

Green Infrastructure: Land Revitalization Success Stories



Cover Photos: Photo bar—Westerly Creek stream restoration design, Westerly neighborhood children playing soccer on limited turf field and native plants, and Green Street initiative planters. Background photo—Genetta Park Wetland after photo

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The mission of EPA's Land Revitalization Program is to restore land and other natural resources into sustainable community assets that maximize beneficial economic, ecological and social uses and ensure protection of human health and the environment. The goal is to find solutions that can become true community investments—in the environment and in social and economic development—that yield benefits to the “triple bottom line.”

Introduction

EPA's Land Revitalization Program is producing significant environmental benefits and helping transform communities into more sustainable and livable places. EPA's Land Revitalization Team works in partnership with local communities, states and tribes; other federal agencies; nonprofit and philanthropic organizations; and the private sector to develop, test, and scale up new approaches that recognize valuable reuse alternatives for formerly contaminated properties.

Building green infrastructure on previously contaminated properties to help manage stormwater runoff and flooding is one such approach. Green infrastructure involves the use of landscape features, vegetation, soils, and natural processes to manage rainwater where it falls. This reduces the amount of water that enters sewer systems and helps decrease the discharge of pollutants into area water bodies.

Green infrastructure features such as permeable pavements, rain gardens, bioswales, and green roofs are engineered features that are incorporated into the natural landscape and building designs to capture and infiltrate stormwater, reduce runoff volume, and treat or clean runoff. Restoring or "daylighting" streams and channels, creating wetlands, and restoring natural habitat also provide or enhance green infrastructure. These environmentally friendly features often improve the aesthetics of an area and many times are paired with additional community amenities such as parks, walking and biking trails, and recreational facilities for residents.

Green infrastructure elements often are sited on parcels where development or redevelopment is not planned in the near term. These sites nonetheless can become community assets by providing greenspace and sometimes recreational or other amenities for residents while increasing the economic value of the surrounding area.

Building green infrastructure on underused and vacant properties, including brownfields, also can be an innovative environmental solution that goes beyond

conventional regulatory fixes for controlling stormwater runoff. For example, Detroit and other major cities are applying cost-effective green infrastructure features as important elements of comprehensive public works projects to reduce combined sewer overflow (CSO) discharges and protect area waters. These communities and the regulatory agencies recognize the important role that land revitalization can play in controlling water pollution from stormwater runoff. Building green infrastructure on underused parcels in urban areas can simultaneously help cities reduce combined sewer overflows (CSOs), discharges, stormwater runoff, and the amount of vacant property, while creating greenspace and public amenities that contribute to neighborhood revitalization.

In communities such as Lakewood, Colorado, Denver, Colorado, and Montgomery, Alabama, stream restoration and realignment were key elements of brownfield revitalization efforts. These practices reduced flooding risk and resulted in more effective stormwater management, while providing greenspace, parks, and trails for residents.

This booklet describes these and other brownfields and land revitalization projects where green infra-





structure elements were used to restore formerly contaminated land and other natural resources into sustainable community assets. These projects improve stormwater management while maximizing the positive environmental, economic, and social

benefits of brownfields cleanup and revitalization. Including green infrastructure in reuse strategies also helps to promote “smart growth,” a range of planning and building strategies that protect the environment and public health, support economic development, create strong neighborhoods with diverse housing and transportation options, and improve the overall quality of life.

The projects described here demonstrate the importance of supporting community-based projects, building partnerships, and engaging communities all of which are hallmarks of EPA’s Land Revitalization Program. They also show how to find solutions that can become true community investments—in the environment and in social and economic development—that yield benefits to the triple bottom line. By documenting these success stories, EPA’s Land Revitalization Program hopes to share good ideas and examples, and encourage other communities to include green infrastructure features in redevelopment plans for brownfields and other contaminated properties.

Sewer Systems and Control of Urban Runoff

Many communities in the U.S. have separate sewer systems. One set of sewer pipes conveys wastewater to treatment plants before discharging it into nearby lakes and rivers. A second set of pipes conveys stormwater from rain events, which is discharged into receiving waters, generally without treatment. Stormwater typically contains pollutants such as bacteria, nutrients, and oil and grease, which wash off streets, parking lots, and other surfaces during heavy rains. The large volumes of stormwater and pollutants discharged can have significant adverse effects on lakes, rivers, streams, and wetlands.

Urban runoff is a challenge in many communities, regardless of what type of sewer system a community has. However, controlling stormwater runoff is particularly problematic in the more than 770 U.S. cities that have combined sewer systems. Combined sewer systems have only one set of sewer pipes to handle wastewater and stormwater. These systems can convey wastewater and stormwater to area treatment plants in dry weather, but often cannot handle the heavy volume of water during rain events. As a result, the sewers overflow, releasing a mixture of stormwater and untreated wastewater into receiving waters. These discharges, called combined sewer overflows (CSOs), are a major water pollution concern for cities with combined sewer systems.

