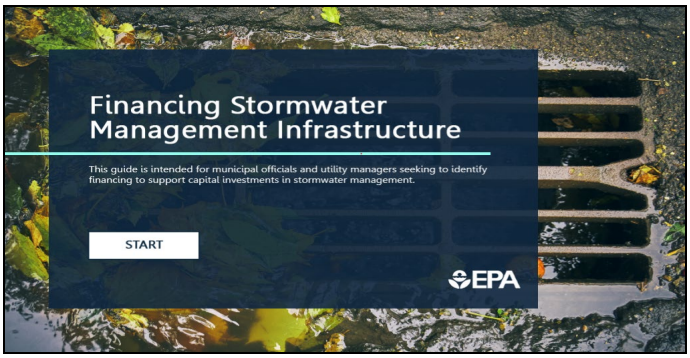
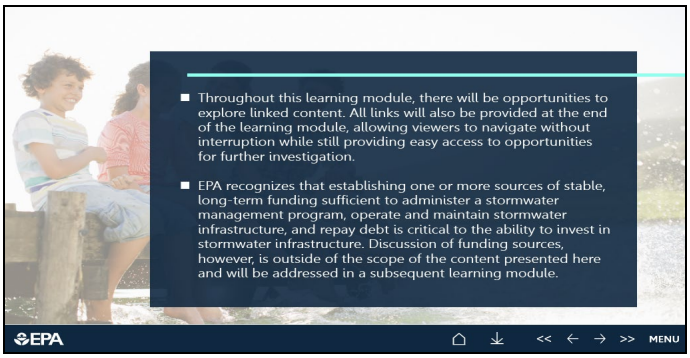


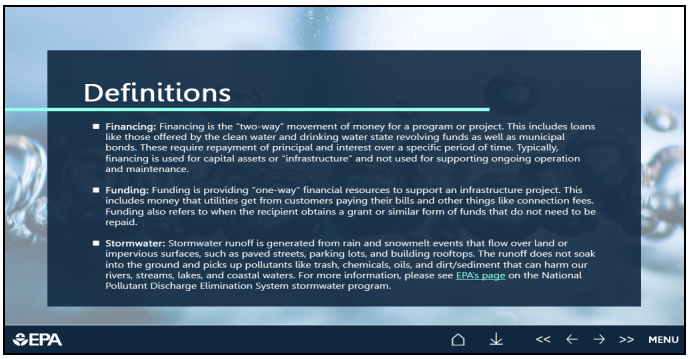
Financing Stormwater Management Infrastructure

This guide is intended for municipal officials and utility managers seeking to identify financing to support capital investments in stormwater management.



Throughout this learning module, there will be opportunities to explore linked content. All links will also be provided at the end of the learning module, allowing viewers to navigate without interruption while still providing easy access to opportunities for further investigation.

EPA recognizes that establishing one or more sources of stable, long-term funding sufficient to administer a stormwater management program, operate and maintain stormwater infrastructure, and repay debt is critical to the ability to invest in stormwater infrastructure. Discussion of funding sources, however, is outside of the scope of the content presented here and will be addressed in a subsequent learning module.

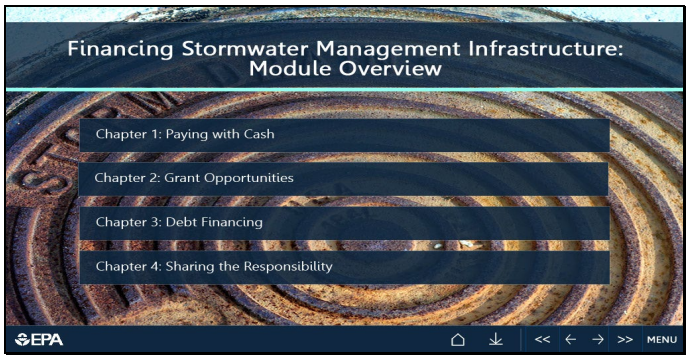


Definitions

Financing: Financing is the "two-way" movement of money for a program or project. This includes loans like those offered by the clean water and drinking water state revolving funds as well as municipal bonds. These require repayment of principal and interest over a specific period of time. Typically, financing is used for capital assets or "infrastructure" and not used for supporting ongoing operation and maintenance.

Funding: Funding is providing "one-way" financial resources to support an infrastructure project. This includes money that utilities get from customers paying their bills and other things like connection fees. Funding also refers to when the recipient obtains a grant or similar form of funds that do not need to be repaid.

Stormwater: Stormwater runoff is generated from rain and snowmelt events that flow over land or impervious surfaces, such as paved streets, parking lots, and building rooftops. The runoff does not soak into the ground and picks up pollutants like trash, chemicals, oils, and dirt/sediment that can harm our rivers, streams, lakes, and coastal waters. For more information, please see EPA's page on the National Pollutant Discharge Elimination System stormwater program.



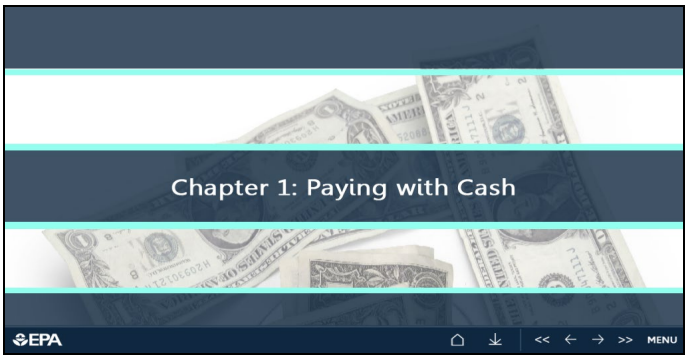
Financing Stormwater Management Infrastructure: Module Overview

Chapter 1: Paying with Cash

Chapter 2: Grant Opportunities

Chapter 3: Debt Financing

Chapter 4: Sharing the Responsibility



Chapter 1: Paying with Cash

Chapter 1: Paying with Cash

Approach

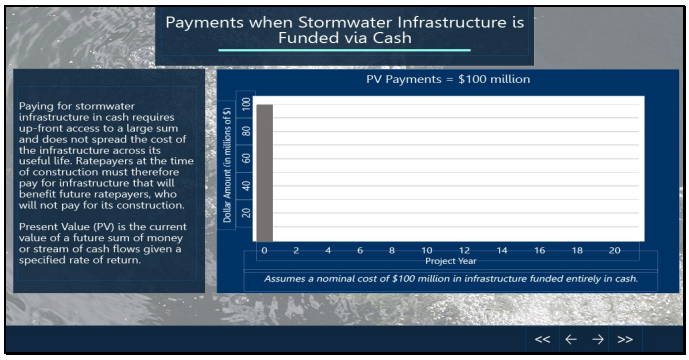
- Use municipal or utility revenue to pay for stormwater infrastructure in full at time of project

Home buying analogies

- You build a home room by room, as your checking account allows
- You save, save, save… then pay cash

Potential revenue sources

- Municipal general fund (i.e., tax revenue)
- Stormwater utility fees paid semiannually or annually, possibly linked to impervious cover
- One-time development impact fees paid for adding impervious cover

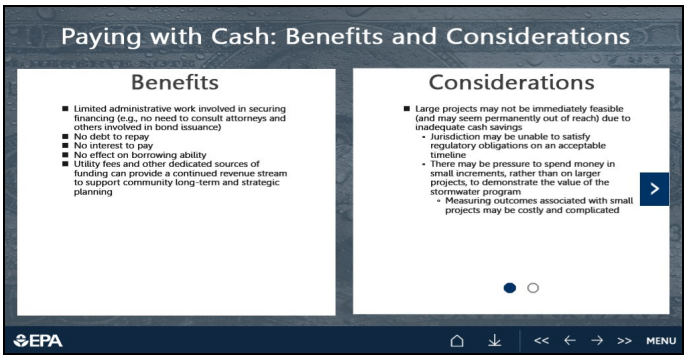


Payments when Stormwater Infrastructure is Funded via Cash

Paying for stormwater infrastructure in cash requires up-front access to a large sum and does not spread the cost of the infrastructure across its useful life. Ratepayers at the time of construction must therefore pay for infrastructure that will benefit future ratepayers, who will not pay for its construction.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

Assumes a nominal cost of $100 million in infrastructure funded entirely in cash.



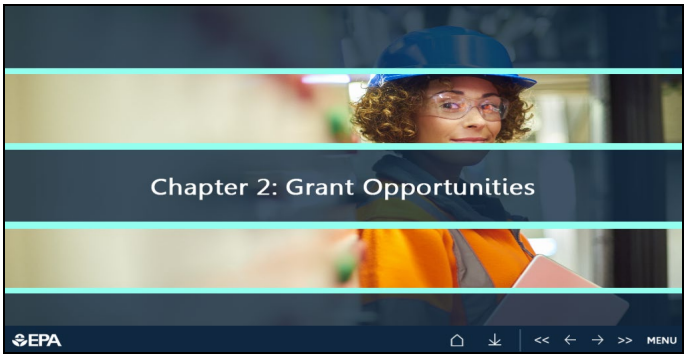
Paying with Cash: Benefits and Considerations

Benefits

- Limited administrative work involved in securing financing (e.g., no need to consult attorneys and others involved in bond issuance)
- No debt to repay
- No interest to pay
- No effect on borrowing ability
- Utility fees and other dedicated sources of funding can provide a continued revenue stream to support community long-term and strategic planning

Considerations

- Large projects may not be immediately feasible (and may seem permanently out of reach) due to inadequate cash savings
- Jurisdiction may be unable to satisfy regulatory obligations on an acceptable timeline
- There may be pressure to spend money in small increments, rather than on larger projects, to demonstrate the value of the stormwater program
- Measuring outcomes associated with small projects may be costly and complicated
    - Inability to invest in expensive infrastructure may prevent community from achieving environmental justice goals
- Misalignment between payors and beneficiaries
- Current ratepayers pay for projects that benefit ratepayers for decades into the future
- Ensuring adequate financing to complete projects may require a substantial increase in fees assessed to ratepayers
- In traditional design/bid/build delivery model, money is spent regardless of infrastructure performance
- Consider contracting approaches that incorporate performance metrics



Chapter 2: Grant Opportunities

Chapter 2: Grant Opportunities

Approach

- Use grants to offset the cost of stormwater infrastructure

Home buying analogy

- You receive a one-time gift from a family member or friend toward the down payment

Potential Federal sources of grant funding

- U.S. Environmental Protection Agency (EPA) (via states)
    - Sewer Overflow and Stormwater Reuse Municipal Grants Program (OSG) (https://www.epa.gov/cwsrf/sewer-overflow-and-stormwater-reuse-municipal-grants-program)
    - Learn more about OSG
- U.S. Department of Housing and Urban Development (HUD)
    - Community Development Block Grant Programs (https://www.hudexchange.info/programs/cdbg/)
- U.S. Department of Agriculture (USDA)
    - Rural Development Water and Environmental Program (https://www.rd.usda.gov/programs-services/water-environmental-programs)
- Federal Emergency Management Agency (FEMA) (via states, tribes, and territories
    - Hazard Mitigation Grant Program (https://www.fema.gov/grants/mitigation/hazard-mitigation)

Details on additional grant opportunities can be found through EPA's Water Finance Clearinghouse (https://ordspub.epa.gov/ords/wfc/f?p=WFC:12) and grants.gov (https://www.grants.gov/)

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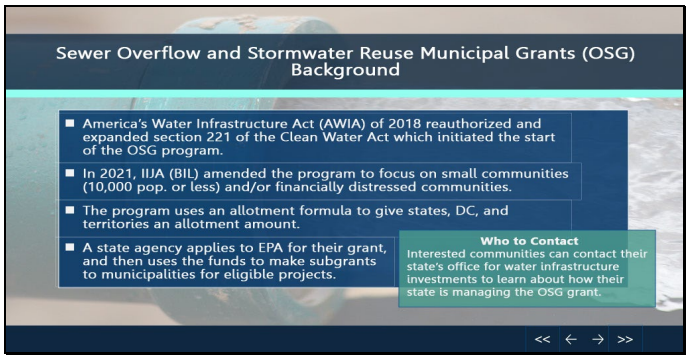
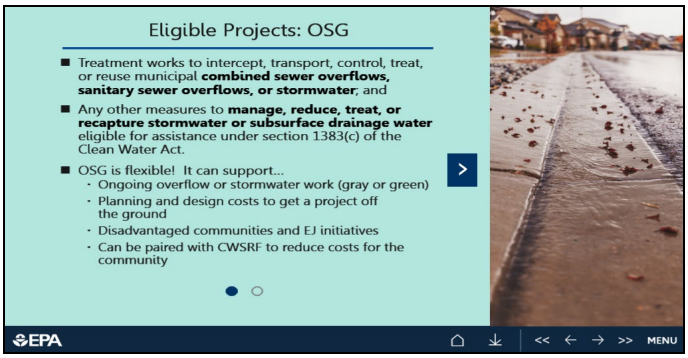


Sewer Overflow and Stormwater Reuse Municipal Grants (OSG) Background

- America's Water Infrastructure Act (AWIA) of 2018 reauthorized and expanded section 221 of the Clean Water Act which initiated the start of the OSG program.
- In 2021, IIJA (BIL) amended the program to focus on small communities (10,000 pop. or less) and/or financially distressed communities.
- The program uses an allotment formula to give states, DC, and territories an allotment amount.
- A state agency applies to EPA for their grant, and then uses the funds to make subgrants to municipalities for eligible projects.

Who to Contact

- Interested communities can contact their state's office for water infrastructure investments to learn about how their state is managing the OSG grant.



Eligible Projects: OSG

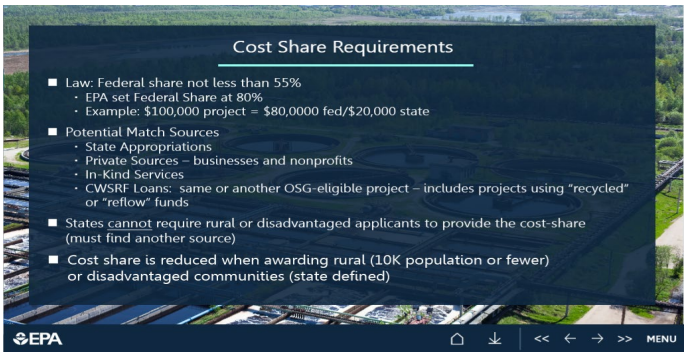
- Treatment works to intercept, transport, control, treat, or reuse municipal combined sewer overflows, sanitary sewer overflows, or stormwater; and
- Any other measures to manage, reduce, treat, or recapture stormwater or subsurface drainage water eligible for assistance under section 1383(c) of the Clean Water Act.
- OSG is flexible! It can support…
    - Ongoing overflow or stormwater work (gray or green)
    - Planning and design costs to get a project off the ground
    - Disadvantaged communities and EJ initiatives
    - Can be paired with CWSRF to reduce costs for the community
- Eligible projects may include but are not limited to:
    - Separate sanitary and storm sewers
    - Downspout disconnection
    - Overflow tanks/tunnels
    - Infiltration/inflow correction
    - Conveyance infrastructure / Sewer Pipes
    - Street Sweepers
    - Vacuum trucks
    - Green Infrastructure
    - Constructed Wetlands

Eligible Projects: Section 319

- Eligible entities may fund publicly or privately-owned projects that implement nonpoint source (NPS) management programs established under section 319.
- Projects must support the implementation of a current EPA approved state NPS management program plan or nine-element watershed-based plan
- Projects can be publicly or privately owned
- CWA section 603(c)(2) funding is for the control of NPS pollution; only projects that do not directly implement a final National Pollutant Discharge Elimination System (NPDES) permit are eligible
- EPA encourages states to work with their NPS programs to ensure that projects funded under the CWA section 319 authority are consistent with the current approved state NPS management program plan
- The vast majority of CWSRF projects are wastewater, which are not eligible for OSG.
- All OSG projects are CWSRF eligible.

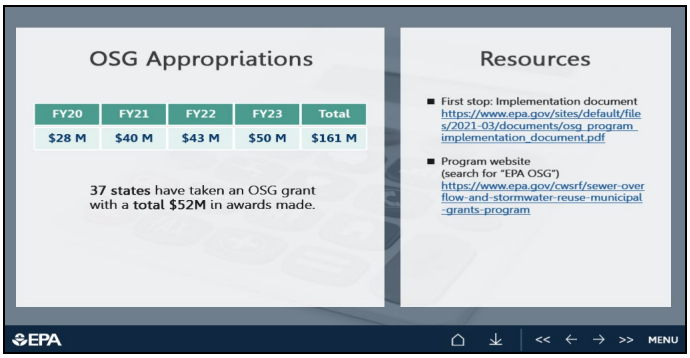
OSG Priorities

- States shall give priority to applicants that are:
    - Financially distressed communities
    - Implementing a long-term control plan for CSO or SSO
    - Requesting funding for a project on the CWSRF Intended Use Plan (IUP)
    - Alaskan Native Villages
- 20% Green Project Reserve Requirement – if no GPR projects ready to go, may still apply and submit a written plan on how you plan to target those going forward
- 25% to Rural (10k or fewer people) and/or Financially Distressed Communities
- Another consideration: Projects that are Ready-to-Proceed, as the Period of Performance is only 4 years.



