Developing a Municipal Downspout Disconnect and Green Infrastructure Program
Introduction
Runoff from more frequent and higher intensity storms coupled with increased impervious surfaces are causing capacity problems at wastewater treatment plants. Nuisance flooding in roadways and basements is also a result of these storms and constraints on wastewater infrastructure capacity.

One solution that municipalities can use to address runoff is to implement residential downspout disconnect and green infrastructure programs. The result is cost savings for wastewater utilities and decreased combined sewer overflow and stormwater runoff in neighborhoods and local waterways.

Why Encourage Downspout Disconnection and Green Infrastructure Installation?
Illicit sump pump, downspout, and other drain connections to sanitary sewer lines can overwhelm the capacity of treatment plants. By disconnecting unpermitted drains from the sanitary sewer, municipalities can reduce the volume of water unnecessarily sent to wastewater treatment plants and decrease energy costs and need for system improvements, which would be passed on to ratepayers.

Coupling a downspout disconnection with green infrastructure implementation can further strengthen community climate resiliency by: reducing localized flooding, decreasing polluted runoff into local waterways, retaining water for use by residents, and allowing water to percolate into the ground (see Figure 1). The purpose of installing green infrastructure is to retain residential runoff, that may have been previously entered the sanitary sewer system or directly discharged into waterways. Once water enters a green infrastructure installation, depending on the type of GI used, the water is slowly released back into local waterways, held for use—such as watering gardens—by the resident, or allowed to percolate back into the groundwater.

Some municipalities are loathe to enforce disconnection of illegal connections of downspouts and sump pumps to the sanitary sewer system, in part, because people don't want the additional flows on their lots and are worried about basement flooding. Encouraging downspout disconnect without increasing green infrastructure to capture the runoff, the water that is diverted from the treatment plant into the storm sewer can result in an increase in flooding.

Coupled Downspout Disconnection and Green Infrastructure Programs
Municipalities of all sizes can successfully design and implement a downspout disconnect and residential green infrastructure program. This guidance scales some of the practices and lessons learned from these cities down to guidance for smaller municipalities. Currently, such disconnect programs are primarily undertaken in large cities—see Case Studies (Appendix C) for municipal disconnect programs.

Inflow reduction and green infrastructure programs generally provide either financial or technical support – or both – to residents. In instances where the municipality has an existing ordinance prohibiting unpermitted connection to sanitary sewer lines, some municipalities have instituted an ‘amnesty period’ during which property owners could contact the city for assistance without any legal repercussions for illicit connections. This amnesty period should last at least 6-12 months to allow time for homeowners to learn about and participate in the program. Upon conclusion of the amnesty period, the municipality can then assess any fines that would normally be associated with an illicit sanitary sewer connection.

More Downpours for the Northeast
Public programs to disconnect downspouts from sanitary sewer lines and install green infrastructure will help municipalities adapt to a changing climate. According to NOAA¹, “extreme precipitation events have grown more frequent since the start of the twentieth century, and such events are likely to become even more frequent over the twenty-first.” This trend is seen strongly in the Northeastern United States, see the figures below².

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¹ Scott, M. 2019 July 10. Prepare for more downpours: Heavy rain has increased across most of the United States, and is likely to increase further. NOAA Climate.gov. https://www.climate.gov/news-features/featured-images/prepare-more-downpours-heavy-rain-has-increased-across-most-united-
² Image credit: NOAA Climate.gov Fourth National Climate Assessment
### Program Development Step-by-Step

#### 1. Determine Baseline and Estimate Targets

Prior to designing a downspout disconnect/green infrastructure program, the community should first determine a baseline estimate of the number of properties with stormwater connections to the sanitary sewer. After this baseline has been established, the number can be used to create program milestones and goals, such as a target number of properties that will be disconnected from the sanitary sewer as a result of the program.

#### 2. Determine Budget

The overall cost of a downspout disconnect/green infrastructure program will vary with the size, scope, and duration of program. However, even municipalities with limited budgets can create and implement an effective program. A program focused only on education/outreach/providing technical documentation will be lower cost than a program that provides financial incentives or conducts inspections and installations, which would require dedicated staff (in-house or contracted).