Green Infrastructure to Control Urban Runoff

Land revitalization projects that use green infrastructure to reduce water pollution, beautify neighborhoods, and spark economic development

Green Infrastructure Projects In Detroit's Lower East Side and Recovery Park

Detroit, Michigan



Detroit Skyline Source: U.S. EPA National Exposure Research Laboratory

EPA Region 5 and EPA's Office of Brownfields and Land Revitalization are working with other federal agencies to support the City of Detroit's blight elimination and land use and infrastructure efforts. EPA is providing assistance to help the city accelerate brownfield redevelopment, train staff to monitor environmental conditions, and work with local officials to reclaim vacant land and conduct greener demolitions.

As part of this effort, EPA is helping Detroit reuse vacant properties for green infrastructure projects. In 2014, Detroit received a one million dollar Shoreline Cities Green Infrastructure Grant through EPA's Great Lakes Restoration Initiative. This funding is supporting major green infrastructure projects in Detroit's Near East Side. One project will transform vacant lots into greenspace consisting of meadows, trees and other vegetation. It is estimated this project will reduce the discharge of untreated stormwater into the city's combined sewer system by approximately 100,000 gallons during significant storms.

The second project involves installing green infrastructure in the Recovery Park neighborhood to reduce the discharge of untreated stormwater to the sewer system by approximately one million gallons during significant storms. The EPA grant can be used to fund up to 50 percent of the cost of green infrastructure projects on public property. Two Detroit-based foundations are contributing funds to match the EPA grant. The green infrastructure projects will be constructed on vacant land and are expected to create models for future vacant-lot treatments. (For more information, see <http://www.epa.gov/greatlakes/fund/shoreline/>).

EPA also awarded \$200,000 to the State of Michigan through its Brownfield section 128(a) grant program for environmental site assessments of brownfields and vacant properties in Detroit. These funds were targeted for parcels where green infrastructure will be implemented. This was the first time that EPA provided brownfields assessment funding specifically for sites that would be used for green infrastructure.

Implementing green infrastructure on vacant parcels is a major opportunity in Detroit, a means of helping to reduce CSOs and helping to foster neighborhood stabilization. EPA and the Michigan DEQ have sparked green infrastructure implementation in two areas of the city via requirements in the National Pollutant Discharge Elimination System (NPDES) permit for the Detroit Water and Sewer Department (DWSD). One provision in the permit requires DWSD to invest \$3 million annually in green infrastructure stormwater projects in one part of the sewer service area.

To demonstrate the feasibility and aesthetics of green infrastructure on vacant parcels, the nonprofit organization, Greening of Detroit, collaborated with residents and community groups in the Cody-Rouge neighbor-





Community members planting trees

hood to transform 10 vacant residential lots owned by the Michigan Land into natural, low-maintenance

spaces that will become neighborhood assets. Community residents were engaged in the process of selecting one of four low-maintenance treatment plans for each location: a low-growth prairie grass; a perennial wildflower mix; a rye grass and wildflower combination; and tree planting. Each treatment is designed to stabilize and beautify the areas, increase the tree canopy, and reduce stormwater runoff. The community voted on plans for each of the 10 properties.

Many vacant parcels in Detroit have abandoned buildings that are in poor condition and present safety risks. Major efforts are underway to demolish dilapidated structures. EPA's Land Revitalization Program is working closely with the state and local stakeholders to plan and conduct demolitions in ways that will be protective of the environment and citizens, and which will facilitate green infrastructure implementation on these parcels. (See box below.)

EPA Land Revitalization Team Provides Assistance for Better Demolition Practices to Improve Urban Soils

Detroit plans to demolish up to 80,000 unsalvageable residential structures in the next five years, according to an ambitious blight elimination plan announced in February 2014. EPA Region 5 assisted Detroit's Blight Task Force by providing technical assistance with environmentally sensitive activities of residential demolition—from pre-planning to site rehabilitation.

Using environmentally beneficial residential demolition practices can set the stage for constructing green infrastructure and revitalizing vacant lots. This often includes properly removing and recycling demolition debris, minimizing soil compaction, restricting the types and amounts of fill that can be used, and preparing surface soil more carefully for vegetation.

Region 5 convened a [U.S. EPA Demolition Best Practices Workshop](#) on March 4, 2014. Local experts discussed ways to reasonably incorporate materials management, health, and workforce development strategies in planned residential demolitions.

The information from the workshop was intended for use by Detroit's Blight Task Force for development of the task force's report, and by the Detroit Land Bank for future implementation. Solution-oriented breakout sessions focused on six key issues related to residential demolition: public health, economic development, job training, communications, deconstruction, and recycling. For more information on the Demolition Best Practices Workshop, please visit: <http://detroitfuturecity.com/wp-content/uploads/2014/03/dfc-demo-best-practice-20140228.pdf>

Green Infrastructure Elements Enhance Milwaukee's 30th Street Industrial Corridor

Milwaukee, Wisconsin

EPA's Office of Brownfields and Land Revitalization and EPA Region 5 are working in partnership with other federal, state, local, and community stakeholders to revitalize Milwaukee's 30th Street Industrial Corridor. The corridor is a five-mile long by half-mile-wide swath of land that bustled with manufacturing activity until the 1980s. When manufacturing declined, many industries along the 30th Street Industrial Corridor downsized or left, leaving behind blight, significant environmental issues and a community faced with high unemployment.