Cost Share Requirements

- Law: Federal share not less than 55%
    - EPA set Federal Share at 80%
    - Example: $100,000 project = $80,0000 fed/$20,000 state
- Potential Match Sources
    - State Appropriations
    - Private Sources – businesses and nonprofits
    - In-Kind Services
    - CWSRF Loans: same or another OSG-eligible project – includes projects using "recycled" or "reflow" funds
- States cannot require rural or disadvantaged applicants to provide the cost-share (must find another source)
- Cost share is reduced when awarding rural (10K population or less) or disadvantaged communities (state defined)



OSG Appropriations

FY20 - $28 M

FY21 - $40 M

FY22 - $43 M

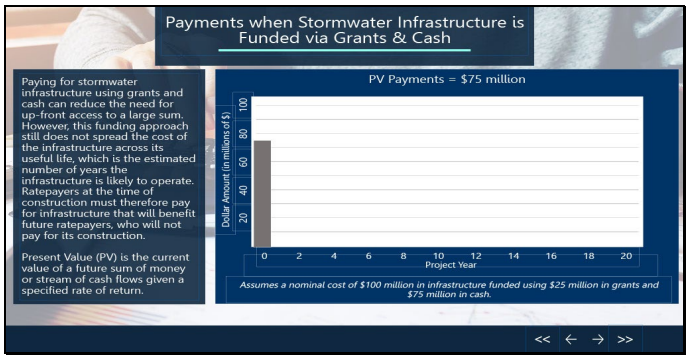
FY23 - $50 M

Total - $161 M

37 states have taken an OSG grant with a total $52M in awards made.

Resources

- First stop: Implementation document https://www.epa.gov/sites/default/files/2021-03/documents/osg_program_implementation_document.pdf
- Program website (search for "EPA OSG") https://www.epa.gov/cwsrf/sewer-overflow-and-stormwater-reuse-municipal-grants-program



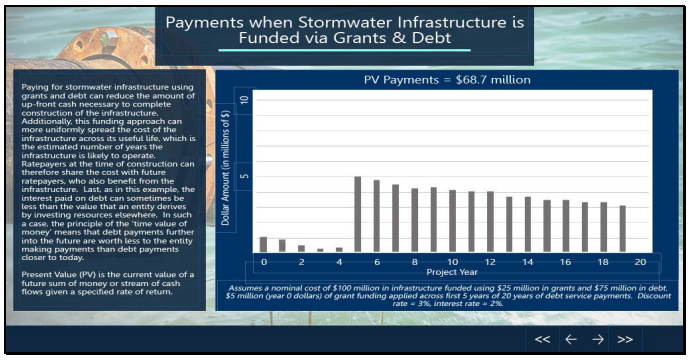
Payments when Stormwater Infrastructure is Funded via Grants & Cash

Paying for stormwater infrastructure using grants and cash can reduce the need for up-front access to a large sum. However, this funding approach still does not spread the cost of the infrastructure across its useful life, which is the estimated number of years the infrastructure is likely to operate. Ratepayers at the time of construction must therefore pay for infrastructure that will benefit future ratepayers, who will not pay for its construction.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

PV Payments = $75 million

Assumes a nominal cost of $100 million in infrastructure funded using $25 million in grants and $75 million in cash.



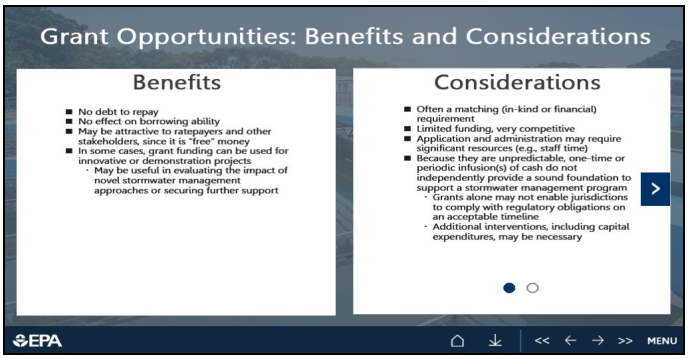
Payments when Stormwater Infrastructure is Funded via Grants & Debt

Paying for stormwater infrastructure using grants and debt can reduce the amount of up-front cash necessary to complete construction of the infrastructure. Additionally, this funding approach can more uniformly spread the cost of the infrastructure across its useful life, which is the estimated number of years the infrastructure is likely to operate. Ratepayers at the time of construction can therefore share the cost with future ratepayers, who also benefit from the infrastructure. Last, as in this example, the interest paid on debt can sometimes be less than the value that an entity derives by investing resources elsewhere. In such a case, the principle of the 'time value of money' means that debt payments further into the future are worth less to the entity making payments than debt payments closer to today.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

PV Payments = $68.7 million

Assumes a nominal cost of $100 million in infrastructure funded using $25 million in grants and $75 million in debt. $5 million (year 0 dollars) of grant funding applied across first 5 years of 20 years of debt service payments. Discount rate = 3%, interest rate = 2%.



Grant Opportunities: Benefits and Considerations

Benefits

- No debt to repay
- No effect on borrowing ability
- May be attractive to ratepayers and other stakeholders, since it is "free" money
- In some cases, grant funding can be used for innovative or demonstration projects
    - May be useful in evaluating the impact of novel stormwater management approaches or securing further support

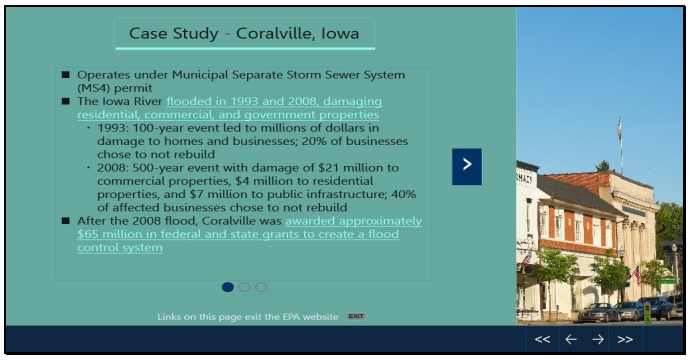
Considerations

- Often a matching (in-kind or financial) requirement
- Limited funding, very competitive
- Application and administration may require significant resources (e.g., staff time)
- Because they are unpredictable, one-time or periodic infusion(s) of cash do not independently provide a sound foundation to support a stormwater management program
    - Grants alone may not enable jurisdictions to comply with regulatory obligations on an acceptable timeline
    - Additional interventions, including capital expenditures, may be necessary
- New infrastructure, whether paid for by grants or other means, will require O&M
    - Grant recipients may need to raise additional revenue to operate and maintain new infrastructure properly, capture its full benefits, and maximize its useful life
- May be output-based, where money is spent regardless of infrastructure performance
- Sometimes limitations on how funds can be used

Grant Case Studies

Click each location to view the case study

- Coralville, Iowa
- New Orleans, Louisiana



Case Study - Coralville, Iowa

- Operates under Municipal Separate Storm Sewer System (MS4) permit
- The Iowa River flooded in 1993 and 2008, damaging residential, commercial, and government properties (https://www.press-citizen.com/story/news/2018/06/11/iowa-flood-2008-river-water-disaster/664298002/)
    - 1993: 100-year event led to millions of dollars in damage to homes and businesses; 20% of businesses chose to not rebuild
    - 2008: 500-year event with damage of $21 million to commercial properties, $4 million to residential properties, and $7 million to public infrastructure; 40% of affected businesses chose to not rebuild
- After the 2008 flood, Coralville was awarded approximately $65 million in federal and state grants to create a flood control system (https://www.coralville.org/795/Flood-Mitigation)
- Maintaining the grant-funded infrastructure, which has been tested by strong storms, is challenging, and the community has little budget for capital projects, including green infrastructure projects
- Maintenance of floodwall and stormwater pump stations accounts for 40% of total stormwater budget of $540,000, which is funded through a utility fee, property taxes, and road use taxes
- Remaining stormwater budget covers other operation and maintenance (O&M) activities and staff-related expenses
- The community is unable to meet key objectives, including maintenance of regional detention ponds, which protect residents from localized flooding driven by heavy rainfall
- Changing precipitation patterns, including more intense storms, demand additional resources to protect against flooding
- Coralville projects that ongoing maintenance requirements will increase as storm events become larger and more destructive
- The community's Flood Resilience Action Plan (FRAP) (https://iowawatershedapproach.org/wp-content/uploads/2021/07/Coralville-Flood-Resilience-Action-Plan_FINAL.pdf) indicates that stormwater runoff management infrastructure is currently insufficient to manage stormwater-related flooding, which is particularly problematic in economically vulnerable areas
- The FRAP recommends that Coralville pursue additional voluntary buy-outs of particularly vulnerable properties, potentially using state or FEMA funds
- The community has integrated green infrastructure on public lands and properties, has set aside funding to offset the cost of residential property owners' investment in retrofits, and adopted a revised stormwater ordinance to better manage post-development runoff

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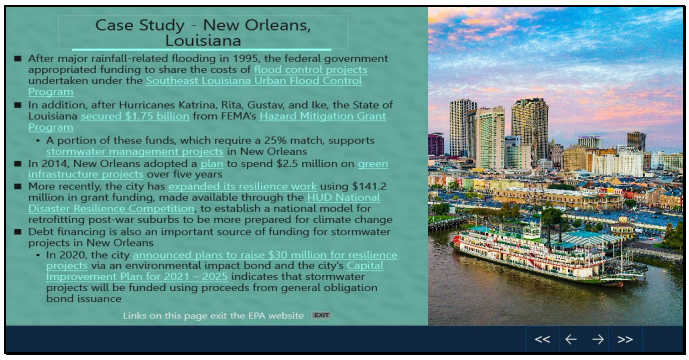

Case Study - New Orleans, Louisiana

- After major rainfall-related flooding in 1995, the federal government appropriated funding to share the costs of flood control projects (http://www.swbnosela.com/selaorleans/projects.aspx) undertaken under the Southeast Louisiana Urban Flood Control Program (http://www.swbnosela.com/selaorleans/overview.aspx)
- In addition, after Hurricanes Katrina, Rita, Gustav, and Ike, the State of Louisiana secured $1.75 billion (https://www.fema.gov/pdf/hazard/hurricane/2005katrina/la_hmgp_pa.pdf) from FEMA's Hazard Mitigation Grant Program (https://www.fema.gov/grants/mitigation)
    - A portion of these funds, which require a 25% match, supports stormwater management projects (https://nola.gov/resilience-sustainability/(hmgp)-stormwater-projects/) in New Orleans
- In 2014, New Orleans adopted a plan (https://www.swbno.org/documents/environmental/greeninfrastructure/GreenInfrastructurePlan.pdf) to spend $2.5 million on green infrastructure projects (https://www.swbno.org/Projects/InteractiveGuideToGreenInfrastructure) over five years
- More recently, the city has expanded its resilience work (https://nola.gov/resilience-sustainability/gentilly-resilience-district/) using $141.2 million in grant funding, made available through the HUD National Disaster Resilience Competition (https://www.hud.gov/sites/documents/NDRCGRANTPROF.PDF), to establish a national model for retrofitting post-war suburbs to be more prepared for climate change
- Debt financing is also an important source of funding for stormwater projects in New Orleans
    - In 2020, the city announced plans to raise $30 million for resilience projects (https://dxc.news/DXC/article/6C871714-mrcti-award-helps-move-city-of-new-orleans-toward-environmental-impact-bond-for-green-infrastructure) via an environmental impact bond and the city's Capital Improvement Plan for 2021 – 2025 (https://www.nola.gov/nola/media/City-Planning/2021-2025-Capital-Improvement-Plan-ADOPTED_2.pdf) indicates that stormwater projects will be funded using proceeds from general obligation bond issuance

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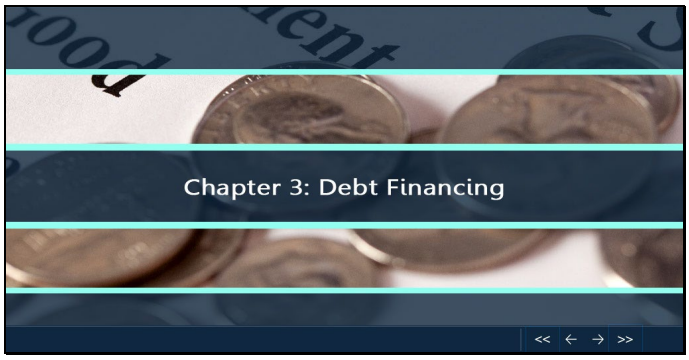
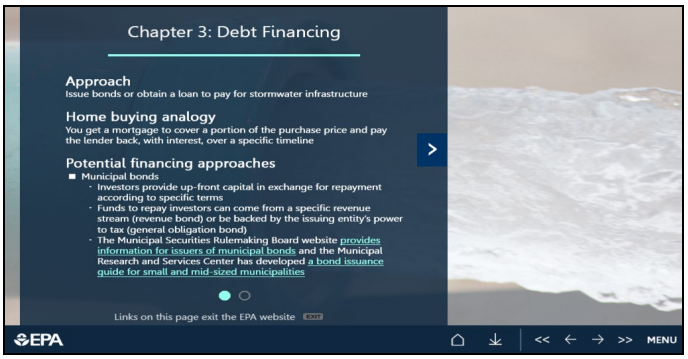


Chapter 3: Debt Financing



Chapter 3: Debt Financing

Approach

- Issue bonds or obtain a loan to pay for stormwater infrastructure

Home buying analogy

- You get a mortgage to cover a portion of the purchase price and pay the lender back, with interest, over a specific timeline

Potential financing approaches

- Municipal bonds
    - Investors provide up-front capital in exchange for repayment according to specific terms
    - Funds to repay investors can come from a specific revenue stream (revenue bond) or be backed by the issuing entity's power to tax (general obligation bond)
    - The Municipal Securities Rulemaking Board website provides information for issuers of municipal bonds (https://www.msrb.org/sites/default/files/MSRBSixThingstoKnow.pdf) and the Municipal Research and Services Center has developed a bond issuance guide for small and mid-sized municipalities (https://mrsc.org/getmedia/f32730ac-c814-444f-90d6-550db9443562/BondIssueGuide.aspx)
- Loans
    - EPA's Water Infrastructure Finance and Innovation Act (WIFIA) (https://www.epa.gov/wifia) program and CWSRF (https://www.epa.gov/cwsrf)
    - USDA's Rural Development Water & Waste Disposal Loan Guarantee program (https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-loan-guarantees), which guarantees private loans
    - Details on government loan programs, including a learning module on the State Revolving Fund (https://ordspub.epa.gov/ords/wfc/f?p=165:9:2553133747192:::9:P9_MODULE:SRF_101), can be found through EPA's Water Finance Clearinghouse (https://ordspub.epa.gov/ords/wfc/f?p=WFC:12)

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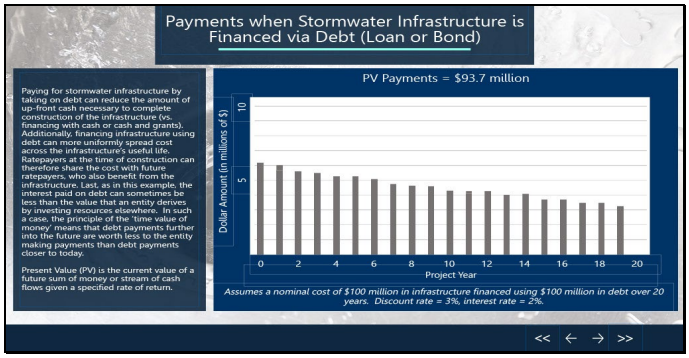


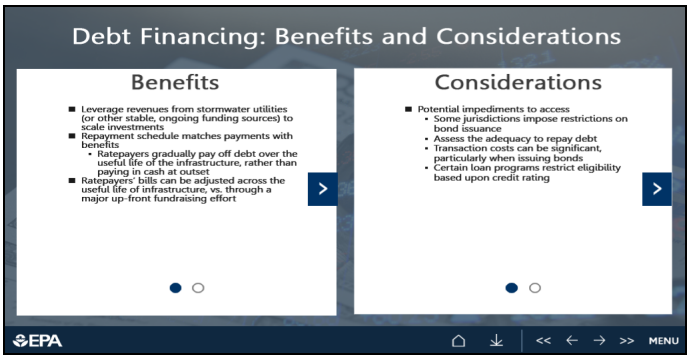
Payments when Stormwater Infrastructure is Financed via Debt (Loan or Bond)

Paying for stormwater infrastructure by taking on debt can reduce the amount of up-front cash necessary to complete construction of the infrastructure (vs. financing with cash or cash and grants). Additionally, financing infrastructure using debt can more uniformly spread cost across the infrastructure's useful life. Ratepayers at the time of construction can therefore share the cost with future ratepayers, who also benefit from the infrastructure. Last, as in this example, the interest paid on debt can sometimes be less than the value that an entity derives by investing resources elsewhere. In such a case, the principle of the 'time value of money' means that debt payments further into the future are worth less to the entity making payments than debt payments closer to today.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

PV Payments = $93.7 million

Assumes a nominal cost of $100 million in infrastructure financed using $100 million in debt over 20 years. Discount rate = 3%, interest rate = 2%.