#### 3. Determine Program Structure and Administration

All programs should be developed with meaningful participation, input, and feedback from local stakeholders, and tailored to local needs and priorities. Program managers should consider and incorporate local environmental justice issues throughout the design and implementation, and should remain central to programmatic decisions.

The municipality should first determine the structure of the program, including how the program will be administered, the program budget, the types of financial and technical support to be offered, and program goals.

Small and large-scale options are presented below, but municipalities may opt for a program that incorporates components from multiple categories. Program administration is a key component of the success of the initiative, and so the municipality should determine this framework early in the program design process.

**“In-house” administration vs. contracted, or a little of both:**

The municipality may opt to manage and administer the program in-house, or may choose to work with subcontractors/non-profits. For programs that focus primarily on education or strictly providing technical documentation (explained further below), it may be feasible for an existing municipal staff person to manage these efforts. If inspection and installation tasks are involved, the municipality may prefer to contract or partner with a local vendor or organization.

**Voluntary vs compliance-based programs**

Municipal administrators can determine whether the program will be voluntary, incentive-based, or if it will be tied to enforcement of existing ordinances regarding “illicit connections.” Some municipalities have local ordinances in place which prohibit unpermitted connections to the sanitary sewer, and use enforcement of this ordinance as a method to encourage residents to comply. If there is not a local ordinance in place, the municipality may consider the effectiveness of passing and enforcing such legislation.

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Types of Resources Provided

Technical support documentation

Technical support may include published guidance documents, “how to” instructions for disconnecting a sump pump or downspout and redirecting it onto a lawn or other permeable surface, and information about stormwater management practices such as rain barrels or rain gardens. The program manager should also consider which languages the technical support documentation should be provided in, and ensure that these documents are provided from the outset of the program. See the Appendix at the end of this document for examples of technical support documentation.

Financial support

Financial support may include incentives such as grants, rebates, or water bill reductions provided to property owners. For both grants and rebates, the municipality should ensure that the appropriate legal documentation is in place so that they or their intermediaries (in the case of sub-contractors, grantees, etc.) can process payments, subsidies, and reimbursements.

• Grant: municipality provides services (either directly or through a representative organization/contractor) at no cost to the property owner.
• Rebate: property owner has work completed independently, and municipality provides reimbursement of varying amounts after verification that work has been completed
• Bill (fee or other charge) reduction: A one-time or recurring reduction on a stormwater utility fee or other water treatment charge on a ratepayer’s monthly bill. In some cases, municipalities will determine the amount of the bill reduction based upon how much of the stormwater generated by the property is treated on-site.

If the program offers grants or rebates for installations, staffing requirements may need to increase because the need for work must be verified as well as the completion of the work, along with tracking and disbursement of grant or rebate funds, and verification of maintenance (as necessary).

For more information about incentives and examples of approaches used by other municipalities, see the USEPA’s Municipal Handbook on Green Infrastructure Incentives.4

Determine Tracking Approach

It is important to carefully track program activities including the number of participating properties and outreach efforts. A digital tracking system that is compatible with GIS (such as an Excel spreadsheet) may be all you need, but depending on the complexity or the regulatory nature of the program, an approach that integrates easily with wastewater treatment plant or budget and accounting software might require another approach.

4 USEPA’s Municipal Handbook on Green Infrastructure Incentives.

Case Study

City of Olean
Cattaraugus County population 13,711 (2017)
Southern Tier on the Alleghany River

For decades, during storm events the City of Olean discharges untreated sewerage into the Alleghany River. In response to an Order of Consent by NYS DEC for violations of the State Pollutant Discharge Elimination System (SPDES) regulations, which threatened over $100 million in fees, the City of Olean instituted a program to detect and remove illegal connections to their sanitary sewer system. To demonstrate the impact of stormwater connections to the sanitary system, one example they give in their outreach material is “a typical eight-inch sanitary sewer can handle domestic sewage from up to 225 homes; however, it takes only five sump pumps operating at full capacity to overload an eight-inch sanitary sewer.” Olean adopted a sewer use ordinance in 2016 (Olean City Code of Ordinances, Section 27–43 and 44), which states that no new inflows can be added and existing inflows must be disconnected when the property is sold. It also lays out an Enforcement Response Plan with penalties for those who fail to comply with a notice to disconnect an illegal connection. The City can also charge for the discharges up to a rate up to five times the normal sewage rate.

