local water issues in more detail. What issues are likely to drive action?

Describe current stormwater management practices in your community (for example, age of infrastructure, level of maintenance, most common technology).

☐ My community has areas with combined sewers.

☐ There are sewer overflows in my community.

How would you rate your community's overall commitment to managing rain where it falls? Take into account:

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Policies and plans that promote green infrastructure/low impact development
☐	☐	☐	☐	☐	Green infrastructure installations on the ground (or grey/green hybrids)

(note the remainder of the assessment will go in depth on particular policies and programs)

Additional comments/explanation:

Your community's local plans

Toolkit: Incorporating green infrastructure in local plans

Which of the following plans does your community have? How would you rate the commitment to green infrastructure? Include any key quotes or explanations.

Tip: Interview a knowledgeable insider for this question. Alternatively, search documents for keywords including "green infrastructure", "storm water" or "low impact development" (or other terms commonly used in your region). A strong commitment to green infrastructure in a plan sets ambitious, measurable and enforceable targets. A medium commitment might mention GI several times without an implementation plan. A weak commitment might be a single mention.

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Green infrastructure strategy
☐	☐	☐	☐	☐	Stormwater management master plan
☐	☐	☐	☐	☐	Infrastructure plan
☐	☐	☐	☐	☐	Official land use plan
☐	☐	☐	☐	☐	Watershed plan
☐	☐	☐	☐	☐	Sourcewater protection plan
☐	☐	☐	☐	☐	Water conservation plan
☐	☐	☐	☐	☐	Flood reduction plan
☐	☐	☐	☐	☐	Sustainability plan
☐	☐	☐	☐	☐	Climate adaptation plan
☐	☐	☐	☐	☐	Other plan: ☐

☐ My community has a specific rainwater management target

Enter target and provide details:

☐ My community has a body/governing organization to consider watershed-level impacts of development.

How would you rate the authority of this body?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong
☐	☐	☐	☐	☐

Provide more details:

Your community's engagement

Toolkit: Building community support, participation

Does your municipality (or another local organization) conduct public outreach on green infrastructure/low impact development? What kind? Please include links or descriptions where appropriate.

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Information on websites, brochures, etc.
☐	☐	☐	☐	☐	Demonstration projects - publicly accessible rain gardens, permeable pavement, rainwater harvesting with explanatory signage
☐	☐	☐	☐	☐	Property-level consultations, advice for managing rain where it falls; visits nnn(specify residential, commercial or both)
☐	☐	☐	☐	☐	Hands on workshops (e.g. building rain gardens, managing runoff around the home)
☐	☐	☐	☐	☐	Recognition (stormwater awards, etc)
☐	☐	☐	☐	☐	Incentives (e.g. rain garden rebate)
☐	☐	☐	☐	☐	Online tools for calculating property-level runoff
☐	☐	☐	☐	☐	Design Competitions
					Green infrastructure tours and/or maps
☐	☐	☐	☐	☐	Other:

Additional comments (links, description etc):

Your community's capacity

Toolkit: Bringing practitioners and decision-makers up to speed

How would you rate the current capacity level for planning and implementation of green infrastructure in your community?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong
☐	☐	☐	☐	☐

Additional comments/explanation:

What kind of training/resources are offered to green infrastructure professionals in your area?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Detailed how-to guides for contractors or property owners
☐	☐	☐	☐	☐	In person training on rain gardens, permeable paving etc. nnnnnn for design and construction professionals
☐	☐	☐	☐	☐	Job creation programs for green infrastructure construction and maintenance
☐	☐	☐	☐	☐	Training for municipal staff
☐	☐	☐	☐	☐	Other:

Your community's new development and redevelopment

Toolkit: New build – creating a shining example

How does your community support managing rain where it falls through its requirements for new developments or redevelopment?

All new/re developments must…

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Meet a target for how much rain is permanently retained on site.
☐	☐	☐	☐	☐	Use green roofs.
☐	☐	☐	☐	☐	Maintain a prescribed tree canopy cover.