Revitalization of the 30th Street Industrial Corridor now underway is a comprehensive effort to clean up and redevelop brownfields; help manage stormwater and reduce CSOs; eliminate blight; develop the workforce; and improve public health, housing, and multimodal transportation. The initiative calls for several green infrastructure elements to enhance stormwater management, while adding wetlands, recreational amenities and greenspace that will make the area more attractive and improve the quality of life for residents.

The multi-faceted effort began with a series of EPA brownfields assessment grants that enabled the city and its partners—the Wisconsin Department of Natural Resources and The Corridor (formerly the 30th Street Industrial Corridor Corporation)—to inventory and prioritize contaminated sites for further assessment and cleanup. The goal was to clean up and help return brownfield sites to productive use as industrial, commercial, residential or mixed-use properties. If successful, these redeveloped properties also will catalyze additional public, private and non-profit reinvestment in the 30th Street Industrial Corridor.

The effort dovetails with the Milwaukee's community-wide comprehensive planning process, which includes four area plans that address this part of the city. The city's 30th Street Corridor Economic Development Master Plan includes a detailed market study and examines the larger projects that are expected to spur further redevelopment along the corridor. While the focus of the comprehensive planning process is on economic development to restore the area's economic vitality, plans for the area also include the creation of an urban agriculture zone and numerous green infrastructure features to promote sustainable stormwater management.

For example, one of the area-wide plans, for the Century City area of the 30th Street Industrial Corridor, envisions a green, linear park that will buffer the new industrial redevelopment planned for the area from an adjacent residential area. The long greenway will



Perspective view of linear park with industrial buildings in the background. Source: Redevelopment Authority of the City of Milwaukee.

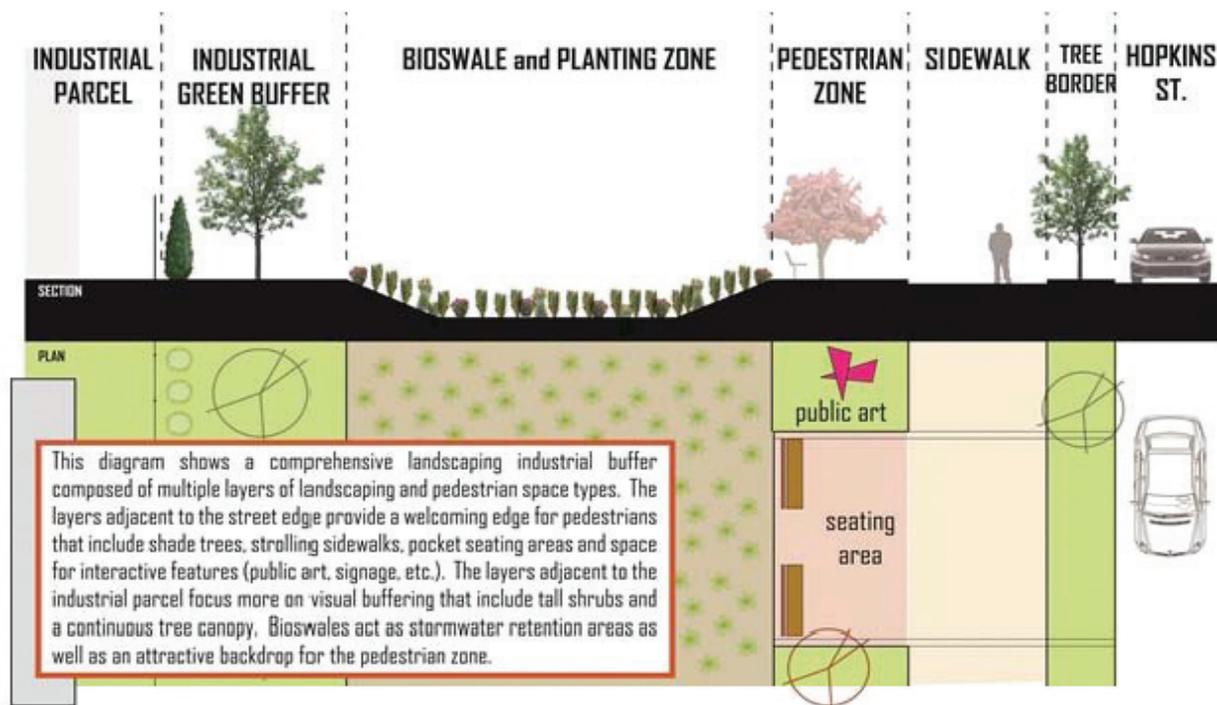
be created by the Metropolitan Milwaukee Sanitary District (MMSD). It will connect two waterways and include strategically placed bioswales, wetlands, and infiltration areas. The greenway also will connect to major bike trails and provide an amenity for residents while contributing to the revitalization nearby neighborhoods, which currently have many vacant industrial properties.

The Century City brownfields redevelopment plan includes the removal of more than two million square feet of impervious surface and a number of other green infrastructure elements designed to significantly reduce stormwater runoff. Overall, the Century City brownfields redevelopment plan is expected to remove runoff from about 30 acres of land in Milwaukee's combined sewer area.

Other accomplishments of the Century City brownfields redevelopment project include:

- 1,500,000 square feet of hazardous and blighted structures were demolished.
- 255,703 tons of concrete were recycled for use onsite and for other street/sewer projects in Milwaukee and Wauwatosa.
- 60,000 tons of contaminated soil were removed from the site.
- More than 40 underground storage tanks, vessels, and vaults were removed from the site.
- 80% of demolition materials were recycled from the site. This includes all metal, brick, concrete, furniture, computers, and light fixtures.
- Achieved cost savings by partnering with the Department of Public Works saved on construction and demolition waste disposal costs.