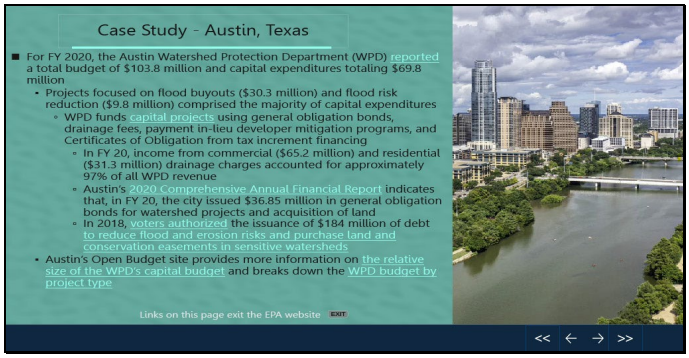
Debt Financing: Benefits and Considerations

Benefits

- Leverage revenues from stormwater utilities (or other stable, ongoing funding sources) to scale investments
- Repayment schedule matches payments with benefits
    - Ratepayers gradually pay off debt over the useful life of the infrastructure, rather than paying in cash at outset
- Ratepayers' bills can be adjusted across the useful life of infrastructure, vs. through a major up-front fundraising effort
- Flexibility
    - Funding from the Clear Water State Revolving Fund (CWSRF) can be used to fund a wide variety of stormwater infrastructure (https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-stormwater)
    - CWSRF funds can also be used to fund watershed management activities through sponsorship lending; this and other nontraditional uses of CWSRF funds are discussed in EPA's Financing Options for Nontraditional Eligibilities in the Clean Water State Revolving Fund Programs (https://www.epa.gov/sites/default/files/2017-05/documents/financing_options_for_nontraditional_eligibilities_final.pdf)
    - Some jurisdictions use tax increment financing (https://www.fhwa.dot.gov/ipd/pdfs/fact_sheets/program_value_cap_tax_increment_financing.pdf), borrowing against expected additional tax revenue after project completion, to support infrastructure investment

Considerations

- Potential impediments to access
    - Some jurisdictions impose restrictions on bond issuance
    - Assess the adequacy to repay debt
    - Transaction costs can be significant, particularly when issuing bonds
    - Certain loan programs restrict eligibility based upon credit rating
- Output-based: community must service entirety of debt, regardless of infrastructure's performance
- Cost of debt (i.e., interest rate)
    - Are low-cost government-subsidized options available?
    - Are private entities willing to lend at attractive rates?
- Potential impact on ability to borrow additional funds



Case Study - Austin, Texas

- For FY 2020, the Austin Watershed Protection Department (WPD) reported (https://www.austintexas.gov/sites/default/files/files/Watershed/flyers/2020_WPD_AnnualReport.pdf) a total budget of $103.8 million and capital expenditures totaling $69.8 million
    - Projects focused on flood buyouts ($30.3 million) and flood risk reduction ($9.8 million) comprised the majority of capital expenditures
        - WPD funds capital projects (https://capitalprojects.austintexas.gov/projects?categoryId=Water:Stormwater&tab=projects) using general obligation bonds, drainage fees, payment in-lieu developer mitigation programs, and Certificates of Obligation from tax increment financing
            - In FY 20, income from commercial ($65.2 million) and residential ($31.3 million) drainage charges accounted for approximately 97% of all WPD revenue
            - Austin's 2020 Comprehensive Annual Financial Report (https://assets.austintexas.gov/financeonline/downloads/comprehensive_annual_financial_report/comprehensive_annual_financial_report_2020.pdf) indicates that, in FY 20, the city issued $36.85 million in general obligation bonds for watershed projects and acquisition of land
            - In 2018, voters authorized (https://www.austintexas.gov/department/2018-bond-our-community-our-future) the issuance of $184 million of debt to reduce flood and erosion risks and purchase land and conservation easements in sensitive watersheds (https://www.austintexas.gov/sites/default/files/files/Finance/CFO/2018-Bond/Prop_D_Flood_Mitigation_et_al.pdf)
    - Austin's Open Budget site provides more information on the relative size of the WPD's capital budget (http://budget.austintexas.gov/#!/year/All%20Years/capital/0/fdu_sponsor_department?vis=pieChart) and breaks down the WPD budget by project type (http://budget.austintexas.gov/#!/year/All%20Years/capital/0/fdu_sponsor_department/Watershed+Protection/0/project_name?vis=pieChart)

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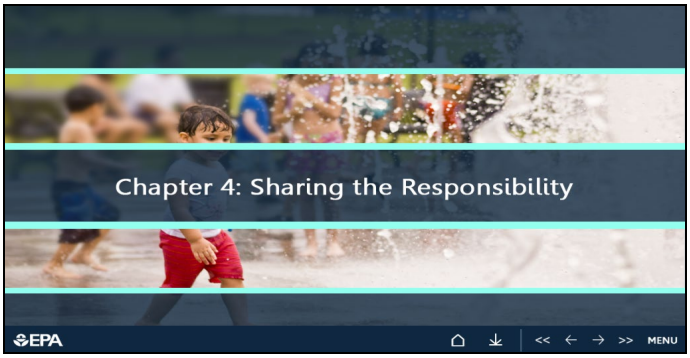
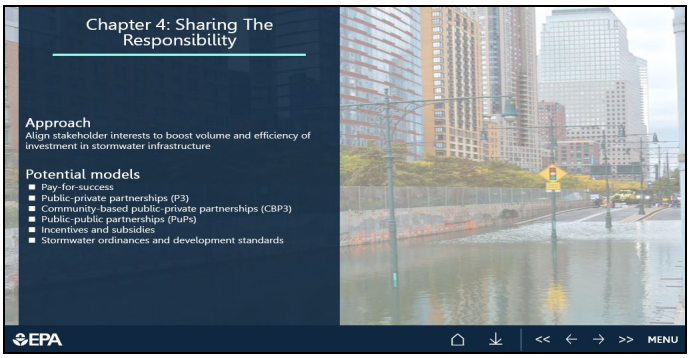


Chapter 4: Sharing the Responsibility



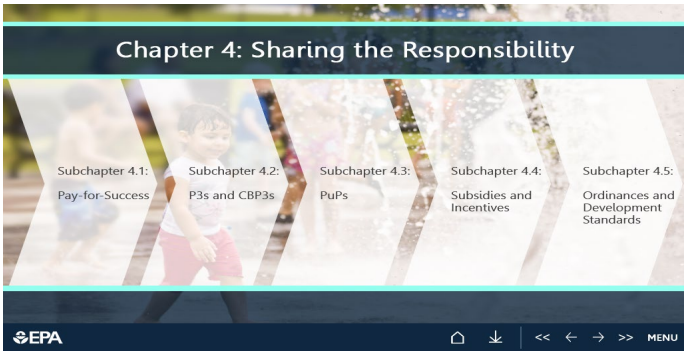
Chapter 4: Sharing The Responsibility

Approach

Align stakeholder interests to boost volume and efficiency of investment in stormwater infrastructure

Potential models

- Pay-for-success
- Public-private partnerships (P3)
- Community-based public-private partnerships (CBP3)
- Public-public partnerships (PuPs)
- Incentives and subsidies
- Stormwater ordinances and development standards



Chapter 4: Sharing the Responsibility

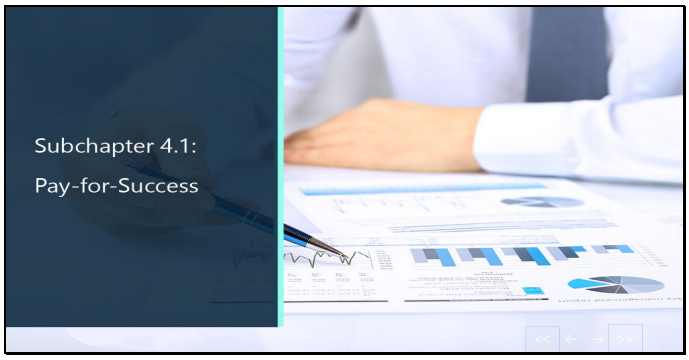
Subchapter 4.1: Pay-for-Success

Subchapter 4.2: P3s and CBP3s

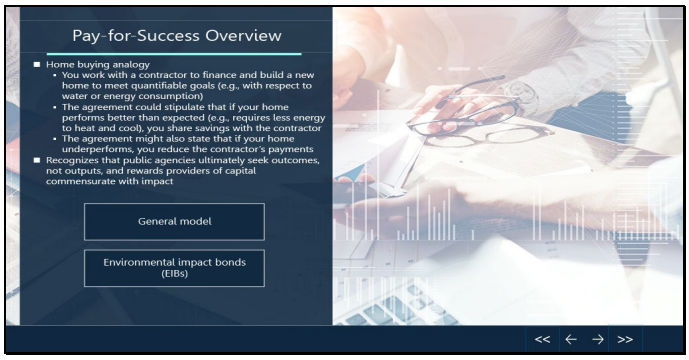
Subchapter 4.3: PuPs

Subchapter 4.4: Subsidies and Incentives

Subchapter 4.5: Ordinances and Development Standards



Subchapter 4.1: Pay-for-Success



Pay-for-Success Overview

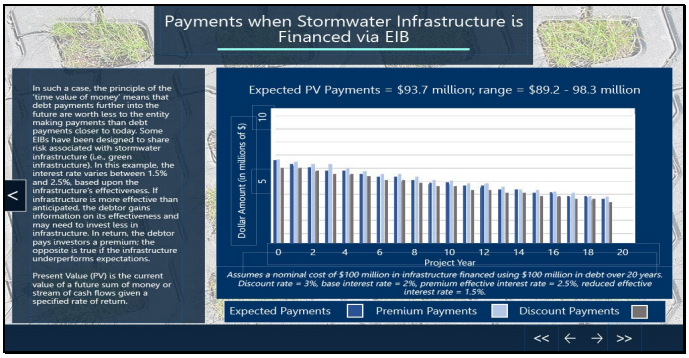
- Home buying analogy
    - You work with a contractor to finance and build a new home to meet quantifiable goals (e.g., with respect to water or energy consumption)
    - The agreement could stipulate that if your home performs better than expected (e.g., requires less energy to heat and cool), you share savings with the contractor
    - The agreement might also state that if your home underperforms, you reduce the contractor's payments
- Recognizes that public agencies ultimately seek outcomes, not outputs, and rewards providers of capital commensurate with impact

General model

- Payor (e.g., public agency) identifies desired outcome(s)
- Investors provide capital to implement interventions expected to generate desired outcome(s)
- Objective measurement of outcome(s)
- Payor makes payments to investors based upon outcomes and agreement

Environmental impact bonds (EIBs)

- EIBs are a relatively new tool, similar to the social impact bond (https://www.frbsf.org/community-development/publications/community-development-investment-review/2013/april/social-impact-bonds-investment-expansion-social-programs/) and Forest Resilience Bond (https://www.epa.gov/sites/default/files/2021-04/documents/forest_resilience_bond_report.pdf) models, and are one form of the pay-for-success paradigm
- Implemented in Washington, DC, Atlanta, GA, Buffalo, NY, and Hampton, VA to fund stormwater management infrastructure
- These examples highlight the degree to which it is possible to tailor the EIB model to meet the needs of individual jurisdictions



Payments when Stormwater Infrastructure is Financed via EIB

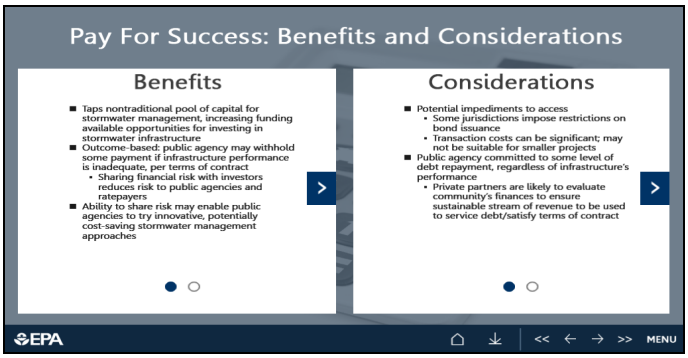
Paying for stormwater infrastructure by taking on debt can reduce the amount of up-front cash necessary to complete construction of the infrastructure (vs. financing with cash or cash and grants). Additionally, financing infrastructure using debt can more uniformly spread cost across the infrastructure's useful life. Ratepayers at the time of construction can therefore share the cost with future ratepayers who also benefit from the infrastructure. Lastly, as in this example, the interest paid on debt can sometimes be less than the value that an entity derives by investing resources elsewhere.

In such a case, the principle of the 'time value of money' means that debt payments further into the future are worth less to the entity making payments than debt payments closer to today. Some EIBs have been designed to share risk associated with stormwater infrastructure (i.e., green infrastructure). In this example, the interest rate varies between 1.5% and 2.5%, based upon the infrastructure's effectiveness. If infrastructure is more effective than anticipated, the debtor gains information on its effectiveness and may need to invest less in infrastructure. In return, the debtor pays investors a premium; the opposite is true if the infrastructure underperforms expectations.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

Expected PV Payments = $93.7 million; range = $89.2 - 98.3 million

Assumes a nominal cost of $100 million in infrastructure financed using $100 million in debt over 20 years. Discount rate = 3%, base interest rate = 2%, premium effective interest rate = 2.5%, reduced effective interest rate = 1.5%.



Pay For Success: Benefits and Considerations

Benefits

- Taps nontraditional pool of capital for stormwater management, increasing funding available opportunities for investing in stormwater infrastructure
- Outcome-based: public agency may withhold some payment if infrastructure performance is inadequate, per terms of contract
    - Sharing financial risk with investors reduces risk to public agencies and ratepayers
- Ability to share risk may enable public agencies to try innovative, potentially cost-saving stormwater management approaches
- Latitude for identifying appropriate success metrics and developing risk-share agreement
- Potential to identify additional beneficiaries of infrastructure, identify desirable outcomes/thresholds, measure, and tap additional sources of revenue
    - Example: Stormwater infrastructure can reduce the frequency and severity of flood events. If flood reduction can be shown to reduce capital or operating costs to, for example, public transit agencies, there may be an opportunity to apply transit funds to stormwater infrastructure, spreading the costs across more than one public agency.