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Retain existing trees where possible.
☐	☐	☐	☐	☐	Use rain gardens, permeable paving or other green infrastructure.
☐	☐	☐	☐	☐	Other:

Additional information – links, description, comments:

Toolkit: Making green infrastructure attractive for developers

To encourage green infrastructure in new development, my community offers…

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Design consultation between developers and approvals staff to facilitate inclusion of green infrastructure
☐	☐	☐	☐	☐	Accelerated approvals for developments that use green infrastructure
☐	☐	☐	☐	☐	Floor area bonuses for developments that use green infrastructure
☐	☐	☐	☐	☐	Other:

Additional information/comments:

Your community's soils

Toolkit: Nurturing healthy soils to soak up rain

- ☐ Rules are in place to ensure areas disturbed during constructionare re-landscaped with uncompacted topsoil

  Depth requirement: _____

  Organic content requirement: _____

- ☐ All development/redevelopment projects must have soil management plans

Please provide more information about your community's soil management requirements:

Your community's streets

Toolkit: Building green infrastructure in rights of way

How does your community include green infrastructure in public rights of way?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	There are pilot projects on the ground in rights of way.
☐	☐	☐	☐	☐	There is a Green Streets policy
☐	☐	☐	☐	☐	There is a Green Streets guidance manual/guidelines for practitioners.
☐	☐	☐	☐	☐	Other: _____

Additional information:

Your community's alleys

Toolkit: Managing rain in alleys

Does your community use alleyways for green infrastructure?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	There are pilot projects on the ground in alleyways.
☐	☐	☐	☐	☐	There is a Green Alley program
☐	☐	☐	☐	☐	There is a Green Alley guidance manual/guidelines for practitioners.
☐	☐	☐	☐	☐	Other:

Your community's parking lots

Toolkit: Greening up those unlovely parking lots

What does your community do to manage stormwater from parking lots?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	There are pilot projects of green parking lots.
☐	☐	☐	☐	☐	There are requirements for onsite rainwater management for new/retrofit parking lots.
☐	☐	☐	☐	☐	There is a green parking lots program/policy to systematically improve stormwater management in parking lots.
☐	☐	☐	☐	☐	Other:

Additional information:

Your community's parks and vacant lands

Toolkit: Enhancing the ecological function of greenspace

How does your community enhance the stormwater management services of parks and vacant lands?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	There are green infrastructure pilot projects on the ground in parks.
☐	☐	☐	☐	☐	There are green infrastructure pilot projects on the ground on vacant lands.
☐	☐	☐	☐	☐	There is a green parks policy/program to systematically incorporate green stormwater infrastructure into parks.
☐	☐	☐	☐	☐	There is a green vacant lots policy/program to systematically incorporate green stormwater infrastructure onto vacant lands.
☐	☐	☐	☐	☐	Other:_____

Additional information:

Your community's schools

Toolkit: Soaking up rain and knowledge on school grounds

How does your community support green infrastructure in schools?

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	There are green infrastructure pilot projects on school grounds.
☐	☐	☐	☐	☐	There is a green schools policy/program to systematically install green infrastructure on school grounds.

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	Green infrastructure/the urban water cycle are part of school curriculum
☐	☐	☐	☐	☐	Other:

Your community's urban forest

Toolkit: Creating multiple benefits with healthy trees

◯ My community has an urban forest strategy/plan.

Does this plan (or other tree-related policies) include…

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	A target for the amount of tree canopy cover
☐	☐	☐	☐	☐	Minimum soil volumes for newly planted trees
☐	☐	☐	☐	☐	Tree removal bylaw for private lands
☐	☐	☐	☐	☐	Tree retainment/planting for new development
☐	☐	☐	☐	☐	Adequate budget for tree maintenance
☐	☐	☐	☐	☐	Specific recognition of trees for their stormwater management benefits
☐	☐	☐	☐	☐	Other:

Additional information:

Your community's natural areas

Toolkit: Preserving undeveloped lands and restoring rivers

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	My community restricts development on natural areas to preserve ecosystem services
☐	☐	☐	☐	☐	My community purchases undeveloped land to preserve the ecosystem services it provides
☐	☐	☐	☐	☐	My community values natural areas as infrastructure
☐	☐	☐	☐	☐	My community has projects or plans in place to naturalize/daylight urban creeks

Additional information:

Your community's green infrastructure on private lands

Toolkit: Matching stormwater fees to runoff volumes

How is stormwater management funded in your community?