Examples of Outreach Materials and Guidance Documents

– should include program point of contact information:
  • Web content, and a link to this page should be added to the municipality’s website
  • Door-hanger style flier with information about the program
  • One-page flier describing program for use at public events
  • How-To/DIY Info Sheets with step-by-step instructions and photos for disconnecting sump pump or downspout – this should be posted online and available in hard copy for distribution at events

Conclusion

Disconnected downspouts are an important piece of living in a community watershed, because when implemented correctly they will benefit sewer systems and, on smaller scales, home gardens. Municipalities can easily develop downspout programs through the series of steps outlined in this document.

Performing Disconnections
Disconnecting residential downspouts can be done by a professional plumber or by a home owner with simple tools and materials.


Residential Green Infrastructure Guidance
Below is information about some of the most common and useful green infrastructure practices. Prior to installing any of the practices listed below, property owners should ensure that all necessary permits and permissions are obtained. More information can be found through the Chesapeake Stormwater Network: https://chesapeakestormwater.net/training-library/stormwater-bmps/

Rain Barrels and Cisterns
Rain barrels and cisterns can be used to collect rainwater from rooftops, which can be used later to water gardens or other nearby vegetation. Rain Barrels/Cisterns Should...

- Be sized appropriately for roof area draining into barrel:
  - https://www.lid-stormwater.net/raincist_sizing.htm
- Have screened openings to prevent mosquitoes/other bugs from breeding in the water, non-toxic mosquito “dunks” can also be used.
- Have an ‘overflow’ outlet or mechanism to direct excess water (after the barrel is full) away from foundation of building.
- Be located near vegetation/other permeable surface for ease of emptying (and can use a soaker hose).
- Be located ‘upslope’ from whatever resident would be watering – most rain barrels are gravity-fed and so the water pressure is not that great
- Be disconnected from the downspout when temperatures are below freezing

Rain Gardens
Rain Gardens are sunken gardens that intercept stormwater runoff from a downspout, drain, or nearby impervious areas. A rain barrel and rain garden can be connected to the same downspout; in this case, the overflow or excess water from the rain barrel is routed into the rain garden. Do It Yourself installation/project guides:

- http://www.stormwater.allianceforthebay.org/take-action/installations/raingardens
- NEMO (also has a link to a mobile app) - http://nemo.uconn.edu/raingardens/

Dry Wells
In some cases, dry wells may be a better fit than rain gardens. Dry wells function similarly to rain gardens in that they collect and infiltrate stormwater coming off a roof. Instead of water being routed into a vegetated area, dry wells collect excess water underground in a tank, which then allows the water to infiltrate into the ground slowly. Dry wells, like rain gardens, may or may not be suitable for DIY installations due to technical and design requirements.

- https://www.phrc.psu.edu/assets/docs/Publications/Dry-Well-Design.pdf

Checklists

Key Questions: Program Oversight and Management

- Program Administration
  - Who will administer the program?
  - What languages will documents need to be provided in?
  - If technical assistance is provided, who will do the work?
    - If a contractor will be completing this work, does the municipality have the necessary legal structure in place for them to do so (to work on private property, to disburse funds on behalf of the municipality, etc.)?
    - If there are grants/rebates, who will handle tracking and disbursement of funds?
    - If technical or financial assistance is provided, how will the need for work and the completion of the work be verified?
    - Will there be any time of maintenance required and is inspection of maintenance tasks required?

- Have program managers met with local community and business leaders to gather and incorporate feedback about the program?

- If there is an “amnesty period,” ensure that any local ordinances allow for temporary non-enforcement

- How will program progress and milestone achievements be tracked? A digital tracking system for participating properties should be created, ideally in Excel or another format that is compatible with GIS.
## Appendix B
### Sample 12-Month Outreach Strategy
Below is an outline for an example 12-month outreach strategy for a municipal downspout disconnect program.