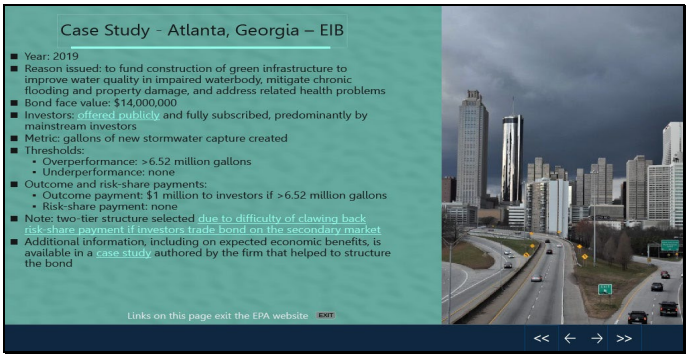
Considerations

- Potential impediments to access
    - Some jurisdictions impose restrictions on bond issuance
    - Transaction costs can be significant; may not be suitable for smaller projects
- Public agency committed to some level of debt repayment, regardless of infrastructure's performance
    - Private partners are likely to evaluate community's finances to ensure sustainable stream of revenue to be used to service debt/satisfy terms of contract
- Although model can be used to shift financial risk, compliance-related risk is not transferrable
- Cost of debt (i.e., interest rate)
    - Are low-cost government-subsidized options available? How does the cost of private money compare?
- Potential impact on ability to borrow additional funds

Pay-for-Success Case Studies

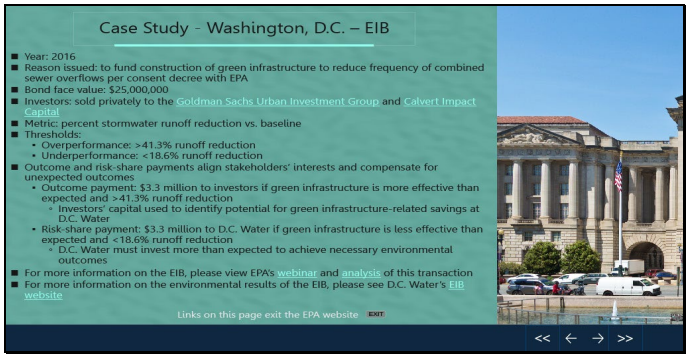
Click each location to view the case study

- Atlanta, Georgia
- Hampton, Virginia
- Washington, D.C.
- Principio Creek Watershed, Maryland



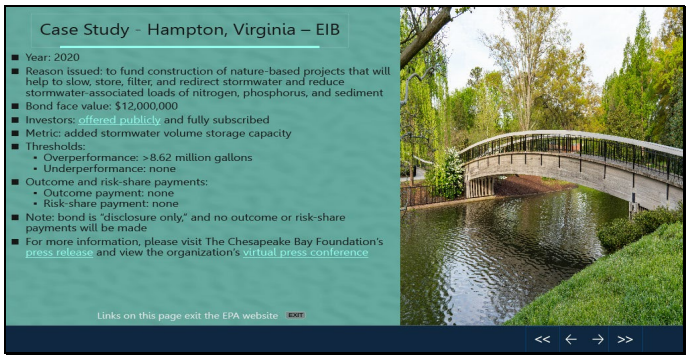
Case Study - Atlanta, Georgia – EIB

- Year: 2019
- Reason issued: to fund construction of green infrastructure to improve water quality in impaired waterbody, mitigate chronic flooding and property damage, and address related health problems
- Bond face value: $14,000,000
- Investors: offered publicly (https://www.prnewswire.com/news-releases/quantified-ventures-announces-first-publicly-issued-environmental-impact-bond-for-city-of-atlanta-department-of-watershed-management-300800036.html) and fully subscribed, predominantly by mainstream investors
- Metric: gallons of new stormwater capture created
- Thresholds:
    - Overperformance: >6.52 million gallons
    - Underperformance: none
- Outcome and risk-share payments:
    - Outcome payment: $1 million to investors if >6.52 million gallons
    - Risk-share payment: none
- Note: two-tier structure selected due to difficulty of clawing back risk-share payment if investors trade bond on the secondary market (https://conservationfinancenetwork.org/2019/06/24/atlanta-environmental-impact-bond-breaks-into-public-market)
- Additional information, including on expected economic benefits, is available in a case study (https://static1.squarespace.com/static/5d5b210885b4ce0001663c25/t/5e136bad70b78f691391cf07/1578331071956/Atlanta+Case+Study_Quantified+Ventures) authored by the firm that helped to structure the bond



Case Study - Washington, D.C. – EIB

- Year: 2016
- Reason issued: to fund construction of green infrastructure to reduce frequency of combined sewer overflows per consent decree with EPA
- Bond face value: $25,000,000
- Investors: sold privately to the Goldman Sachs Urban Investment Group (https://www.goldmansachs.com/media-relations/press-releases/current/dc-water-environmental-impact-bond-fact-sheet.pdf) and Calvert Impact Capital (https://calvertimpact.org/resources/breaking-ground-with-dc-water)
- Metric: percent stormwater runoff reduction vs. baseline
- Thresholds:
    - Overperformance: >41.3% runoff reduction
    - Underperformance: <18.6% runoff reduction
- Outcome and risk-share payments align stakeholders' interests and compensate for unexpected outcomes
    - Outcome payment: $3.3 million to investors if green infrastructure is more effective than expected and >41.3% runoff reduction
        - Investors' capital used to identify potential for green infrastructure-related savings at D.C. Water
    - Risk-share payment: $3.3 million to D.C. Water if green infrastructure is less effective than expected and <18.6% runoff reduction
        - D.C. Water must invest more than expected to achieve necessary environmental outcomes
- For more information on the EIB, please view EPA's webinar (https://www.youtube.com/watch?v=hgHGlNjWOrI&feature=youtu.be) and analysis (https://www.epa.gov/sites/default/files/2017-04/documents/dc_waters_environmental_impact_bond_a_first_of_its_kind_final2.pdf) of this transaction
- For more information on the environmental results of the EIB, please see D.C. Water's EIB website (https://www.dcwater.com/environmental-impact-bond)



Case Study - Hampton, Virginia – EIB

- Year: 2020
- Reason issued: to fund construction of nature-based projects that will help to slow, store, filter, and redirect stormwater and reduce stormwater-associated loads of nitrogen, phosphorus, and sediment
- Bond face value: $12,000,000
- Investors: offered publicly (https://emma.msrb.org/IssueView/Details/P1407369) and fully subscribed
- Metric: added stormwater volume storage capacity
- Thresholds:
    - Overperformance: >8.62 million gallons
    - Underperformance: none
- Outcome and risk-share payments:
    - Outcome payment: none
    - Risk-share payment: none
- Note: bond is "disclosure only," and no outcome or risk-share payments will be made
- For more information, please visit The Chesapeake Bay Foundation's press release (https://www.cbf.org/news-media/newsroom/2020/virginia/city-of-hampton-fights-flooding-with-issuance-of-vas-first-eib.html) and view the organization's virtual press conference (https://www.youtube.com/watch?v=Ukgf8mvRV2o&feature=youtu.be)

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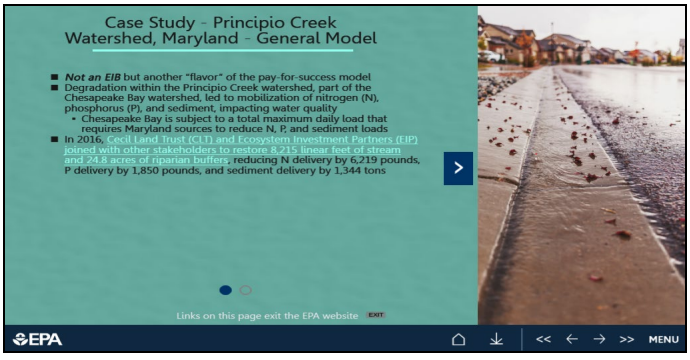
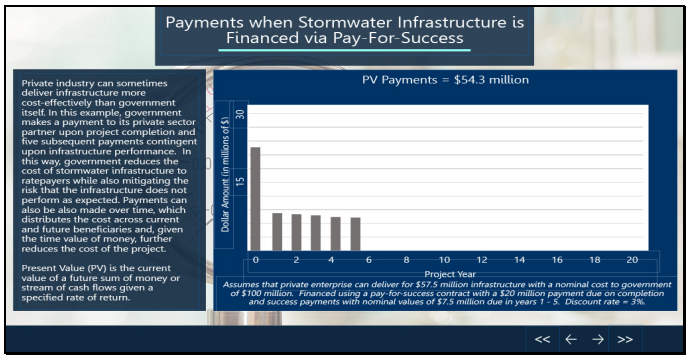


Case Study - Principio Creek Watershed, Maryland - General Model

- Not an EIB but another "flavor" of the pay-for-success model
- Degradation within the Principio Creek watershed, part of the Chesapeake Bay watershed, led to mobilization of nitrogen (N), phosphorus (P), and sediment, impacting water quality
    - Chesapeake Bay is subject to a total maximum daily load that requires Maryland sources to reduce N, P, and sediment loads
- In 2016, Cecil Land Trust (CLT) and Ecosystem Investment Partners (EIP) joined with other stakeholders to restore 8,215 linear feet of stream and 24.8 acres of riparian buffers (https://www.cecillandtrust.org/current-news/restoring-24-acres-principio-restoration-project), reducing N delivery by 6,219 pounds, P delivery by 1,850 pounds, and sediment delivery by 1,344 tons
- CLT facilitated access to private property on which restoration work was conducted, managed the project, and will conduct long-term stewardship; EIP provided private capital; a private contractor conducted restoration activities; and the Maryland Department of Natural Resources (MDNR) evaluated the restoration outcomes prior to paying for the work
- Upon completion:
    - CLT advanced its mission of protecting Cecil County's lands and waters and received an administrative fee from MDNR
    - EIP was paid a fixed fee by MDNR after restoration complete and is eligible for further payments, consistent with restoration results
    - Cecil County gained credit for the water quality benefits of the project
    - MDNR (and taxpayers) paid less than half of what State government typically pays for equivalent water quality improvement (https://www.chesapeakeconservancy.org/conservation-innovation-center/consulting-services/supporting-pay-for-success/)
- For more information, consult the Environmental Policy Innovation Center's discussion of this project (https://sandcountyfoundation.org/uploads/SCF_2017_EPIC_DOC_SMFL.pdf)



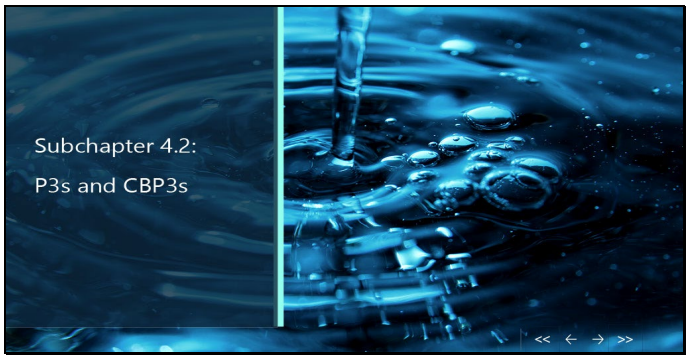
Payments when Stormwater Infrastructure is Financed via Pay-For-Success

Private industry can sometimes deliver infrastructure more cost-effectively than government itself. In this example, government makes a payment to its private sector partner upon project completion and five subsequent payments contingent upon infrastructure performance. In this way, government reduces the cost of stormwater infrastructure to ratepayers while also mitigating the risk that the infrastructure does not perform as expected. Payments can also be also made over time, which distributes the cost across current and future beneficiaries and, given the time value of money, further reduces the cost of the project.

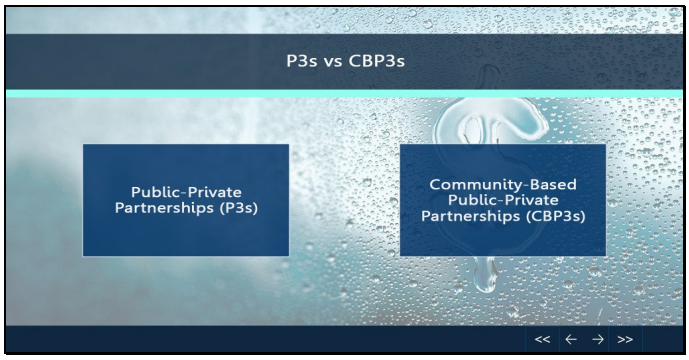
Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

PV Payments = $54.3 million

Assumes that private enterprise can deliver for $57.5 million infrastructure with a nominal cost to government of $100 million. Financed using a pay-for-success contract with a $20 million payment due on completion and success payments with nominal values of $7.5 million due in years 1 - 5. Discount rate = 3%.



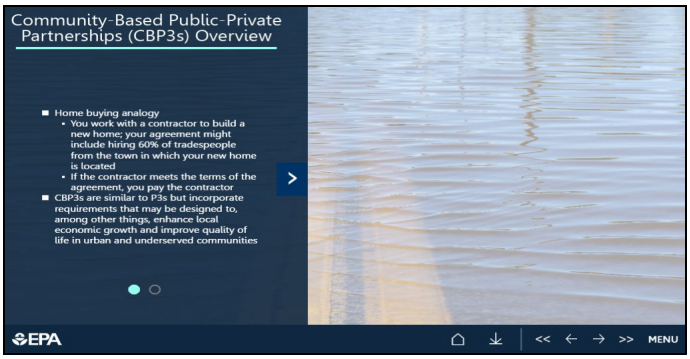
Subchapter 4.2: P3s and CBP3s



P3s vs CBP3s

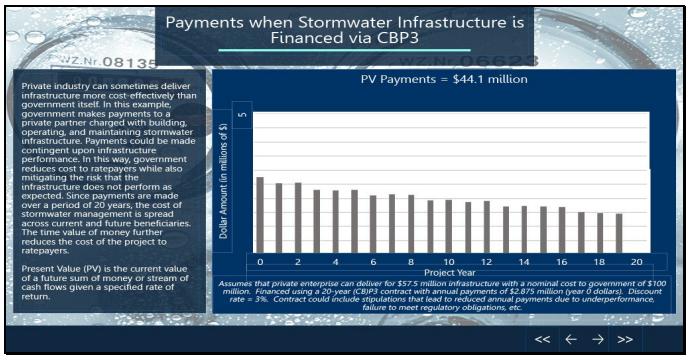
Public-Private Partnerships (P3s)

Community-Based Public-Private Partnerships (CBP3s)



Community-Based Public-Private Partnerships (CBP3s) Overview

- Home buying analogy
    - You work with a contractor to build a new home; your agreement might include hiring 60% of tradespeople from the town in which your new home is located
    - If the contractor meets the terms of the agreement, you pay the contractor
- CBP3s are similar to P3s but incorporate requirements that may be designed to, among other things, enhance local economic growth and improve quality of life in urban and underserved communities
- Public agencies, for example, can build into contracting documents requirements related to the use of local, small, women-, or minority-owned subcontractors, ensuring that investments in a community's physical infrastructure also provide specific social and economic benefits
    - Contract could require that green infrastructure installation and maintenance activities are conducted as part of a green infrastructure job training program to support under- or unemployed members of the community
- For additional information on the CBP3 model, please consult EPA's Community-Based Public-Private Partnerships (CBP3s) and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure (https://www.epa.gov/sites/default/files/2015-12/documents/gi_cb_p3_guide_epa_r3_final_042115_508.pdf)



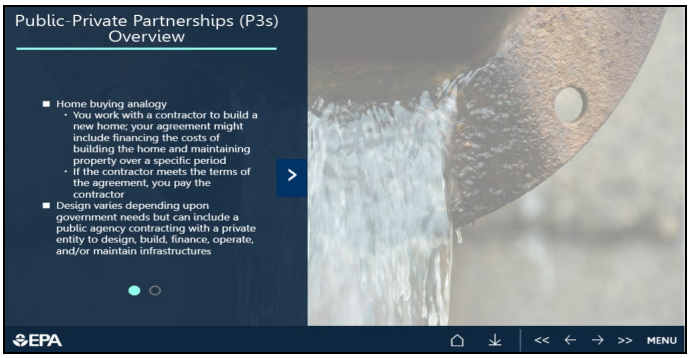
Payments when Stormwater Infrastructure is Financed via CBP3

Private industry can sometimes deliver infrastructure more cost-effectively than government itself. In this example, government makes payments to a private partner charged with building, operating, and maintaining stormwater infrastructure. Payments could be made contingent upon infrastructure performance. In this way, government reduces cost to ratepayers while also mitigating the risk that the infrastructure does not perform as expected. Since payments are made over a period of 20 years, the cost of stormwater management is spread across current and future beneficiaries. The time value of money further reduces the cost of the project to ratepayers.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

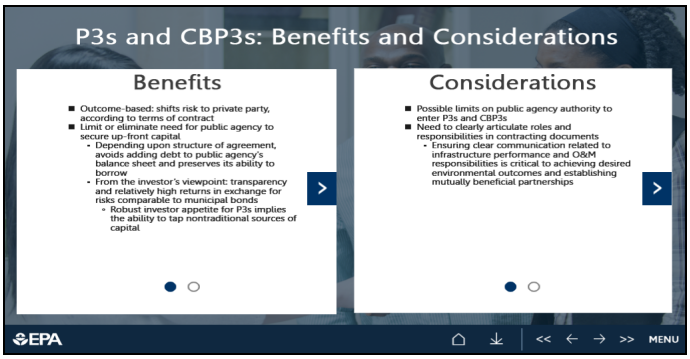
PV Payments = $44.1 million

Assumes that private enterprise can deliver for $57.5 million infrastructure with a nominal cost to government of $100 million. Financed using a 20-year (CB)P3 contract with annual payments of $2.875 million (year 0 dollars). Discount rate = 3%. Contract could include stipulations that lead to reduced annual payments due to underperformance, failure to meet regulatory obligations, etc.