- ☐ Property taxes
- ☐ Water rates (no separate line for stormwater)
- ☐ Water rates with a separate line for stormwater
- ☐ Development charges
- ☐ Stormwater charge based on impervious area on the property

Other:

Additional information about stormwater funding:

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	There are opportunities for homeowners to reduce the amount they pay for stormwater by managing rain on their properties.
☐	☐	☐	☐	☐	There are opportunities for industrial, commercial, or institutional landowners to reduce the amount they pay for stormwater by managing rain on their properties.

Toolkit: Keeping the rain out of sewer systems

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	My community has incentives or requirements to disconnect downspouts and/or foundation drains and sump pumps from the storm or sanitary sewers.

Toolkit: Mobilizing action on private property

1 None	2 Weak	3 Medium	4 Strong	5 Very Strong	
☐	☐	☐	☐	☐	There are incentives in my community for homeowners to install green infrastructure on their properties.
☐	☐	☐	☐	☐	There are incentives in my community for industrial, commercia and institutional property owners to install green infrastructure.

Additional information:

Your community's action plan

Based on the information you have gathered for this assessment, what should your community's priorities be for improving its rainwater management?

Consider:

- Key water issues likely to drive community action and garner support
- Current policies and programs that could be improved/expanded
- Upcoming plan creation or reviews that provide opportunities for community input
- Long term areas of greatest need

Within the next year:

Within the next five years:

Within the next ten years:

How do you plan to share the results of this assessment with decision makers and influencers in your community?

- ☐ Article for a website, local paper, or newsletter
- ☐ Presentation to council
- ☐ Presentation to a community meeting or conference

Other: _____

Feedback

This is the first version of the Stormwater Scorecard. Please let us know how we can make it and the Soak it up! Toolkit better by contacting us at info@raincommunitysolutions.ca

Contribute to benchmarking the state of municipal stormwater policy across Canada by filling out the Quick Stormwater Scorecard at: https://www.surveymonkey.com/r/stormwaterscorecard

Take action to reduce runoff and runoff pollution.

1. **Incorporate green infrastructure in plans, policies.** Adopt high-level commitments, policies, strategies, and implementation targets.
2. **Build community support, participation.** Secure buy-in and public understanding for a new kind of stormwater management.
3. **Bring practitioners and decision-makers up to speed.** Develop skills, knowledge.
4. **New build—create a shining example.** Get it right the first time. Show how it's done.
5. **Make green infrastructure attractive for developers.** Make them want to do it, even if they don't have to.
6. **Nurture healthy soils to soak up rain.** Preserve and create healthy topsoil, where it all begins.
7. **Build green infrastructure in rights of way.** Use roads to help to solve the runoff problem they create.
8. **Manage rain in alleys.** Create value in underused and neglected public spaces.
9. **Green up those unlovely parking lots.** Design parking lots to manage the stormwater they contribute.
10. **Enhance stormwater services from greenspace.** Incorporate green stormwater infrastructure into parks and vacant lots.
11. **Soak up rain and knowledge in schoolyards.** Transform hard play spaces into beautiful and functional outdoor classrooms.
12. **Create multiple benefits with healthy trees.** Intercept and infiltrate rain with street trees and the urban forest.
13. **Preserve undeveloped lands and restore rivers.** Value the ecosystem services provided by near-urban natural areas.
14. **Match stormwater fees to runoff volumes.** Create a sustainable and fair funding source for stormwater infrastructure, both grey and green.
15. **Keep rain out of sewer systems.** Disconnect downspouts and foundation drains from sewers so that water can soak back into the ground or be reused.
16. **Mobilize action on private property.** Leverage implementation on private properties with programs, credits, and incentives.

Soak it up: 16 actions your community can take to reduce runoff and runoff pollution

This publication describes 16 actions your municipality can undertake to reduce runoff and runoff pollution by integrating green stormwater infrastructure across the urban landscape. Each section contains an overview, examples from real-world experience, and insights from practitioners about what works best–and what doesn't. It's designed to be a quick easy read with links for more information.

THIS DOCUMENT IS FOR:

- decision-makers, such as municipal councillors and managers—anyone with responsibility for shaping stormwater policies and practices
- influencers, including community and environment groups, researchers, consultants, contractors, and other champions of green stormwater infrastructure

The accompanying Stormwater Scorecard will help you to assess your own community's green stormwater infrastructure policies and programs and identify priorities for action.