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Target Audience</th>
<th>Partner Organizations</th>
<th>Expected Outcomes/Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month 1</td>
<td>Present at community meeting about Downspout Disconnect Program</td>
<td>Interested stakeholders</td>
<td>N/A</td>
<td>Introduce effort and receive feedback from residents</td>
</tr>
<tr>
<td>Month 1</td>
<td>Post announcement on neighborhood listserv/relevant social media with same content as community meeting presentation</td>
<td>For residents who did not attend meeting or for permanent record of program</td>
<td>N/A</td>
<td>Increase reach of program information and receive feedback from residents</td>
</tr>
<tr>
<td>Month 1</td>
<td>Table/outreach at a local festival or event</td>
<td>Event attendees</td>
<td>Festival organizers</td>
<td>Face-to-face outreach/engagement</td>
</tr>
<tr>
<td>Month 2</td>
<td>Include flier/info sheet about Downspout Disconnect Program, including participation instructions and contact information, in water bill/with e-bills</td>
<td>All ratepayers</td>
<td>Wastewater Facility</td>
<td>Notify all affected residents of program</td>
</tr>
<tr>
<td>Month 2</td>
<td>Present at community meeting with updates regarding program; inform residents program began</td>
<td></td>
<td>N/A</td>
<td>Official program kick-off</td>
</tr>
<tr>
<td>Month 2</td>
<td>Table/Outreach at public event, (I.E. farmer's market, street festival)</td>
<td>Event attendees</td>
<td>Event staff</td>
<td>Face-to-face interaction with community in a casual setting – residents can ask questions</td>
</tr>
<tr>
<td>Month 2</td>
<td>Listserv/social media post calling for program participation</td>
<td>All residents</td>
<td>N/A</td>
<td>Increase participation in program</td>
</tr>
<tr>
<td>Month 3</td>
<td>Include program flier and participation information in water bill</td>
<td>All ratepayers</td>
<td>Wastewater Facility</td>
<td>Notify all affected residents of program</td>
</tr>
<tr>
<td>Month 4</td>
<td>Announcement on local radio reminding property owners to participate</td>
<td>Property owners</td>
<td>N/A</td>
<td>Increase participation in program</td>
</tr>
<tr>
<td>Month 5</td>
<td>Door-knocking with door hanger flier</td>
<td>Properties within high priority area that have not yet participated in program</td>
<td>None and/or local watershed groups</td>
<td>Increased participation in priority areas</td>
</tr>
<tr>
<td>Month 6</td>
<td>Provide participation update at community meeting</td>
<td>Event attendees</td>
<td>Group holding the meeting</td>
<td>Increase participation and program visibility</td>
</tr>
<tr>
<td>Month 7</td>
<td>Social media post with photo/video of participating property</td>
<td>All residents</td>
<td>Participating property owners</td>
<td>Increase participation and program visibility</td>
</tr>
<tr>
<td>Month 8</td>
<td>Social media/listserv announcement with current participation rates/gallons diverted</td>
<td>All residents</td>
<td>N/A</td>
<td>Increase participation and program visibility</td>
</tr>
<tr>
<td>Month 9</td>
<td>Neighborhood walking tour</td>
<td>All residents</td>
<td>Participating property owners</td>
<td>Peer-to-peer education/recruitment as property owners communicate with other residents regarding their experience with the program</td>
</tr>
<tr>
<td>Month 10</td>
<td>Social media post with photo of participating property</td>
<td>All residents</td>
<td>Participating property owners</td>
<td>Increase participation and program visibility</td>
</tr>
<tr>
<td>Month 11</td>
<td>Table/Outreach at public event, (I.E. farmer’s market, street festival)</td>
<td>Event attendees</td>
<td>Event staff</td>
<td>Face-to-face interaction with community in a casual setting – residents can ask questions</td>
</tr>
<tr>
<td>Month 12</td>
<td>Provide year-end report both online and in water bills with participation information and update on program status (e.g., fines will now be assessed)</td>
<td>Rate payers and all residents</td>
<td>N/A</td>
<td>Inform home owners about potential fines and program visibility</td>
</tr>
</tbody>
</table>
## Program Comparison