Public-Private Partnerships (P3s) Overview

- Home buying analogy
    - You work with a contractor to build a new home; your agreement might include financing the costs of building the home and maintaining property over a specific period
    - If the contractor meets the terms of the agreement, you pay the contractor
- Design varies depending upon government needs but can include a public agency contracting with a private entity to design, build, finance, operate, and/or maintain infrastructures
- EPA's Water Infrastructure and Resiliency Finance Center partnered with the Environmental Finance Center at the University of North Carolina to provide information, including nine case studies, related to the use of P3s in water and wastewater infrastructure (https://efc.sog.unc.edu/resource/alternative-water-project-delivery-models/)
- In addition, EPA's Environmental Financial Advisory Board developed A Decision-Maker's Guide to Alternative Service Delivery Options for Public Utility Projects (https://www.epa.gov/sites/default/files/2019-12/documents/a_decision-makers_guide_to_alternative_service_delivery_options_for_public_utility_projects_june_4_2019.pdf) for use by local governments evaluating financing options for infrastructure projects and EPA is developing a learning module dedicated to providing additional information on Alternative Service Delivery

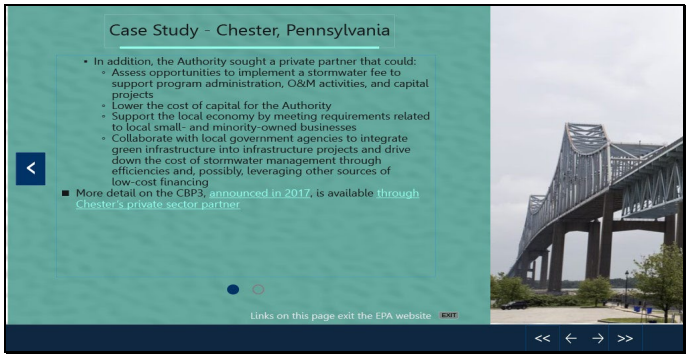


P3s and CBP3s: Benefits and Considerations

- Outcome-based: shifts risk to private party, according to terms of contract
- Limit or eliminate need for public agency to secure up-front capital
    - Depending upon structure of agreement, avoids adding debt to public agency's balance sheet and preserves its ability to borrow
    - From the investor's viewpoint: transparency and relatively high returns in exchange for risks comparable to municipal bonds
        - Robust investor appetite for P3s implies the ability to tap nontraditional sources of capital
- May improve access to resources (e.g., technology, expertise, capital)
    - Potential for private partner to leverage expertise to further reduce costs, particularly if engaged to build, operate, and maintain infrastructure
- CBP3s can be leveraged to achieve both physical infrastructure and social goals
- Potential for economies of scale and related savings
- Potential to site stormwater infrastructure on properties that the public agency alone would have trouble accessing due to contracting-related or other restrictions
- Potential for accelerated deployment of infrastructure
- Potential for turnkey solutions to municipalities'/utilities' compliance challenges

Considerations

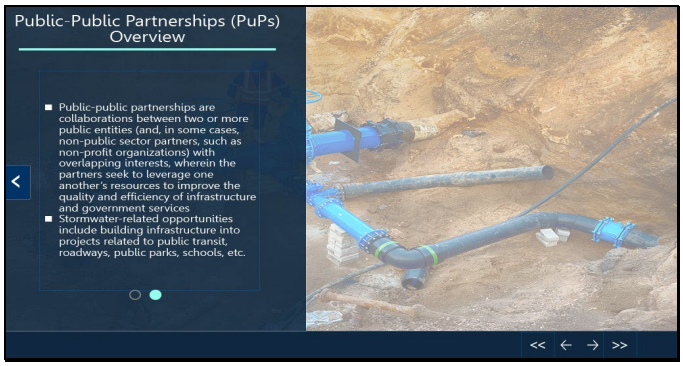
- Possible limits on public agency authority to enter P3s and CBP3s
- Need to clearly articulate roles and responsibilities in contracting documents
    - Ensuring clear communication related to infrastructure performance and O&M responsibilities is critical to achieving desired environmental outcomes and establishing mutually beneficial partnerships
- Green infrastructure has been used for over a decade now to provide multiple benefits simultaneously, but is newer than gray infrastructure
    - Green infrastructure's performance may be inherently more variable than gray infrastructure, and shifting patterns of precipitation may contribute to variability
        - Private partners may perceive additional risk in green infrastructure-based stormwater P3s/CBP3s and may seek an increased financial return in exchange for entering such an arrangement



Case Study - Chester, Pennsylvania

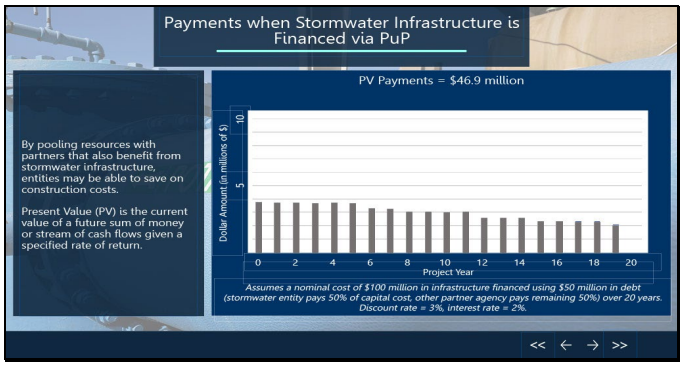
- In 2016, the Stormwater Authority of the City of Chester was established; eight months later, it solicited proposals from prospective private sector partners (https://c21714be-af0f-4071-90fd-cf1a977b3fc6.filesusr.com/ugd/fcf170_6edd1efa782a461b9938464122ef81e9.pdf) to design, build, finance, and, for 30 years, operate and maintain 350 acres of green infrastructure to meet the requirements of the City's MS4 permit
    - In its request, the Authority identified the following drivers for pursuing a private partnership:
        - Prohibitive capital cost of green infrastructure retrofits
        - Suboptimal pace of government-led green infrastructure installation
        - Limited area available for government-led retrofit projects
    - By installing green infrastructure, the Stormwater Authority hoped to:
        - Improve the physical habitat and water quality of local surface waters by reducing flow volume and pollutant loads
        - Enhance resilience to climate change and accompanying shifts in patterns of precipitation
        - Combat urban blight and improve local job opportunities (https://www.delcotimes.com/2017/06/07/stormwater-management-plan-unveiled-for-chester/#author1)
        - Meet total maximum daily load-based pollutant reduction obligations in a cost-effective manner
- In addition, the Authority sought a private partner that could:
    - Assess opportunities to implement a stormwater fee to support program administration, O&M activities, and capital projects
    - Lower the cost of capital for the Authority
    - Support the local economy by meeting requirements related to local small- and minority-owned businesses
    - Collaborate with local government agencies to integrate green infrastructure into infrastructure projects and drive down the cost of stormwater management through efficiencies and, possibly, leveraging other sources of low-cost financing
- More detail on the CBP3, announced in 2017 (https://www.corvias.com/news/new-and-exciting-community-based-public-private-partnership-cbp3-drive-economic-growth-and), is available through Chester's private sector partner (https://www.corvias.com/news/new-and-exciting-community-based-public-private-partnership-cbp3-drive-economic-growth-and)

Subchapter 4.3: Public-Public Partnerships (PuPs)



Public-Public Partnerships (PuPs) Overview

- Home buying analogy
    - You and a friend recognize that you are both looking for new homes and that many of your needs overlap
    - You decide to pool your resources and build a duplex to save on construction and maintenance costs
- Public-public partnerships are collaborations between two or more public entities (and, in some cases, non-public sector partners, such as non-profit organizations) with overlapping interests, wherein the partners seek to leverage one another's resources to improve the quality and efficiency of infrastructure and government services
- Stormwater-related opportunities include building infrastructure into projects related to public transit, roadways, public parks, schools, etc.



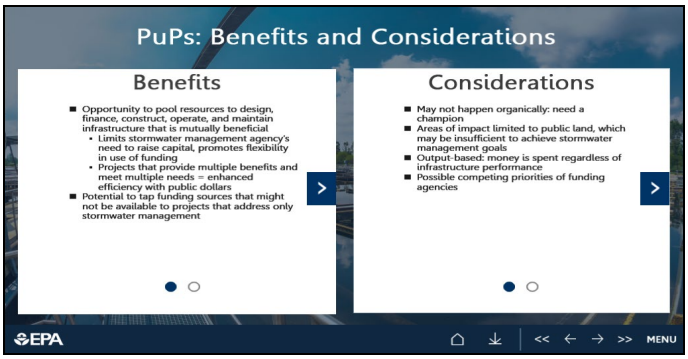
Payments when Stormwater Infrastructure is Financed via PuP

By pooling resources with partners that also benefit from stormwater infrastructure, entities may be able to save on construction costs.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

PV Payments = $46.9 million

Assumes a nominal cost of $100 million in infrastructure financed using $50 million in debt (stormwater entity pays 50% of capital cost, other partner agency pays remaining 50%) over 20 years. Discount rate = 3%, interest rate = 2%.



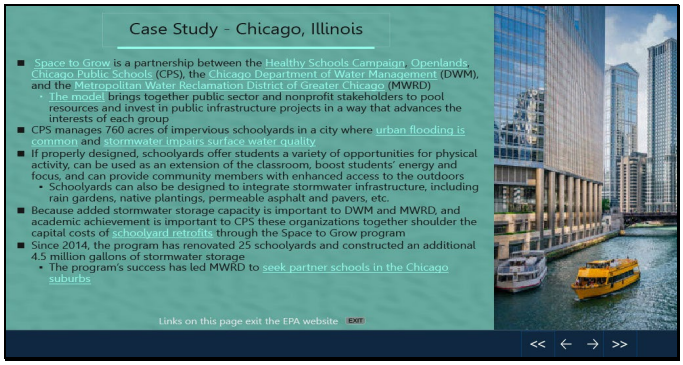
PuPs: Benefits and Considerations

Benefits

- Opportunity to pool resources to design, finance, construct, operate, and maintain infrastructure that is mutually beneficial
    - Limits stormwater management agency's need to raise capital, promotes flexibility in use of funding
    - Projects that provide multiple benefits and meet multiple needs = enhanced efficiency with public dollars
- Potential to tap funding sources that might not be available to projects that address only stormwater management
- Ability to access public land that might not otherwise be available to stormwater management agency
    - Leverage public spaces as neighborhood anchors, places where community members can connect with the natural world, and solutions to urban flooding
- Innovative partnerships may be particularly well-positioned for grant funding
- Potential reputational boost to stormwater management entities that might not otherwise be well-known

Considerations

- May not happen organically: need a champion
- Areas of impact limited to public land, which may be insufficient to achieve stormwater management goals
- Output-based: money is spent regardless of infrastructure performance
- Possible competing priorities of funding agencies
- Model and process may be unfamiliar and uncomfortable
    - How does new approach impact project delivery timeline?
    - Given relatively novel approach and possible lack of precedent, need to clearly articulate roles and responsibilities
        - Who provides capital?
        - Who manages design and construction?
        - Who funds O&M?
        - Who conducts maintenance work?
        - If a park or school is closed, will infrastructure be maintained to manage stormwater?



Case Study - Chicago, Illinois

- Space to Grow (https://www.spacetogrowchicago.org/) is a partnership between the Healthy Schools Campaign (https://healthyschoolscampaign.org/), Openlands (https://openlands.org/), Chicago Public Schools (CPS) (https://www.cps.edu/), the Chicago Department of Water Management (DWM) (https://www.chicago.gov/city/en/depts/water.html), and the Metropolitan Water Reclamation District of Greater Chicago (MWRD) (https://mwrd.org/about)
    - The model (https://www.spacetogrowchicago.org/about/our-model/) brings together public sector and nonprofit stakeholders to pool resources and invest in public infrastructure projects in a way that advances the interests of each group
- CPS manages 760 acres of impervious schoolyards in a city where urban flooding is common (https://cnt.org/urban-flooding) and stormwater impairs surface water quality (https://epa.illinois.gov/content/dam/soi/en/web/epa/documents/water/tmdl/report/lake-michigan-beaches/fact-sheet-02-28-2012.pdf)
- If properly designed, schoolyards offer students a variety of opportunities for physical activity, can be used as an extension of the classroom, boost students' energy and focus, and can provide community members with enhanced access to the outdoors
    - Schoolyards can also be designed to integrate stormwater infrastructure, including rain gardens, native plantings, permeable asphalt and pavers, etc.
- Because added stormwater storage capacity is important to DWM and MWRD, and academic achievement is important to CPS these organizations together shoulder the capital costs of schoolyard retrofits (https://www.spacetogrowchicago.org/about/school-profiles/) through the Space to Grow program
- Since 2014, the program has renovated 25 schoolyards and constructed an additional 4.5 million gallons of stormwater storage
    - The program's success has led MWRD to seek partner schools in the Chicago suburbs (https://mwrd.org/sites/default/files/2021-02/Green Schoolyard.pdf)

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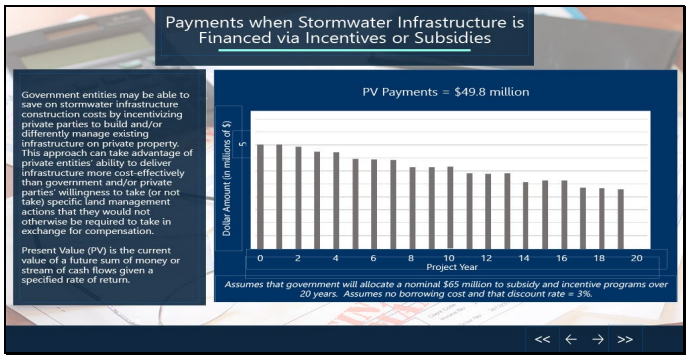
Subchapter 4.4: Subsidies and Incentives

Subsidies and Incentives Overview

- Home buying analogy
    - A family member is planning to visit for an extended period and your house isn't large enough to accommodate them. Since it is less expensive than building an addition, you lease a vacant garage apartment from a neighbor
    - In addition to making monthly rent payments, your agreement might include replacing the unreliable refrigerator and installing a new dishwasher
- Models (not necessarily mutually exclusive)
    - Public agency provides funding to offset capital costs associated with stormwater infrastructure retrofit on private property
    - Public agency provides financial benefits (e.g., reduced stormwater utility fee) to private property owners in exchange for installation of stormwater controls (e.g., reduction of impervious area)
    - May include formal agreement with public agency (e.g., easement) to document rights and responsibilities associated with installation and/or maintenance of stormwater infrastructure



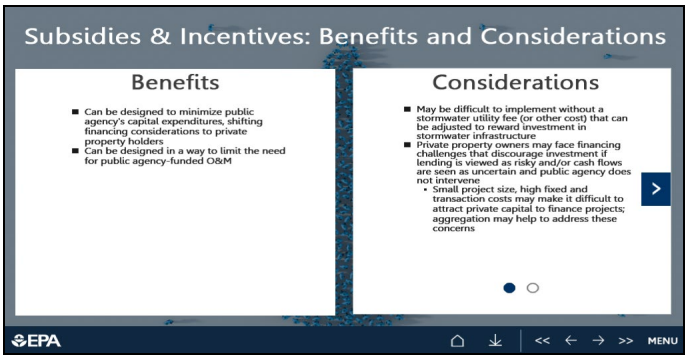
Payments when Stormwater Infrastructure is Financed via Incentives or Subsidies

Government entities may be able to save on stormwater infrastructure construction costs by incentivizing private parties to build and/or differently manage existing infrastructure on private property. This approach can take advantage of private entities' ability to deliver infrastructure more cost-effectively than government and/or private parties' willingness to take (or not take) specific land management actions that they would not otherwise be required to take in exchange for compensation.

Present Value (PV) is the current value of a future sum of money or stream of cash flows given a specified rate of return.

PV Payments = $49.8 million

Assumes that government will allocate a nominal $65 million to subsidy and incentive programs over 20 years. Assumes no borrowing cost and that discount rate = 3%.