Landscaping Diagram for the Century City Greenway and Gate



Source: Redevelopment Authority of the City of Milwaukee.

Green Infrastructure in Cincinnati's South Fairmount/Lick Run Project

Cincinnati, Ohio

The Metropolitan Sewer District (MSD) of Greater Cincinnati is working on several projects that use green infrastructure to meet CSO control commitments as part of MSD's 2013 agreement with EPA to reduce CSO discharges and eliminate sanitary overflows. The agreement allowed MSD to substitute green infrastructure solutions for conventional "grey infrastructure" control measures, provided the same level of CSO control could be achieved. This effort is expected to demonstrate that sustainable infrastructure approaches to solving CSO problems can provide significant social, environmental and economic benefits, especially when coordinated with other land revitalization efforts.

The Lick Run project is a series of underground storm sewers, water quality features, and natural, aboveground waterways constructed throughout the watershed to transport stormwater and natural drainage to Mill Creek. Its central element is the Valley Conveyance System (VCS), an urban waterway that will run through the middle of the South Fairmount neighborhood. The VCS is an innovative source-control solution that will convey stormwater through an engineered but natural-looking aboveground, meandering stream channel with natural stone and a riparian edge planted with native plants and trees. The VCS includes features designed to capture sediments and debris and slow the conveyance of stormwater into Mill Creek. An underground stormwater conveyance box will be constructed beneath the system to handle flows from large rain events. This will free up capacity in the sewer system and reduce CSO discharges.

EPA's Land Revitalization Program and Region 5 are working closely with MSD to support community-based efforts that extend beyond regulatory compliance. In addition, EPA Brownfields and Land Revitalization Program funds are being used to support MSD's planning work, including site assessments of properties in the Lick Run corridor and planning of action steps to bring the concept to fruition. EPA also is actively seeking federal, state, and local partners to assist MSD in achieving these goals.

The Lick Run project is the largest and most significant effort included in Project Groundwork, MSD's multi-year initiative with hundreds of sewer and stormwater management techniques designed to meet its CSO-control commitments. Project Groundwork won the U.S. Water Alliance's 2014 U.S. Water Prize for "its green infrastructure strategy to reduce water pollution, beautify neighborhoods and help spark economic development."

The Lick Run project will clean up and repurpose about 30 acres of brownfields, vacant or otherwise underutilized land in Cincinnati's South Fairmount neighborhood and is expected to provide a catalyst for revitalization of other brownfields nearby. It will create a new green corridor with wetlands, bioswales, and "green street" features designed to reduce stormwater pollution carried from roads and paved services. It also will create a more beautiful—and often safer—environment for pedestrians and cyclists. The project includes a multi-use trail, lighting, safety railing, retention walls, and improved recreation space, parking and bridges. The new green corridor is expected to provide a significant amenity for the neighborhood and spark commercial and economic revitalization in the area. Site clearing is already underway and the VCS construction is expected to begin in spring 2015.

EPA Region 5 and EPA's Brownfields and Land Revitalization Program provided significant assistance to MSD during planning. EPA's Brownfields program completed a sweeping analysis of all the brownfield parcels in the Lick Run Corridor through Targeted Brownfields Assessments. The analysis results were used to design the green stormwater solution and identify properties for future redevelopment. For a more detailed look into the planning process for the South Fairmount Neighborhood/Lick Run Watershed please see [An Innovative Solution to Urban Water Challenges Video](#).



Proposed Lick Run Development. Private Source: Developed by Human Nature, Inc.; Strand Associated, Inc.; and XCG Consultants Inc. for MSD

The Lick Run Watershed Strategic Integration Plan was drafted with assistance from EPA's Brownfields and Land Revitalization Program. The plan provides an "implementation road map" that outlines opportunities associated with a green infrastructure approach. EPA is working with other federal partners to leverage investments in the South Fairmount community (e.g., housing development, floodplain management, and transportation improvements). EPA also invited the U.S. Department of Housing and Urban Development (HUD) and the U.S. Department of Transportation (DOT) to help focus transportation and community development resources and leverage investments in the South Fairmount neighborhood. This interagency partnership is an outgrowth of a national HUD/DOT/EPA Partnership for Sustainable Communities. The agencies worked with MSD to develop a strategy to

increase habitat, clean up brownfields, and reduce the supply of vacant land in the area.

EPA Region 5 also assisted in developing deconstruction and salvage strategies for demolition of residential structures in the South Fairmount neighborhood as part of MSD's green infrastructure plans to create a water conveyance feature. For an in depth look into the deconstruction process, please see the Wow! What a Find! Video linked below.

Video:

Lick Run – Wow! What a Find!