<table>
<thead>
<tr>
<th>Program Name/Location</th>
<th>Website</th>
<th>Practices</th>
<th>Incentive</th>
<th>Key Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sump Pump and Roof Drain Grants Sterling, IL</td>
<td><a href="http://ci.sterling.il.us/sumppumpgrantcfm.cfm">http://ci.sterling.il.us/sumppumpgrantcfm.cfm</a></td>
<td>Sump pump and downspout disconnection</td>
<td>$400 maximum rebate for sump pump and downspout disconnection</td>
<td>Program is targeted to keep ratepayer costs in check, and address sewer overflows</td>
</tr>
<tr>
<td>Sump Pump Amnesty Program Revere, MA</td>
<td><a href="https://www.revere.org/news/post/city-sump-pump-amnesty-program">https://www.revere.org/news/post/city-sump-pump-amnesty-program</a></td>
<td>Sump pump disconnection from sanitary sewer</td>
<td>City pays for disconnection for limited time</td>
<td>After “amnesty period” homeowner is responsible for all associated costs of disconnection</td>
</tr>
<tr>
<td>“Illegal Connections” Muncie, IN</td>
<td><a href="https://www.munciesanitary.org/illegal-connections">https://www.munciesanitary.org/illegal-connections</a></td>
<td>Sump pump and downspout disconnection – encourages rain gardens</td>
<td>None – outreach only</td>
<td>No financial incentives offered, but city provides guidance for disconnection and encourages rain gardens, etc.</td>
</tr>
<tr>
<td>Illegal Connection Inspection Program Lower Merion, PA</td>
<td><a href="http://www.lowermerion.org/home/showdocument?id=5451">http://www.lowermerion.org/home/showdocument?id=5451</a></td>
<td>Sump pump disconnection</td>
<td>Program provides a grace period for businesses and homeowners to correct illegal drainage connections</td>
<td>Uses volume of water figures to draw attention to scale of problem Emphasizes that illegal connections increase costs to ratepayers</td>
</tr>
<tr>
<td>Downspout Disconnect Program Clark County, WA</td>
<td><a href="https://www.clark.wa.gov/public-works/downspout-disconnect-program">https://www.clark.wa.gov/public-works/downspout-disconnect-program</a></td>
<td>Sump pump and downspout disconnection and BMPs</td>
<td>County provides technical assistance, but no financial assistance</td>
<td>Provides very good technical information in ‘How To’ handout, including important things to consider about a property’s suitability for disconnection</td>
</tr>
<tr>
<td>Find It, Fix It Greenwood, IN</td>
<td><a href="http://www.greenwood.in.gov/subtopic/index.php?topicid=103&amp;structureid=13#navJump">http://www.greenwood.in.gov/subtopic/index.php?topicid=103&amp;structureid=13#navJump</a></td>
<td>Sump pump and downspout disconnection</td>
<td>Free inspection and discount on bill</td>
<td>City is not requiring inspections, but is paying for them.</td>
</tr>
<tr>
<td>Downspout Disconnection Louisville, KY</td>
<td><a href="http://www.louisvillemsd.org/DownspoutDisconnection">http://www.louisvillemsd.org/DownspoutDisconnection</a></td>
<td>Downspout disconnection, encourages rain barrels and other BMPs</td>
<td>$100 reimbursement per downspout that is disconnected</td>
<td>City conducts an initial site visit and inspection to determine property eligibility and to provide guidance</td>
</tr>
<tr>
<td>Downspout Disconnection Program Columbia City, IN</td>
<td><a href="http://columbiacity.net/wp-content/uploads/2016/04/revised_Downspout-Disconnection-Program.pdf">http://columbiacity.net/wp-content/uploads/2016/04/revised_Downspout-Disconnection-Program.pdf</a></td>
<td>Downspout disconnection and rain barrels</td>
<td>Free downspout disconnection, City has a separate rain barrel rebate program</td>
<td>Provides an example of homeowner agreement with legal language regarding working on private property</td>
</tr>
</tbody>
</table>
This material is based upon work supported under a grant by the Rural Utilities Service, United States Department of Agriculture. Any opinions, findings, and conclusions or recommendations expressed in this material are solely the responsibility of the authors and do not necessarily represent the official views of the Rural Utilities Service.