Subsidies & Incentives: Benefits and Considerations

Benefits

- Can be designed to minimize public agency's capital expenditures, shifting financing considerations to private property holders
- Can be designed in a way to limit the need for public agency-funded O&M

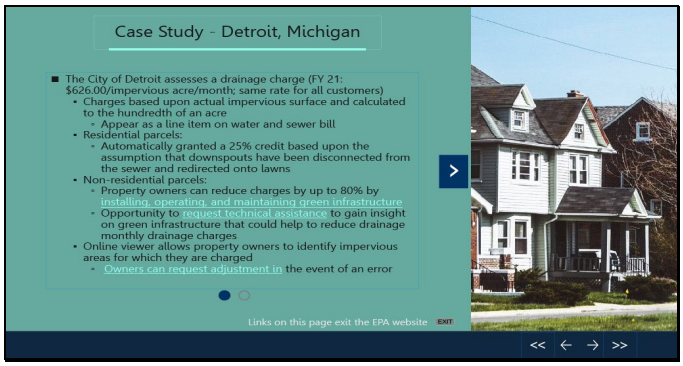
Considerations

- May be difficult to implement without a stormwater utility fee (or other cost) that can be adjusted to reward investment in stormwater infrastructure
- Private property owners may face financing challenges that discourage investment if lending is viewed as risky and/or cash flows are seen as uncertain and public agency does not intervene
    - Small project size, high fixed and transaction costs may make it difficult to attract private capital to finance projects; aggregation may help to address these concerns
- Decentralized infrastructure on private property may limit oversight capacity and compromise public agency’s ability to assess whether private parties are conducting appropriate maintenance
- Output-based: money is spent regardless of infrastructure’s performance

Subsidies and Incentives Case Studies

Click each location to view the case study

- Detroit, Michigan
- New York City, New York
- Seattle, Washington



Case Study - Detroit, Michigan

- The City of Detroit assesses a drainage charge (FY 21: $626.00/impervious acre/month; same rate for all customers)
    - Charges based upon actual impervious surface and calculated to the hundredth of an acre
        - Appear as a line item on water and sewer bill
    - Residential parcels:
        - Automatically granted a 25% credit based upon the assumption that downspouts have been disconnected from the sewer and redirected onto lawns
    - Non-residential parcels:
        - Property owners can reduce charges by up to 80% by installing, operating, and maintaining green infrastructure (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/A%20Guide%20to%20Drainage%20Charge%20Credits_0.pdf)
        - Opportunity to request technical assistance (https://app.smartsheet.com/b/form/1bf859ad76e7477c99debf8be03704c5) to gain insight on green infrastructure that could help to reduce drainage monthly drainage charges
    - Online viewer allows property owners to identify impervious areas for which they are charged
        - Owners can request adjustment in (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/Drainage%20Charge%20Adjustment%20Application%20-%20WRITEABLE%20January2018.pdf) the event of an error
- Capital Partnership Program (CPP) (https://detroitmi.gov/departments/water-and-sewerage-department/dwsd-projects/stormwater-management-and-drainage-charge/capital-partnership-program)
    - $5 million/year to fund up to 50% of capital costs (maximum: $50,000) associated with installation of approved green infrastructure on non-residential properties
    - Under CPP agreement (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/Sample%20DWSD%20Capital%20Partnership%20Program%20Agreement%20-%2001292019.pdf), property owner commits to 20 years of maintenance
    - A restrictive covenant (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/DWSD%20CPP%20DECLARATION%20OF%20RESTRICTIVE%20COVENANT%20-%20Revised%20Draft%2006252019.pdf)
    - and easement (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/Stormwater%20Management%20Easement%20-%20Revised%20Draft%20062519.pdf) must be filed
- Shared Stormwater Management Practice
    - Water and Sewerage Department can approve an application to secure drainage charge credit using off-site green infrastructure (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-

07/Shared%20Stomwater%20Practice%20Credit%20Application%20Form_4-15-2019.pdf), providing more flexibility and enabling property owners to make more efficient investments in stormwater control

- Off-site stormwater management approaches are discussed later in this module

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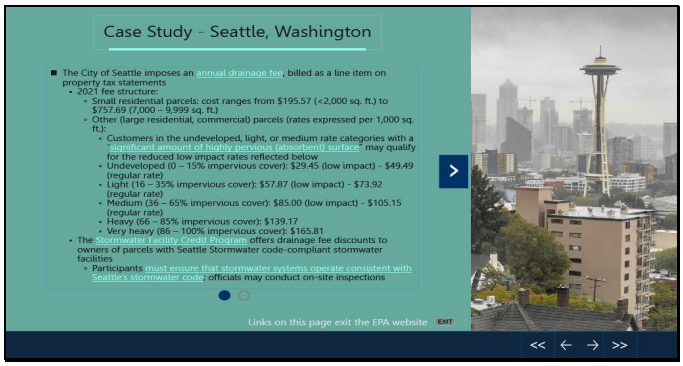

Case Study - Seattle, Washington

- The City of Seattle imposes an annual drainage fee (https://www.seattle.gov/utilities/your-services/accounts-and-payments/rates/drainage), billed as a line item on property tax statements
    - 2021 fee structure:
        - Small residential parcels: cost ranges from $195.57 (<2,000 sq. ft.) to $757.69 (7,000 – 9,999 sq. ft.)
        - Other (large residential, commercial) parcels (rates expressed per 1,000 sq. ft.):
            - Customers in the undeveloped, light, or medium rate categories with a "significant amount of highly pervious (absorbent) surface" (https://www.seattle.gov/utilities/your-services/accounts-and-payments/rates/drainage/understanding-your-drainage-bill) may qualify for the reduced low impact rates reflected below
            - Undeveloped (0 – 15% impervious cover): $29.45 (low impact) - $49.49 (regular rate)
            - Light (16 – 35% impervious cover): $57.87 (low impact) - $73.92 (regular rate)
            - Medium (36 – 65% impervious cover): $85.00 (low impact) - $105.15 (regular rate)
            - Heavy (66 – 85% impervious cover): $139.17
            - Very heavy (86 – 100% impervious cover): $165.81
    - The Stormwater Facility Credit Program (https://www.seattle.gov/utilities/your-services/discounts-and-incentives/stormwater-facility-credit) offers drainage fee discounts to owners of parcels with Seattle Stormwater code-compliant stormwater facilities
        - Participants must ensure that stormwater systems operate consistent with Seattle's stormwater code (https://www.seattle.gov/Documents/Departments/SPU/SFCPFlyer.pdf); officials may conduct on-site inspections
- The Rainwise program (https://700milliongallons.org/rainwise/) provides rebates of up to 100% of the cost of installing cisterns or rain gardens on residential parcels within eligible combined sewer-served parts of Seattle
    - Seattle offers several financial assistance programs to minimize up-front costs and ensure that the program reaches the widest audience possible

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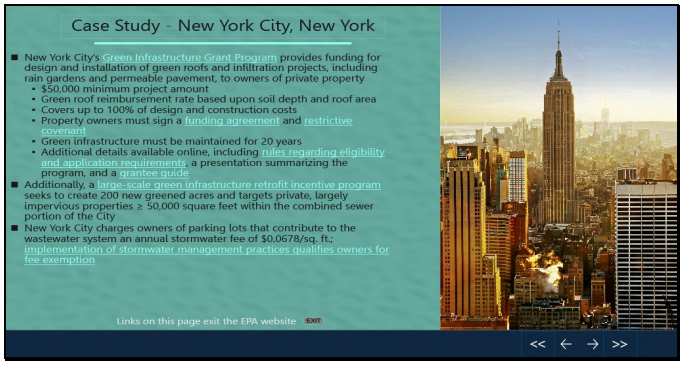
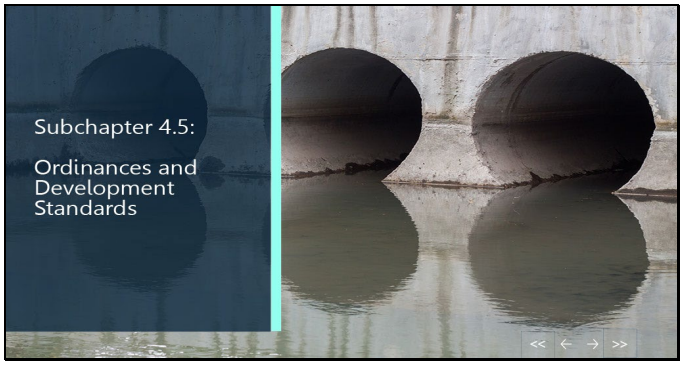
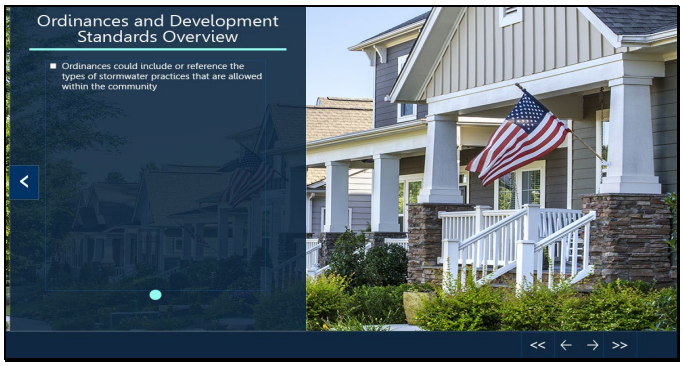


Case Study - New York City, New York

- New York City's Green Infrastructure Grant Program (https://www.nyc.gov/site/dep/water/green-infrastructure-grant-program.page) provides funding for design and installation of green roofs and infiltration projects, including rain gardens and permeable pavement, to owners of private property
    - $50,000 minimum project amount
    - Green roof reimbursement rate based upon soil depth and roof area
    - Covers up to 100% of design and construction costs
    - Property owners must sign a funding agreement (https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/gi-grant-funding-agreement.pdf) and restrictive covenant (https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/gi-grant-declaration-of-restrictive-covenant.pdf)
    - Green infrastructure must be maintained for 20 years
    - Additional details available online, including rules regarding eligibility and application requirements (https://codelibrary.amlegal.com/codes/newyorkcity/latest/overview), a presentation summarizing the program, and a grantee guide (https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/grantee-guide-green-roofs.pdf)
- Additionally, a large-scale green infrastructure retrofit incentive program (https://www.nyc.gov/site/dep/water/private-property-retrofit-incentive-program.page) seeks to create 200 new greened acres and targets private, largely impervious properties ≥ 50,000 square feet within the combined sewer portion of the City
- New York City charges owners of parking lots that contribute to the wastewater system an annual stormwater fee of $0.0678/sq. ft.; implementation of stormwater management practices qualifies owners for fee exemption (https://www.nyc.gov/assets/nycwaterboard/downloads/pdf/rates/fy2020_rates.pdf)



Subchapter 4.5: Ordinances and Development Standards

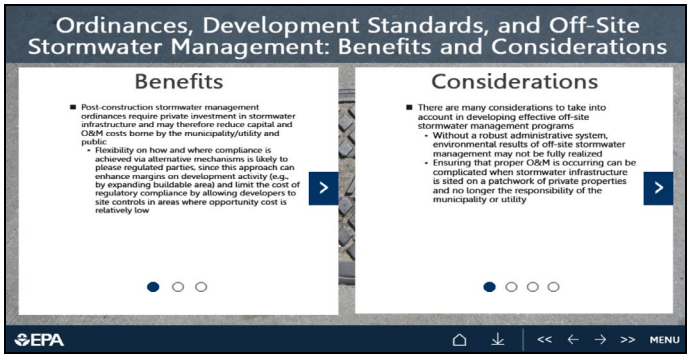


Ordinances and Development Standards Overview

- Some jurisdictions have ordinances requiring that properties undergoing new development and redevelopment control stormwater. In communities regulated under the municipal separate storm sewer system (MS4) program, these ordinances are consistent with post-construction performance standards, such as retention-based requirements, that are required in an applicable MS4 permit
    - This ensures that private parties are part of the solution to stormwater management as they play an important role in finding cost-effective solutions along with municipalities/utilities and ratepayers
    - Incorporating sustainable stormwater controls into sites as they are being developed and redeveloped is more cost-effective, since it prevents and controls pollution at the source
    - EPA has compiled examples of post-construction stormwater standards in MS4 permits (https://www.epa.gov/sites/default/files/2017-01/documents/part2-revised_sw_compendium_post_construction_508.pdf)
- Ordinances could include or reference the types of stormwater practices that are allowed within the community

Ordinances and Development Standards Off-Site Stormwater Management

- In some situations, some portion of a required post-construction performance standard may be achieved off site, via off-site stormwater management. This is sometimes referred to as "alternative compliance"
- In jurisdictions that utilize off-site stormwater management, MS4 permits allow performance standards that cannot otherwise be met on the new development/redevelopment sites to take place at another nearby location to reduce the impacts on the local water
- Off-site stormwater management mechanisms vary by area and may include in-lieu fees and stormwater credit trading programs
    - In some cases, regulations prohibit alternative compliance unless conditions at the (re)development site prevent on-site stormwater management (Detroit, Chattanooga); elsewhere, ordinances may describe the conditions under which off-site controls are allowed
    - Stormwater credit trading allows a property owner to secure credits that recognize that some or all of the required stormwater control is achieved on a property other than the one where the compliance obligation originates
    - In-lieu fees allow regulated parties to satisfy compliance obligations by making payments that can be used by government to fund off-site stormwater controls
- Stormwater credit trading programs are different from water quality trading (https://www.epa.gov/npdes/water-quality-trading)



Benefits

- Post-construction stormwater management ordinances require private investment in stormwater infrastructure and may therefore reduce capital and O&M costs borne by the municipality/utility and public
    - Flexibility on how and where compliance is achieved via alternative mechanisms is likely to please regulated parties, since this approach can enhance margins on development activity (e.g., by expanding buildable area) and limit the cost of regulatory compliance by allowing developers to site controls in areas where opportunity cost is relatively low
- Ordinances and development standards can prompt the use of off-site stormwater management
    - Off-site compliance alternatives may incentivize investment in under-invested communities, since the cost of siting stormwater infrastructure in such areas is likely to be lower than in hotter areas where development is occurring
        - Credit ratios can also be used to incentivize investment in specific areas
            - For example, creation of a unit of stormwater retention in a sewershed in particular need of stormwater infrastructure might translate to 1.1 units of retention elsewhere on the landscape
        - Since green infrastructure can enhance quality of life, health outcomes, employment prospects, and property value, investment may lead to multiple benefits in these communities
- The ability to site stormwater infrastructure off-site may change developers' calculus on which re-development sites are desirable, potentially enhancing re-development activity and increasing property tax revenue from underutilized parcels
- Stormwater credit programs may incentivize property owners that are not regulated by stormwater ordinances to install retrofits and generate credits that can be sold to regulated parties, leading to a distributed network of stormwater control sites
- Evidence suggests that distributed stormwater infrastructure may outperform centralized stormwater infrastructure at protecting natural flow regimes

Considerations

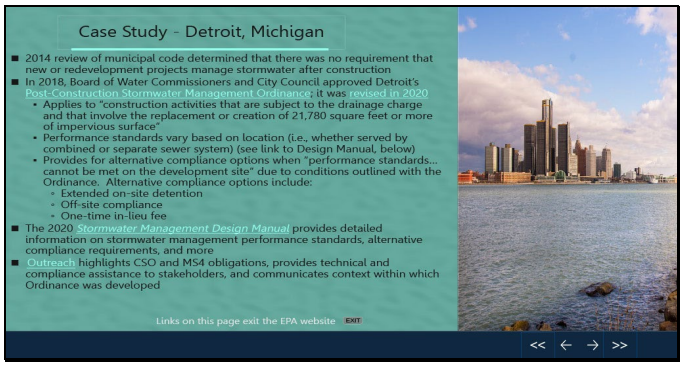
- There are many considerations to take into account in developing effective off-site stormwater management programs
    - Without a robust administrative system, environmental results of off-site stormwater management may not be fully realized
    - Ensuring that proper O&M is occurring can be complicated when stormwater infrastructure is sited on a patchwork of private properties and no longer the responsibility of the municipality or utility
- Without a clear history of stormwater credit supply and demand, stormwater credit markets may flounder

- Supply project financing is likely to be difficult if creditors are unsure of the value of credits or how easily suppliers will be able to sell them
- Regulated developers will likely limit participation to situations in which they have confidence that a supply of compliance grade credits exists
- As seen in Washington, DC, clear support from the public sector, perhaps in the form of a program to purchase credits that developers cannot sell to regulated entities, can jumpstart suppliers and market activity
- Establishing limits on where off-site compliance is allowed may be complicated, particularly considering climate change-related shifts in patterns of precipitation
    - Consider the need to avoid creating new problems or exacerbating existing ones when designing off-site compliance programs
    - Overly-restrictive requirements may prevent a market from developing
- Restricting off-site compliance to situations where on-site compliance is impracticable or impossible limits trading activity and may disincentivize the entry of green infrastructure suppliers and mute the impact of private capital on stormwater management
- Trading-related transaction costs, including administrative requirements, act as friction and limit incentive to enter the market
- If improperly priced, in-lieu fees may undercut suppliers, reduce trading activity, and/or overcommit public agencies (e.g., more demand for government-developed stormwater infrastructure than can be funded using fees)
    - Since in-lieu fees typically fund government-led stormwater infrastructure projects, they can affect the need for administrative and technical government support

Ordinance and Development Standards Case Studies

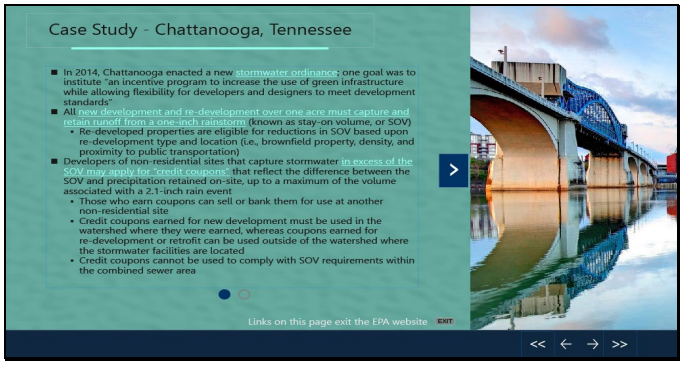
Click each location to view the case study