<https://www.youtube.com/watch?v=RuMyl-CmruY>



On the Road to Reuse: Residential Demolition Bid Specification Development Tool

EPA Region 5 produced a residential demolition bid specification tool for entities engaged in residential demolition operations. The tool identifies the environmentally sensitive activities associated with demolishing residences, from pre-planning to demolition to site rehabilitation (e.g. hazardous materials abatement, fill material selection and placement, material recycling or deconstruction). For each of the activities, the report provides decision-making information and suggested bid specification language to help local government officials update their bid specification documents. The use of environmentally beneficial demolition practices can result in long- and short-term environmental benefits and set the stage for vacant lot reuse and neighborhood revitalization. Tool available at: <http://www2.epa.gov/large-scale-residential-demolition/road-reuse-residential-demolition-bid-specification-development>

Green Corridor Revitalization Project

Ranson, West Virginia

The City of Ranson, West Virginia, used a 2010 EPA Brownfields Area-Wide Planning grant and EPA technical assistance to evaluate, design and deploy a variety of green infrastructure approaches to handle stormwater pollution in the downtown area as part of its "Green Corridor" revitalization project. Ranson's use of green infrastructure technologies on roadways, in public parks, and on brownfields redevelopment projects will help meet key water quality goals in this Chesapeake Bay watershed community, save costs on grey infrastructure, and make the community more livable and beautiful.

Ranson's area-wide planning was conducted together with planning for the transformation of the city's central commercial roadway into a "complete street." The city also used DOT TIGER planning funds and a HUD Sustainable Community Challenge Grant that focused on creating a new comprehensive land use plan and form-based "Ranson Smart Code" for redevelopment.

The area-wide planning process identified key brownfields sites for redevelopment and involved extensive research, charrettes, public visioning, and community engagement. Key brownfield sites included the closed Kidde Brass Foundry and Manufacturing Facility, the closed Dixie-Narco manufacturing site, and the Charles Town Public Works Yard, a former municipal dump. All of these sites are located along the Evitts Run Creek, the only waterway in Ranson and the adjacent city of Charles Town. Evitts Run Creek empties into the Shenandoah River, which joins the Potomac River and eventually flows into the Chesapeake Bay. These cities have little or no stormwater management systems in place, which will now be essential to reach Chesapeake Bay water quality goals.

The community's area-wide plan created exciting initiatives for the cleanup and redevelopment of the targeted brownfield sites. The 8-acre Kidde



*Stormwater runoff at the Powhattan Place site.
Source: U.S. EPA Region 3.*

Brass Foundry is now slated to become a mixed-use, downtown center called "Powhatan Place," with 100,000 square feet of new development planned, including 14 new retail stores, commercial offices, and a mix of multi-family housing units centered around a public square and plaza that incorporates green infrastructure. The city is using an EPA Brownfields Cleanup grant and local resources to remove inorganic contaminants from the foundry facility and demolish the dilapidated buildings to clear the way for reuse.

Before developing specific plans for the Powhatan Place redevelopment project, Ranson requested EPA's assistance integrating green infrastructure into the design. EPA provided several recommendations, including improvements to the streets circumscribing Powhatan Place.

The proposed street redesign integrates bioswales within the rights-of-way and along several roadways, parking lots, and sidewalks. The right-of-way bioswales

are designed to provide effective stormwater runoff capture, treatment, and infiltration through biologically active plants and soils. Due to karst conditions in the region, the systems will be designed to promote infiltration in limited quantities and will operate independently, without channeling stormwater to points down gradient. This infiltration will help reduce the acidity of stormwater, which can slowly dissolve the limestone below and lead to sinkholes.

EPA recommended plant species tolerant of wet and dry conditions for use in the swales. A greater variety of plants will be added to the palette by regulating the moisture in the swales. These green infrastructure elements are expected to improve the existing drainage while encouraging creation of habitats, promoting community stewardship, and increasing public awareness of stormwater issues and solutions.

Green infrastructure innovations will go beyond the planned Powhatan Place development. Ranson is constructing a “complete street” upgrade of Fairfax Boulevard into a grand central roadway that accommodates wide sidewalks, dedicated bike lanes, traffic calming, and access to transit. It also includes a green infrastructure system with extensive bioswales, silva-cell forestry units, and more than 2,000 trees and shrubs planted for stormwater management and aesthetic benefits. This Green Corridor Revitalization project will transform Fairfax Boulevard into a mixed-use corridor that provides affordable housing, retail and entertainment amenities, parks and recreational areas, and allows for easy walking and biking access between Ranson and Charles Town.

The Charles Town Public Works and Dixie-Narco brownfield sites are slated for a major green infrastructure facility that will put the tools developed through the area-wide planning process into action. EPA and the National Fish and Wildlife Foundation provided resources for a team of water quality and green infrastructure experts to design a new community lake on the Public Works site to handle stormwater from the broader two-city area in a setting that will serve as a community park and gathering space. Charles Town will use resources from two EPA Brownfields Cleanup Revolving Loan Fund grants to address brownfields cleanup issues in these new stormwater park areas.

The area-wide planning partnership between Ranson and Charles Town was aided by the interagency Partnership for Sustainable Communities, an effort between the EPA, HUD, and DOT to promote sustainable redevelopment of brownfields by improving access to affordable housing and public transportation while also protecting the environment. With close interagency coordination and access to the combined resources of EPA, DOT, and HUD, Ranson and Charles Town conducted extensive community visioning and design charrettes that led to the development of a new master plan. The updated plan focuses on smart growth strategies for a compact, walkable, sustainable development that is expected to spur job growth and economic revitalization while addressing environmental issues in Ranson and Charles Town.