- Detroit, Michigan
- Washington, D.C.
- Chattanooga, Tennessee



Case Study - Detroit, Michigan

- 2014 review of municipal code determined that there was no requirement that new or redevelopment projects manage stormwater after construction
- In 2018, Board of Water Commissioners and City Council approved Detroit's Post-Construction Stormwater Management Ordinance (https://detroitmi.gov/sites/detroitmi.localhost/files/2020-12/Ordinance%20with%20Cover%20-%20Post-Construction%20Stormwater%20Management%20-%20Approved%20Revision%20November%202020.pdf); it was revised in 2020 (https://detroitmi.gov/sites/detroitmi.localhost/files/2020-12/PCSWMO%20Fact%20Sheet%20-%20Revised%20December%202020.pdf)
    - Applies to "construction activities that are subject to the drainage charge and that involve the replacement or creation of 21,780 square feet or more of impervious surface"
    - Performance standards vary based on location (i.e., whether served by combined or separate sewer system) (see link to Design Manual, below)
    - Provides for alternative compliance options when "performance standards… cannot be met on the development site" due to conditions outlined with the Ordinance. Alternative compliance options include:
        - Extended on-site detention
        - Off-site compliance
        - One-time in-lieu fee
- The 2020 Stormwater Management Design Manual (https://detroitmi.gov/sites/detroitmi.localhost/files/2021-01/PCSWMO%20Design%20Manual%20December%202020%20-%20Compressed.pdf) provides detailed information on stormwater management performance standards, alternative compliance requirements, and more
- Outreach (https://detroitmi.gov/sites/detroitmi.localhost/files/2021-02/2021-0127%20Stormwater%20Design%20Manual%20Workshop.pdf) highlights CSO and MS4 obligations, provides technical and compliance assistance to stakeholders, and communicates context within which Ordinance was developed



Case Study - Chattanooga, Tennessee

- In 2014, Chattanooga enacted a new stormwater ordinance (https://library.municode.com/tn/chattanooga/codes/code_of_ordinances?nodeId=CH31SEMADR_ARTVIIISTMA); one goal was to institute "an incentive program to increase the use of green infrastructure while allowing flexibility for developers and designers to meet development standards"
- All new development and re-development over one acre must capture and retain runoff from a one-inch rainstorm (https://chattanooga.gov/component/content/article/44-public-works/1360-rain-management-guide-faq) (known as stay-on volume, or SOV)
    - Re-developed properties are eligible for reductions in SOV based upon re-development type and location (i.e., brownfield property, density, and proximity to public transportation)
- Developers of non-residential sites that capture stormwater in excess of the SOV may apply for "credit coupons" (https://chattanooga.gov/images/citymedia/publicworks/Credits__Incentives_Manual.pdf) that reflect the difference between the SOV and precipitation retained on-site, up to a maximum of the volume associated with a 2.1-inch rain event
    - Those who earn coupons can sell or bank them for use at another non-residential site
    - Credit coupons earned for new development must be used in the watershed where they were earned, whereas coupons earned for re-development or retrofit can be used outside of the watershed where the stormwater facilities are located
    - Credit coupons cannot be used to comply with SOV requirements within the combined sewer area
- Coupon award ratios differ depending upon how they are earned
    - Re-development and retrofits: one coupon for each unit of excess SOV achieved
    - New development: one coupon for every 1.5 units of excess SOV achieved
- Chattanooga has also established an in-lieu fee, which can be used as an alternative to the use of credit coupons if a developer seeks an alternative compliance solution
- The first credit coupons were awarded in 2019 (https://www.chattanoogan.com/2019/2/6/384285/A.D.-Engineering-Earns-1st-SOV.aspx); Some analysis from American Rivers hypothesizes that stormwater market activity has been muted (https://s3.amazonaws.com/american-rivers-website/wp-content/uploads/2019/10/21221336/AR_StormwaterVolumeCreditTrading_Final_Revised100919.pdf) due to several reasons, including:
    - Credit coupons can only be used for off-site compliance if a developer can demonstrate that a hardship (e.g., hydrologic or soil conditions) prohibits the implementation of effective stormwater controls
        - Economic infeasibility or physical limitations (e.g., lack of space) are not acceptable reasons for off-site stormwater management

- Chattanooga does not guarantee the purchase credit coupons, as Washington, DC does; the lack of a purchase guarantee coupled with unclear demand may limit opportunities for suppliers to enter the market

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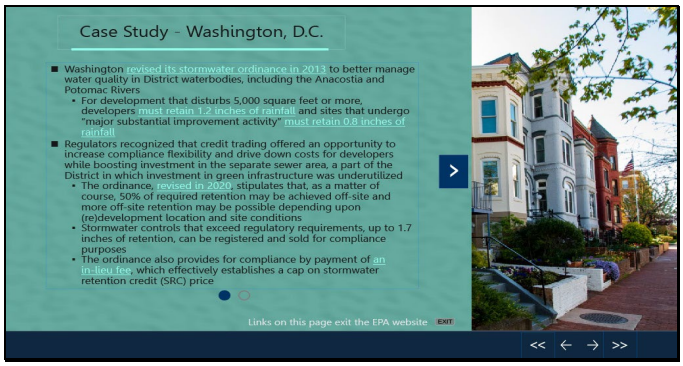

Case Study - Washington, D.C.

- Washington revised its stormwater ordinance in 2013 (https://doee.dc.gov/node/164302) to better manage water quality in District waterbodies, including the Anacostia and Potomac Rivers
    - For development that disturbs 5,000 square feet or more, developers must retain 1.2 inches of rainfall (https://dcregs.dc.gov/Common/DCMR/RuleDetail.aspx?RuleId=R0039072) and sites that undergo "major substantial improvement activity" must retain 0.8 inches of rainfall (https://dcregs.dc.gov/Common/DCMR/RuleDetail.aspx?RuleId=R0039074)
- Regulators recognized that credit trading offered an opportunity to increase compliance flexibility and drive down costs for developers while boosting investment in the separate sewer area, a part of the District in which investment in green infrastructure was underutilized
    - The ordinance, revised in 2020 (https://doee.dc.gov/node/610572), stipulates that, as a matter of course, 50% of required retention may be achieved off-site and more off-site retention may be possible depending upon (re)development location and site conditions
    - Stormwater controls that exceed regulatory requirements, up to 1.7 inches of retention, can be registered and sold for compliance purposes
    - The ordinance also provides for compliance by payment of an in-lieu fee (https://doee.dc.gov/service/paying-lieu-fee), which effectively establishes a cap on stormwater retention credit (SRC) price
- From 2014, the first year in which an SRC was traded, through 2020, the number of SRCs sold annually has grown from 11,013 to 581,404, and annual sales has grown from $25,000 to over $954,000 (https://octo.quickbase.com/up/bjkxxcfcp/g/rb7/eg/va/levels.html?sitelevel=2&pagerecord=90&userrole=Everyone%20On%20the%20Internet)
    - Initially, uncertainty regarding demand and price led to low SRC supply, and market activity was modest through 2016
    - Following a 2016 commitment by the Department of Energy & Environment (DOEE) to provide $11.5 million to purchase SRCs (https://doee.dc.gov/node/1160582) at predetermined prices, in one year the number of SRCs sold and the value of the market more than quadrupled
- For more information on Washington, D.C.'s stormwater credit market, please visit the DOEE's SRC trading page (https://doee.dc.gov/src), read an article by The Nature Conservancy (https://www.nature.org/en-us/magazine/magazine-articles/planning-for-a-rainy-day/) profiling a SRC supplier, review the Metropolitan Planning Council's summary of key elements of the DC program (https://www.metroplanning.org/news/8671/Stormwater-Credit-Trading-Lessons-from-Washington-D-C), and check out Conservation Finance Network's write-up (https://www.conservationfinancenetwork.org/2018/08/27/focus-on-investors-boosts-dcs-stormwater-credit-market), which includes perspective from market participants

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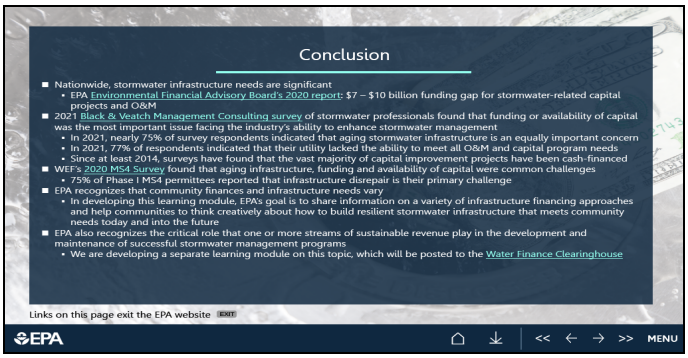

Conclusion

- Nationwide, stormwater infrastructure needs are significant
    - EPA Environmental Financial Advisory Board's 2020 report (https://www.epa.gov/sites/default/files/2020-04/documents/efab-evaluating_stormwater_infrastructure_funding_and_financing.pdf): $7 – $10 billion funding gap for stormwater-related capital projects and O&M
- 2021 Black & Veatch Management Consulting surveys (https://webassets.bv.com/2021-03/2021%20Stormwater%20Utility%20Report%20WEB%20FINAL.pdf) of stormwater professionals found that funding or availability of capital was the most important issue facing the industry's ability to enhance stormwater management
    - In 2021, nearly 75% of survey respondents indicated that aging stormwater infrastructure is an equally important concern
    - In 2021, 77% of respondents indicated that their utility lacked the ability to meet all O&M and capital program needs
    - Since at least 2014, surveys have found that the vast majority of capital improvement projects have been cash-financed
- WEF's 2020 MS4 Survey (https://www.wef.org/topics/practice-areas/stormwater-and-watershed-management/ms4-survey/) found that aging infrastructure, funding and availability of capital were common challenges
    - 75% of Phase I MS4 permittees reported that infrastructure disrepair is their primary challenge
- EPA recognizes that community finances and infrastructure needs vary
    - In developing this learning module, EPA's goal is to share information on a variety of infrastructure financing approaches and help communities to think creatively about how to build resilient stormwater infrastructure that meets community needs today and into the future
- EPA also recognizes the critical role that one or more streams of sustainable revenue play in the development and maintenance of successful stormwater management programs
    - We are developing a separate learning module on this topic, which will be posted to the Water Finance Clearinghouse (https://ordspub.epa.gov/ords/wfc/f?p=WFC:12)

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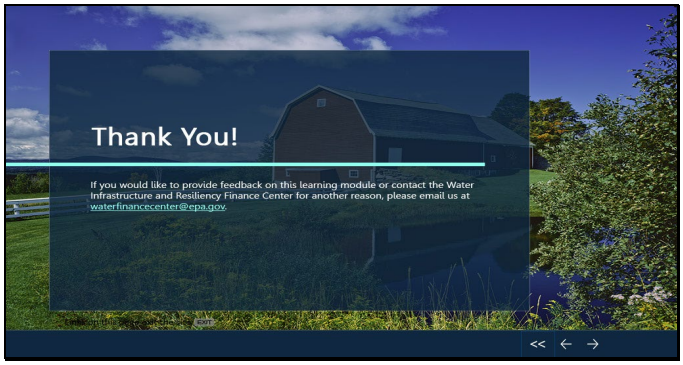


Thank You!

If you would like to provide feedback on this learning module or contact the Water Infrastructure and Resiliency Finance Center for another reason, please email us at waterfinancecenter@epa.gov.

Case Study Directory

Grant and Debt Financing

Coralville, IA

New Orleans, LA

Austin, TX

Ordinances and Development Standards

Washington, DC

Chattanooga, TN

Detroit, MI

Subsidies and Incentives

New York, NY

Seattle, WA

Detroit, MI

EIBs

Atlanta, GA

Hampton, VA

Washington, DC

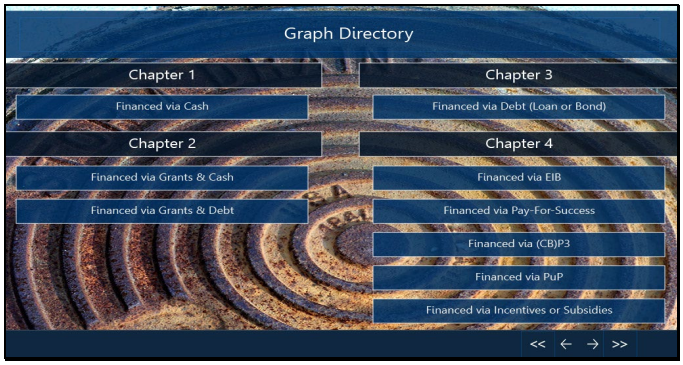
CBP3s and PuPs

Chester, PA

Chicago, IL

Other Examples

Principio Creek Watershed, MD



Graph Directory

Chapter 1

Financed via Cash

Chapter 2

Financed via Grants & Cash

Financed via Grants & Debt

Chapter 3

Financed via Debt (Loan or Bond)

Chapter 4

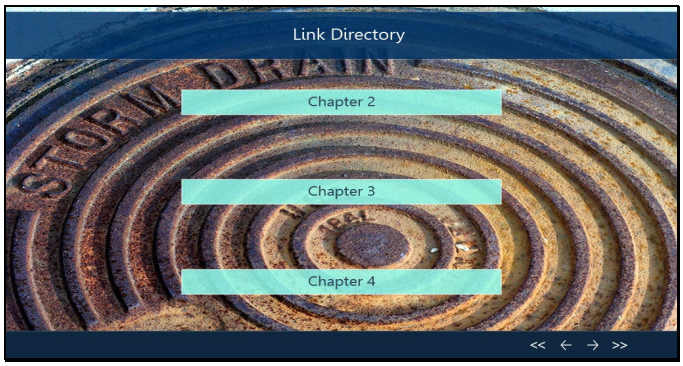
Financed via EIB

Financed via Pay-For-Success

Financed via (CB)P3

Financed via PuP

Financed via Incentives or Subsidies

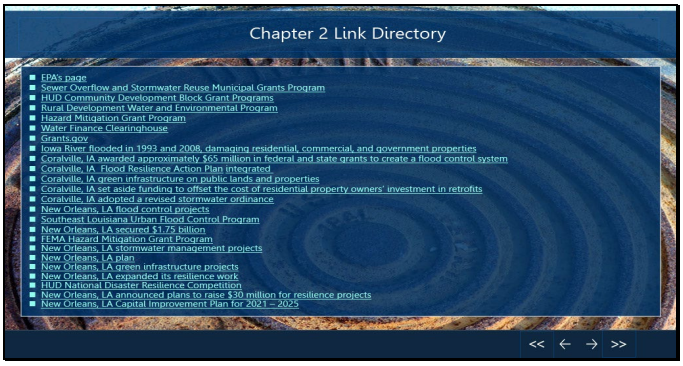


Link Directory

Chapter 2

Chapter 3

Chapter 4



Chapter 2 Link Directory

- EPA's page (https://www.epa.gov/npdes/npdes-stormwater-program)
- Sewer Overflow and Stormwater Reuse Municipal Grants Program (https://www.epa.gov/cwsrf/sewer-overflow-and-stormwater-reuse-municipal-grants-program)
- HUD Community Development Block Grant Programs (https://www.hudexchange.info/programs/cdbg/)
- Rural Development Water and Environmental Program (https://www.rd.usda.gov/programs-services/water-environmental-programs)
- Hazard Mitigation Grant Program (https://www.fema.gov/grants/mitigation/hazard-mitigation)
- Water Finance Clearinghouse (https://ordspub.epa.gov/ords/wfc/f?p=WFC:12)
- Grants.gov (https://www.grants.gov/)
- Iowa River flooded in 1993 and 2008, damaging residential, commercial, and government properties (https://www.press-citizen.com/story/news/2018/06/11/iowa-flood-2008-river-water-disaster/664298002/)
- Coralville, IA awarded approximately $65 million in federal and state grants to create a flood control system (https://www.coralville.org/795/Flood-Mitigation)
- Coralville, IA Flood Resilience Action Plan integrated (https://iowawatershedapproach.org/wp-content/uploads/2021/07/Coralville-Flood-Resilience-Action-Plan_FINAL.pdf)
- Coralville, IA green infrastructure on public lands and properties (https://www.mswmag.com/editorial/2015/02/protecting_local_waterways)
- Coralville, IA set aside funding to offset the cost of residential property owners' investment in retrofits (https://www.coralville.org/121/Stormwater-Management-Funds)
- Coralville, IA adopted a revised stormwater ordinance (https://www.coralville.org/786/Post-Construction-Stormwater-Ordinance-P)
- New Orleans, LA flood control projects (http://www.swbnosela.com/selaorleans/projects.aspx)
- Southeast Louisiana Urban Flood Control Program (http://www.swbnosela.com/selaorleans/overview.aspx)
- New Orleans, LA secured $1.75 billion (https://www.fema.gov/pdf/hazard/hurricane/2005katrina/la_hmgp_pa.pdf)
- FEMA Hazard Mitigation Grant Program (https://www.fema.gov/grants/mitigation/)
- New Orleans, LA stormwater management projects (https://nola.gov/resilience-sustainability/(hmgp)-stormwater-projects/)
- New Orleans, LA plan (https://www.swbno.org/documents/environmental/greeninfrastructure/GreenInfrastructurePlan.pdf)