Green Infrastructure and Urban Waterways

Land revitalization projects that include restoring streams or creating urban waterways to control stormwater, enhance the environment, and improve access to community amenities

Dry Gulch Stream Restoration at Lamar Station Crossing

Lakewood, Colorado



EPA brownfields assessment and cleanup funds, in addition to technical assistance provided by EPA Region 8 were important catalysts for the creation of a new transit-oriented arts district in Lakewood, Colorado. The development includes 176 new affordable green housing units located 400 feet from the Lamar Station on the West Corridor Light Rail, as well as a brand new Head Start facility. Green infrastructure elements will be key in creating a new neighborhood amenity and linkages to a future greenway.

The West Corridor Light Rail project follows the Dry Gulch channel alignment from its confluence with Lakewood Gulch at Lakewood/Dry Gulch Park to Lamar Station. EPA's Office of Brownfields and Land Revitalization provided funding for the development of a green infrastructure stream restoration plan at Dry Gulch in 2013 and 2014. The plan will improve access to the station from the surrounding community, protect and improve streambanks, and improve vegetation and water quality. Native landscaping will be used. The project design complements the existing development and access to the station.

The development effort began with a 2010 EPA Brownfields Assessment grant. EPA Region 8 helped the City of Lakewood, Rocky Mountain College of Art + Design, and numerous community stakeholders embark on a neighborhood visioning process that resulted in the creation of the 40 West Arts District. The visioning process produced a plan that included a set of strategies to reduce blight, clean up and redevelop more than 40 brownfields, reuse existing infrastructure, and incorporate sustainable community concepts into future development along the West Corridor Light Rail. The plan was adopted by the Lakewood City Council in 2012 and won the Denver Regional Council of Governments' 2012 Gold Medal for "Planning with Vision."

In 2011, Metro West Housing Solutions was awarded a Brownfields cleanup grant to clean up 5.5 acres in the center of the 40 West Arts District. This spurred additional cleanup of area brownfields and served as the hub of the new, transit-oriented arts district. In early



Community members visit an affordable housing unit. Source: U.S. EPA Region 8

2012, Region 8 assisted by conducting a Targeted Brownfields Assessment that found additional contamination, which was then cleaned up by Metro West. A total of 4,200 cubic yards of contaminated soil was excavated. Work proceeded quickly. The new housing development, which followed specifications for Leadership in Energy and Environmental Design (LEED) Neighborhood Development, opened in 2013. For a look into the construction of Lamar Station, please see the video to right.

Video:

Lamar Station Crossing
Construction Timeline

<https://www.youtube.com/watch?v=6Pm-X-GKmqA>



Westerly Creek Green Infrastructure and Stream Restoration Design

Denver, Colorado

Starting in 2011, EPA's Land Revitalization Program and staff from Region 8 supported a project to design green infrastructure for Westerly Creek, an impacted stream in Denver's East Colfax neighborhood, a community with a largely immigrant population and environmental justice concerns. The stream restoration component was an unfunded component of a larger project between Trust for Public Lands and the City and County of Denver that transformed a vacant lot into a park with recreational facilities and a community garden.

Now complete, New Freedom Park is a new neighborhood amenity for a diverse community with a large refugee population. The stream restoration component was made possible by an Urban Waters Partnership effort that included the City and County of Denver, Urban Drainage and Flood Control District (UDFCD), EPA, the Trust for Public Land (TPL), Westerly Connect, Mercy Housing, Grace Housing, and Earth Force.

To design the stream, EPA and TPL engaged the community through two community meetings that allowed the community to articulate its vision for the park and develop plans to implement this vision. Translators were on hand to assist non-English speaking residents, and the meeting also included a youth involvement component facilitated by Earth Force, a national nonprofit organization that engages youth in community-based environmental projects. Children were able to share their input about how the creek should look and their ideas were an integral part of the community input.

The design that resulted from the charrettes used green infrastructure approaches to improve access, safety, and water quality; decrease bank erosion;



Children assisting in a design charrette. Source: U.S. EPA Region 8

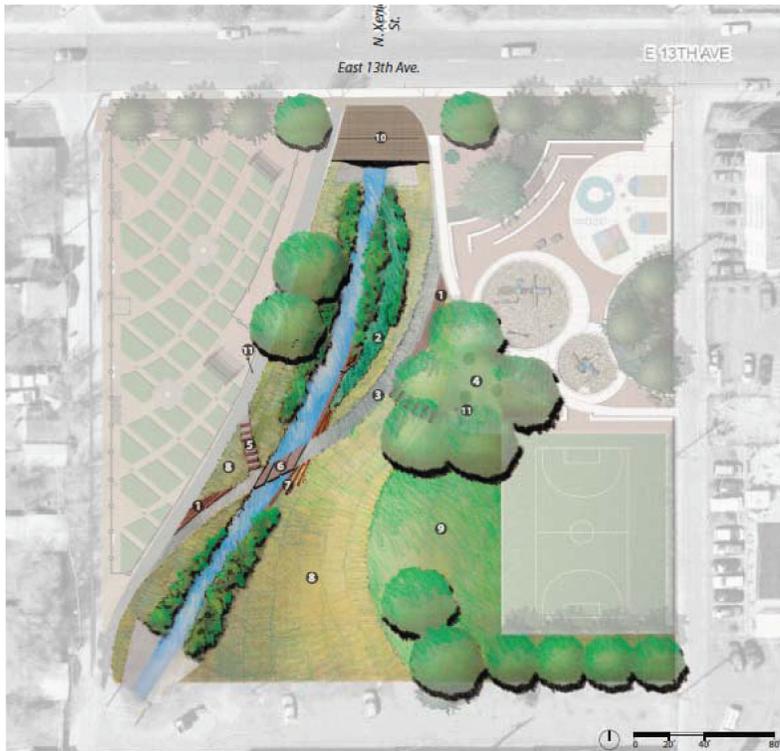
improve aesthetics; meet community needs; and provide wildlife habitat and passive recreation opportunities. The completed park includes a playground, sports field, expanded urban garden, walking trails, new lighting, and access to Westerly Creek, which runs through the parcel. The stream restoration will feature a variety of natural areas of native vegetation, including grassland, wetland, and riparian ecosystems, in addition to recreational greenspace where visitors can picnic.

The green infrastructure design work was funded by EPA's Office of Brownfields and Land Revitalization and by EPA Environmental Justice funds. Design work was completed by Wenk and Associates under an EPA contract with SRA International. EPA's \$50,000 design investment leveraged an additional million dollars in funding: \$500,000 in Natural Resource Damage Assessment (NRDA) funding from Lowry Landfill, \$205,000 in Denver Capital Improvement Funds, and \$295,000 from UDFCD. EPA helped coordinate the application for the NRDA funds.



The design was completed in 2012 and funding for implementation was acquired in 2013. While the original design covered an area less than one block long, Denver will extend the stream restoration to cover almost three blocks. The stream construction will likely begin in the fall of 2015.

This project was a positive experience for EPA, its partners, and the community. Listening to the community's needs improved the design, made it more acceptable to the community, and instilled confidence in the government. The project worked well because all of the partners were brought on in the initial stages.



LEGEND

- ① RETAINING WALL
- ② MARSH WETLAND
- ③ ASPHALT PATH
- ④ PICNIC GROVE
- ⑤ STEPPED RAMP - GARDEN ACCESS
- ⑥ STEPPING STONE CREEK CROSSING
- ⑦ STONE CREEK EDGE
- ⑧ NATIVE GRASS SLOPES
- ⑨ PLAY LAWN
- ⑩ DECK OVERLOOK
- ⑪ PARK LIGHT

Westerly Creek Master Plan. Source: U.S. EPA Region 8



Genetta Park Stream Restoration Project

Montgomery, Alabama

When the 50th anniversary of the 1965 Voting Rights March is celebrated in March 2015, residents of Montgomery, Alabama, will be able to mark the occasion with a new park at the city's gateway to the Selma to Montgomery National Historic Trail. The 54-mile trail commemorates events, people, and the march route of the Historic Civil Rights March. It begins in Selma and continues along U.S. Highway 80 to the State Capitol in Montgomery. Montgomery's new Genetta Park not only provides an attractive gateway to the trail, it is a neighborhood amenity with greenspace, trails, lighting, and important green infrastructure features designed to address stormwater management issues.

EPA Region 4, along with the City of Montgomery; Alabama Department of Environmental Management (ADEM); U.S. Army Corps of Engineers; U.S. Department of Housing and Urban Development (HUD); National Park Service; Department of Agriculture; Federal Highway Administration (FHWA); U.S. Geological Survey; and Maxwell Air Force Base were partners in the \$3.5 million project, which transformed a formerly contaminated site into greenspace, restored an urban stream, and is expected to spur continued revitalization of the surrounding community.

Genetta Park is located on a four-acre former brown-field site at the intersection of Fairview Avenue and Interstate 65. Flowing through the site is Genetta Stream, an urban waterway that is a major tributary of Catoma Creek, a previously listed Clean Water Act Section 303(d) impaired water body. Beginning in the 1960s, the stream was channelized underground using concrete pipes to facilitate urban development. This channelization led to an increase in impermeable surfaces, eliminated the stream and riparian habitat in the watershed, and increased pollutant loading.

The Genetta Stream Restoration Project began in 2009 and will be completed in three phases. Phase One created a constructed wetland, which included "daylighting" of Genetta Stream to bring it back to the surface and return it to its open, natural state. The constructed wetland and stream daylighting will help prevent sewage overflow into the stream and filter bacterial and stormwater runoff before it discharges to the Catoma Creek. The concrete pipelines were removed, a new channel alignment and floodplain were created, and the site was remediated due to brownfield contamination. 2D Studio LLC, the design firm Montgomery hired to create the master plan, proposed planting native shrubs, trees, and grasses to help naturally remediate contaminants in the stormwater. The \$1.5 million cost for Phase One was funded through an ADEM Section 319 grant, a loan from Alabama's EPA-funded Brownfields Revolving Loan Fund, and a HUD Community Development Block Grant. The city financed the design, acquired the land for the park, and contributed matching-share funds for federal program dollars.