- New Orleans, LA green infrastructure projects (https://www.swbno.org/Projects/InteractiveGuideToGreenInfrastructure)
- New Orleans, LA expanded its resilience work (https://nola.gov/resilience-sustainability/gentilly-resilience-district/)
- HUD National Disaster Resilience Competition (https://www.hud.gov/sites/documents/NDRCGRANTPROF.PDF)
- New Orleans, LA announced plans to raise $30 million for resilience projects (https://dxc.news/DXC/article/6C871714-mrcti-award-helps-move-city-of-new-orleans-toward-environmental-impact-bond-for-green-infrastructure)
- New Orleans, LA Capital Improvement Plan for 2021 – 2025 (https://www.nola.gov/nola/media/City-Planning/2021-2025-Capital-Improvement-Plan-ADOPTED_2.pdf)

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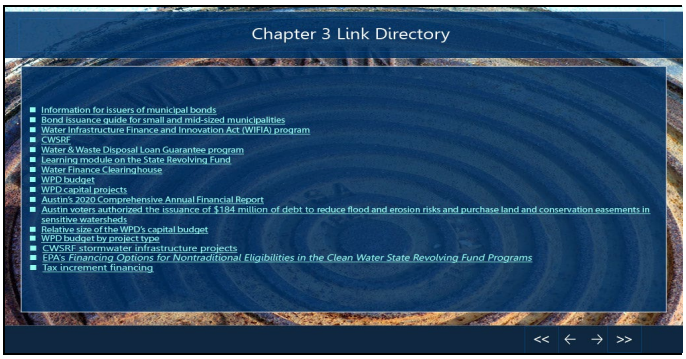

Chapter 3 Link Directory

- Information for issuers of municipal bonds (https://www.msrb.org/sites/default/files/MSRBSixThingstoKnow.pdf)
- Bond issuance guide for small and mid-sized municipalities (https://mrsc.org/getmedia/f32730ac-c814-444f-90d6-550db9443562/BondIssueGuide.aspx)
- Water Infrastructure Finance and Innovation Act (WIFIA) program (https://www.epa.gov/wifia)
- CWSRF (https://www.epa.gov/cwsrf)
- Water & Waste Disposal Loan Guarantee program (https://www.rd.usda.gov/programs-services/water-environmental-programs/water-waste-disposal-loan-guarantees)
- Learning module on the State Revolving Fund (https://ordspub.epa.gov/ords/wfc/f?p=165:9:2553133747192:::9:P9_MODULE:SRF_101)
- Water Finance Clearinghouse (https://ordspub.epa.gov/ords/wfc/f?p=WFC:12)
- WPD budget (https://www.austintexas.gov/sites/default/files/files/Watershed/flyers/2020_WPD_AnnualReport.pdf)
- WPD capital projects (https://capitalprojects.austintexas.gov/projects?categoryId=Water:Stormwater&tab=projects)
- Austin's 2020 Comprehensive Annual Financial Report (https://assets.austintexas.gov/financeonline/downloads/comprehensive_annual_financial_report/comprehensive_annual_financial_report_2020.pdf)
- Austin voters authorized the issuance of $184 million of debt to reduce flood and erosion risks and purchase land and conservation easements in sensitive watersheds (https://www.austintexas.gov/department/2018-bond-our-community-our-future)
- Relative size of the WPD's capital budget (http://budget.austintexas.gov/#!/year/All%20Years/capital/0/fdu_sponsor_department?vis=pieChart)
- WPD budget by project type (http://budget.austintexas.gov/#!/year/All%20Years/capital/0/fdu_sponsor_department/Watershed+Protection/0/project_name?vis=pieChart)
- CWSRF stormwater infrastructure projects (https://www.epa.gov/cwsrf/clean-water-state-revolving-fund-cwsrf-stormwater)
- EPA's Financing Options for Nontraditional Eligibilities in the Clean Water State Revolving Fund Programs (https://www.epa.gov/sites/default/files/2017-05/documents/financing_options_for_nontraditional_eligibilities_final.pdf)
- Tax increment financing (https://www.fhwa.dot.gov/ipd/pdfs/fact_sheets/program_value_cap_tax_increment_financing.pdf)

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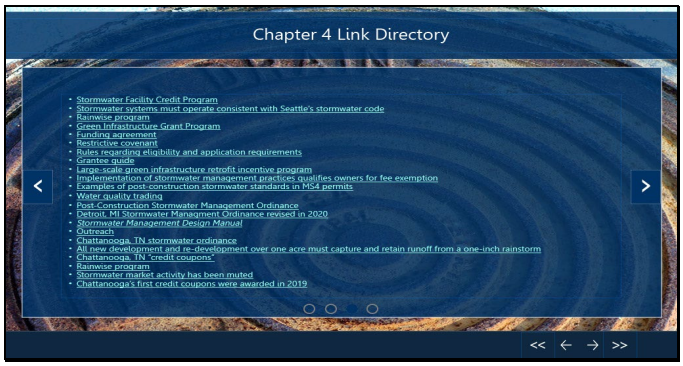

Chapter 4 Link Directory

- Atlanta, GA offered publicly Issued Environmental Impact Bond (https://www.prnewswire.com/news-releases/quantified-ventures-announces-first-publicly-issued-environmental-impact-bond-for-city-of-atlanta-department-of-watershed-management-300800036.html)
- Atlanta, GA two tier structure selected due to difficulty of clawing back risk-share payment if investors trade bond on the secondary market (https://conservationfinancenetwork.org/2019/06/24/atlanta-environmental-impact-bond-breaks-into-public-market)
- Atlanta, GA case study (https://static1.squarespace.com/static/5d5b210885b4ce0001663c25/t/5e136bad70b78f691391cf07/1578331071956/Atlanta+Case+Study_Quantified+Ventures)
- Goldman Sachs Urban Investment Group (https://www.goldmansachs.com/media-relations/press-releases/current/dc-water-environmental-impact-bond-fact-sheet.pdf)
- Calvert Impact Capital (https://calvertimpact.org/resources/breaking-ground-with-dc-water)
- D.C. EIB webinar (https://www.youtube.com/watch?v=hgHGlNjWOrI&feature=youtu.be)
- D.C. EIB analysis (https://www.epa.gov/sites/default/files/2017-04/documents/dc_waters_environmental_impact_bond_a_first_of_its_kind_final2.pdf)
- D.C. Water EIB website (https://www.dcwater.com/environmental-impact-bond)
- Hampton, VA investors offered public improvement bonds (https://emma.msrb.org/IssueView/Details/P1407369)
- Chesapeake Bay Foundation press release (https://www.cbf.org/news-media/newsroom/2020/virginia/city-of-hampton-fights-flooding-with-issuance-of-vas-first-eib.html)
- Chesapeake Bay Foundation virtual press conference (https://www.youtube.com/watch?v=Ukgf8mvRV2o&feature=youtu.be)
- Cecil Land Trust (CLT) and Ecosystem Investment Partners (EIP) joined with other stakeholders to restore 8,215 linear feet of stream and 24.8 acres of riparian buffers (https://www.cecillandtrust.org/current-news/restoring-24-acres-principio-restoration-project)
- MDNR and taxpayers paid less than half of what State government typically pays for equivalent water quality improvement (https://www.chesapeakeconservancy.org/conservation-innovation-center/consulting-services/supporting-pay-for-success/)
- The Environmental Policy Innovation Center's discussion of the Principio Creek Watershed project (https://sandcountyfoundation.org/uploads/SCF_2017_EPIC_DOC_SMFL.pdf)
- EPA's Community-Based Public-Private Partnerships (CBP3s) and Alternative Market-Based Tools for Integrated Green Stormwater Infrastructure (https://www.epa.gov/sites/default/files/2015-12/documents/gi_cb_p3_guide_epa_r3_final_042115_508.pdf)

- Stormwater Authority of the City of Chester solicited proposals from prospective private sector partners (https://c21714be-af0f-4071-90fd-cf1a977b3fc6.filesusr.com/ugd/fcf170_6edd1efa782a461b9938464122ef81e9.pdf)
- Stormwater Authority of the City of Chester request (https://c21714be-af0f-4071-90fd-cf1a977b3fc6.filesusr.com/ugd/fcf170_6edd1efa782a461b9938464122ef81e9.pdf)
- Chester, PA improves local job opportunities (https://www.delcotimes.com/2017/06/07/stormwater-management-plan-unveiled-for-chester/#author1)
- Chester, PA CBP3 announced in 2017 (https://www.corvias.com/news/new-and-exciting-community-based-public-private-partnership-cbp3-drive-economic-growth-and)
- Chester's private sector partner (https://www.corvias.com/news/new-and-exciting-community-based-public-private-partnership-cbp3-drive-economic-growth-and)
- Space to Grow (https://www.spacetogrowchicago.org/)
- Healthy Schools Campaign (https://healthyschoolscampaign.org/)
- Openlands (https://openlands.org/)
- Chicago Public Schools (https://www.cps.edu/)
- Chicago Department of Water Management (https://www.chicago.gov/city/en/depts/water.html)
- Metropolitan Water Reclamation District of Greater Chicago (https://mwrd.org/about)
- Chicago, IL model (https://www.spacetogrowchicago.org/about/our-model/)
- Chicago, IL urban flooding (https://cnt.org/urban-flooding)
- Chicago, IL stormwater impairs surface water quality (https://epa.illinois.gov/content/dam/soi/en/web/epa/documents/water/tmdl/report/lake-michigan-beaches/fact-sheet-02-28-2012.pdf)
- Chicago, IL schoolyard retrofits (https://www.spacetogrowchicago.org/about/school-profiles/)
- MWRD to seek partner schools in the Chicago suburbs (https://mwrd.org/sites/default/files/2021-02/Green%20Schoolyard.pdf)
- Detroit, MI installing, operating, and maintaining green infrastructure (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/A%20Guide%20to%20Drainage%20Charge%20Credits_0.pdf)
- Detroit, MI request technical assistance (https://app.smartsheet.com/b/form/1bf859ad76e7477c99debf8be03704c5)
- Detroit, MI owners can request adjustment (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/Drainage%20Charge%20Adjustment%20Application%20-%20WRITEABLE%20January2018.pdf)
- Detroit, MI Capital Partnership Program (https://detroitmi.gov/departments/water-and-sewerage-department/dwsd-projects/stormwater-management-and-drainage-charge/capital-partnership-program)
- Detroit, MI CPP agreement (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/Sample%20DWSD%20Capital%20Partnership%20Program%20Agreement%20-%2001292019.pdf)
- Restrictive covenant (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/DWSD%20CPP%20DECLARATION%20OF%20RESTRICTIVE%20COVENANT%20-%20Revised%20Draft%2006252019.pdf)
- Easement (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-06/Stormwater%20Management%20Easement%20-%20Revised%20Draft%20062519.pdf)
- Detroit, MI Water and Sewerage Department application to secure drainage charge credit using off-site green infrastructure (https://detroitmi.gov/sites/detroitmi.localhost/files/2019-07/Shared%20Stomwater%20Practice%20Credit%20Application%20Form_4-15-2019.pdf)

- City of Seattle annual drainage fee (https://www.seattle.gov/utilities/your-services/accounts-and-payments/rates/drainage)
- Significant amount of highly pervious (absorbent) surfaces (https://www.seattle.gov/utilities/your-services/accounts-and-payments/rates/drainage/understanding-your-drainage-bill)
- Stormwater Facility Credit Program (https://www.seattle.gov/utilities/your-services/discounts-and-incentives/stormwater-facility-credit)
- Stormwater systems must operate consistent with Seattle's stormwater code (https://www.seattle.gov/Documents/Departments/SPU/SFCPFlyer.pdf)
- Rainwise program (https://700milliongallons.org/rainwise/)
- Green Infrastructure Grant Program (https://www.nyc.gov/site/dep/water/green-infrastructure-grant-program.page)
- Funding agreement (https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/gi-grant-funding-agreement.pdf)
- Restrictive covenant (https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/gi-grant-declaration-of-restrictive-covenant.pdf)
- Rules regarding eligibility and application requirements (https://codelibrary.amlegal.com/codes/newyorkcity/latest/overview)
- Grantee guide (https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/grantee-guide-green-roofs.pdf)
- Large-scale green infrastructure retrofit incentive program (https://www.nyc.gov/site/dep/water/private-property-retrofit-incentive-program.page)
- Implementation of stormwater management practices qualifies owners for fee exemption (https://www.nyc.gov/assets/nycwaterboard/downloads/pdf/rates/fy2020_rates.pdf)
- Examples of post-construction stormwater standards in MS4 permits (https://www.epa.gov/sites/default/files/2017-01/documents/part2-revised_sw_compendium_post_construction_508.pdf)
- Water quality trading (https://www.epa.gov/npdes/water-quality-trading)
- Post-Construction Stormwater Management Ordinance (https://detroitmi.gov/sites/detroitmi.localhost/files/2020-12/Ordinance%20with%20Cover%20-%20Post-Construction%20Stormwater%20Management%20-%20Approved%20Revision%20November%202020.pdf)
- Detroit, MI Stormwater Management Ordinance revised in 2020 (https://detroitmi.gov/sites/detroitmi.localhost/files/2020-12/PCSWMO%20Fact%20Sheet%20-%20Revised%20December%202020.pdf)
- Stormwater Management Design Manual (https://detroitmi.gov/sites/detroitmi.localhost/files/2021-01/PCSWMO%20Design%20Manual%20December%202020%20-%20Compressed.pdf)
- Outreach (https://detroitmi.gov/sites/detroitmi.localhost/files/2021-02/2021-0127%20Stormwater%20Design%20Manual%20Workshop.pdf)
- Chattanooga, TN stormwater ordinance (https://library.municode.com/tn/chattanooga/codes/code_of_ordinances?nodeId=CH31SEMADR_ARTVIIISTMA)
- All new development and re-development over one acre must capture and retain runoff from a one-inch rainstorm (https://chattanooga.gov/component/content/article/44-public-works/1360-rain-management-guide-faq)
- Chattanooga, TN "credit coupons" (https://chattanooga.gov/images/citymedia/publicworks/Credits__Incentives_Manual.pdf)
- Stormwater market activity has been muted (https://s3.amazonaws.com/american-rivers-website/wp-content/uploads/2019/10/21221336/AR_StormwaterVolumeCreditTrading_Final_Revised100919.pdf)

- Chattanooga's first credit coupons were awarded in 2019 (https://www.chattanoogan.com/2019/2/6/384285/A.D.-Engineering-Earns-1st-SOV.aspx)
- Washington, D.C. revised its stormwater ordinance in 2013 (https://doee.dc.gov/node/164302)
- Development must retain 1.2 inches of rainfall (https://dcregs.dc.gov/Common/DCMR/RuleDetail.aspx?RuleId=R0039072)
- Sites that undergo "major substantial improvement activity" must retain 0.8 inches of rainfall (https://dcregs.dc.gov/Common/DCMR/RuleDetail.aspx?RuleId=R0039074)
- Washington, D.C. revised its stormwater ordinance in 2020 (https://doee.dc.gov/node/610572)
- In-lieu fee (https://doee.dc.gov/service/paying-lieu-fee)
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- $11.5 million to purchase SRCs (https://doee.dc.gov/node/1160582)
- SRC trading page (https://doee.dc.gov/src)
- Article by The Nature Conservancy (https://www.nature.org/en-us/magazine/magazine-articles/planning-for-a-rainy-day/)
- Summary of key elements of the DC program (https://www.metroplanning.org/news/8671/Stormwater-Credit-Trading-Lessons-from-Washington-D-C)
- Conservation Finance Network write-up (https://www.conservationfinancenetwork.org/2018/08/27/focus-on-investors-boosts-dcs-stormwater-credit-market)
- Environmental Financial Advisory Board's 2020 report (https://www.epa.gov/sites/default/files/2020-04/documents/efab-evaluating_stormwater_infrastructure_funding_and_financing.pdf)
- 2021 survey of stormwater professionals (https://webassets.bv.com/2021-03/2021%20Stormwater%20Utility%20Report%20WEB%20FINAL.pdf)
- 2020 MS4 Survey (https://www.wef.org/topics/practice-areas/stormwater-and-watershed-management/ms4-survey/)
- Water Finance Clearinghouse (https://ordspub.epa.gov/ords/wfc/f?p=WFC:12)
- waterfinancecenter@epa.gov (mailto:waterfinancecenter@epa.gov)

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