Before Image of the Genetta Park area. Source: 2D Studio LLC



Phase Two of the project added green infrastructure to the park. EPA, FHWA, the National Park Service, and the City of Montgomery worked with the state on the green infrastructure design. The design added a permeable surface so that runoff can infiltrate the ground naturally and added walking paths, seating, and lighting to make the park safe and convenient. The goal of this phase was to use highly visible features to demonstrate how green infrastructure can be used as educational elements in an urban environment. Phase Two cost \$1.3 million and was funded through EPA's Clean Water State Revolving Loan Fund and HUD CDBG funds.

The third and final phase of the project is proposed and awaiting funding. Phase Three includes restoration of the half-mile of culverted stream that runs south from the park and lessens the impact of the modified stream on the unmodified, concrete channel. The proposed design incorporates abandoned water treatment lagoons along the unmodified portion of the channel and diverts water through a series of cross-veins that creates a flow similar to a meander system. This design connects the stream with the floodplain and allows for a natural hydrological function that reduces flood risk. This design also creates a sustainable habitat for species in the stream.

The Genetta Park Stream Restoration Project is part of a larger brownfields cleanup and community revitalization effort along the Selma to Montgomery National Historic Voting Rights Trail. The effort began as



Genetta Stream today prior to the third and final phase.
Source: 2D Studio LLC

a partnership between EPA and ADEM, along with the DOT and HUD, through the Partnership for Sustainable Communities. The goal of the project was to preserve the history of the trail while revitalizing the underserved neighborhoods it traverses.

Work began with EPA conducting 18 brownfields site assessments along the trail to determine the sites in most need of revitalization. EPA, the U.S. Army Corps of Engineers, and the National Park Service supported nine community visioning sessions, which allowed the communities to share their improvement and development ideas. The City of Montgomery also conducted community outreach sessions with HUD Community Development Block Grant funds.



The Mariposa-Lincoln Park Public Housing Redevelopment

Denver, Colorado

The Mariposa-Lincoln Park Public Housing Redevelopment is creating a new and energized transit-oriented community in one of Denver's oldest neighborhoods. The redevelopment, known as the "Mariposa District," offers proximity to downtown and a spectrum of housing options to residents, along with cultural diversity and environmental sustainability. The project is bringing economic, environmental, and social vitality to a Hispanic community with a long tradition of valuing the arts.

Following an EPA-funded brownfields environmental site assessment and a cleanup grant to the City and County of Denver, the site was purchased by Denver Housing Authority (DHA) for transformation into a mixed-use, transit-oriented development with affordable housing in a community with environmental justice concerns. Redevelopment in the neighborhood began in 2009 with the construction of LEED Platinum senior housing and a culinary school, both of which were built on former brownfields near a light rail station. Now in Phase III, the Mariposa District project is helping the neighborhood become a sustainable community with increased access to a range of transportation choices and over 800 units of mixed-income housing.

Green infrastructure elements are an integral part of this innovative and sustainable development project. A regional stormwater strategy workgroup was convened, and the City of Denver modified its Master Development Plan to include design of low-impact development and green infrastructure (porous landscape detention) in city rights-of-way to reduce stormwater runoff and protect water quality.



Right of way detention basin. Source: U.S. EPA Office of Brownfields and Land Revitalization

The Master Development Plan also was modified to include a goal of "net zero energy community" by setting CO₂ emission limits, in addition to an 80 percent decrease in energy consumption. This set a new standard for public housing. The project won a 2012 EPA National Award for Smart Growth Achievement. For a more detailed look into the planning process for the Mariposa District, please see the video linked below.

One of the keys to success was extensive stakeholder involvement from all levels of the community. DHA conducted 123 community meetings and group interviews with residents, community leaders, city agencies, and local government representatives to outline a path for the neighborhood prior to the charrettes. DHA collaborated with residents of La Alma/South Lincoln Park and partnered with the City and County of Denver. DHA asked the HUD/DOT/EPA Partnership for Sustainable Communities to support



Community members participating in a design charrette.
Source: U.S. EPA Office of Brownfields and Land Revitalization

design efforts. EPA funded and helped plan a series of community design charrettes focusing on energy, green infrastructure stormwater management, and transportation under a Partnership for Sustainable Communities Brownfields Pilot Program. Community members wanted to enhance La Alma/Lincoln Park's economic vitality while preserving its distinctive identity and strong sense of community.

The extensive partnership that has made this project possible includes:

- EPA Region 8
- EPA's Office of Brownfields and Land Revitalization, Office of Sustainable Communities, and energy efficiency, green infrastructure, and environmental justice programs
- Region 8's Partnership for Sustainable Communities (HUD/DOT/EPA)

- Department of Energy's National Renewable Energy Laboratory (NREL)
- State of Colorado
- City and County of Denver
- Denver Housing Authority
- Regional Transportation District
- CEL Energy, Auraria Campus
- Private landowners, academic experts and consultants.

DHA also received a HUD HOPE VI grant, using data and lessons learned from the design charrettes. EPA also partially funded a contracted energy modeling study conducted by the National Renewable Energy Laboratory. DOT provided funding for a light rail station that was already in place, and connectivity; and HUD is funding the next phase of mixed-income/mixed-use housing with energy and water design goals.

Video:

EPA's 2012 National Award for Smart Growth Achievement: The Mariposa District, Denver, CO



http://www.youtube.com/watch?feature=player_embedded&v=VNZEz47W_2Y



