

Denver Sun Valley Neighborhood-South Platte River Urban Waters Partnership and Making a Visible Difference in Communities 2011-2021

Urban Waters

The South Platte River emerges from the Rocky Mountain foothills southwest of the Denver suburb of Littleton, where it forms Chatfield Reservoir, a major source of drinking water for the Denver metro area. The South Platte River and a tributary, Cherry Creek, run through Denver. The river flows north through central Denver, which was founded along its banks at its confluence with Cherry Creek.

The Platte valley through Denver is highly industrialized with the population of Denver and the 12-county Denver metro areas of 727,211 (2019) and over 3.5 million, respectively. The City has the 10th largest central business district in the US. The South Platte River in downtown Denver is an important urban recreation amenity, heavily used by families and children from the inner city as well as kayakers.

Anyone who has spent time on the South Platte River in downtown Denver knows it is a much-loved resource. A warm day finds kayakers honing their skills and families frolicking in the shallows. The river is a particularly important recreational resource for low-income families. Much of Cherry Creek has been restored and developed to provide walkways and parks and those developments have promoted an attractive mix of uses.

Urban Water Quality Challenges

Historic flooding in 1965 led to the design and construction of Chatfield Dam and Reservoir. Following construction of the Chatfield project by the U.S. Army Corps of Engineers (USACE) that was completed in 1975, the river downstream was further impacted by narrowing and straightening the channel thus reducing habitat and affecting wildlife. Over the years, industrial and commercial and other development negatively impacted the river and adjacent habitat, resulting in further deterioration of the river ecosystem.

Much of the adjacent land is light or heavy industrial, and the residential areas tend to be poor and under-served. Not that many years ago, the South Platte was akin to an open sewer with garbage trucks dumping their loads into the river. Former gravel pits along the edges of the river were later used as landfills. Unfortunately, problems with bacteria in the river can make it unsafe for human contact. Much of this problem comes from the discharge of urban stormwater runoff into the river from Denver and other municipalities. The South Platte River does not meet water quality standards for E. coli and has other water quality issues.

The South Platte in Denver is on Colorado's 303(d) list of impaired water bodies for E. coli and nitrate. Both point and nonpoint sources of pollution affect water quality.¹ Urbanization and the resulting stormwater play a major role, with 130 stormwater outfalls entering the river in Denver. There are selenium and cadmium issues in groundwater that feeds the river and various contaminant plumes including solvents, trash and nutrient issues.

EPA and it's Partners Efforts to Improve Riparian Ecosystems

There are only 2510 acres or 2.5% of land cover that are wetlands and waterbodies with 714 acres of vegetated wetlands and ponds in the City and County of Denver². In 2013-2014, EPA funded the Colorado Natural Heritage Program to conduct 40 wetland condition assessments in Denver.

The City and County of Denver is partnering with the USACE (Omaha District) on a study to evaluate possible ecosystem restoration solutions to the degraded South Platte River habitat systems in Denver. The Southern Platte Valley Project area includes approximately 2.4 miles of the South Platte River from West Yale Avenue downstream

¹ [Basic Information about Nonpoint Source \(NPS\) Pollution](#), US EPA webpage.

² Smith, P and Kuhn, B; [Survey and Assessment of Critical Urban Wetlands](#), City and County of Denver, Colorado Natural Heritage Program, Warner College of Natural Resources, Colorado State University, Fort Collins, Colorado, June 2015.

(north) to West Mississippi Avenue. The purpose of the Southern Platte Valley feasibility study is to improve the quality and quantity of wetland and riparian habitats, create habitat connectivity and incorporate in-channel aquatics along South Platte River in Denver without reconfiguring existing infrastructure and without adversely impacting the existing floodplain. The report from this study, *The Integrated Feasibility Report and Environmental Assessment*, was approved.³

EPA has a strong commitment to Urban Waters. This has been demonstrated through various support, partnerships, and grants such as: selection of the South Platte as a Region 8 urban waters challenge, an Urban Waters Federal Partnership pilot in 2011, a Brownfields⁴ Area-Wide planning grant pilot for 5 catalytic sites on the river corridor, the South Platte RiverPlace Initiative brownfields assessment grant, an Urban Waters green jobs pilot, and the previous loan of 3 EPA staff, and for hometown funding under Administrator Lisa Jackson.

The City and County of Denver has also been a Sustainable Communities pilot and a green infrastructure program community partner. On March 8, 2016, EPA Administrator Gina McCarthy visited Denver Sun Valley to learn more about its selection as a “Making a Visible Difference in Communities⁵” project as one of 51 projects nationally and a Region 8 Federal Partnership for Sustainability project. EPA’s 2014-2018 strategic plan included a strategic goal for “Working to Make a Visible Difference in Communities. EPA worked to “Align community-based activities to provide seamless assistance to communities, both urban and rural, while maximizing efficiency and results” and “expand support of community efforts to build healthy, sustainable, green neighborhoods and reduce and prevent harmful exposures and health risks to children and underserved, overburdened communities.”⁶

Significant progress has been made to improve the South Platte River from an open sewer and center of industrial activity, to a place of economic vitality where people want to live and play. Denver has made a strong commitment to the South Platte River in its creation of parks, open space, greenways and trails along the South Platte and its goal to make the South Platte fishable and swimmable⁷. EPA has also made a significant additional investment in the South Platte River and Denver.

The City and County of Denver and many other partners have been working to transform the South Platte to improve water quality, provide sustainable and transit-oriented neighborhoods for low-income populations, create park and recreational opportunities, and make the river a city feature. Progress has been made and there is a master plan that divides the river into segments, river north and river south. Local organizations along with the City and County of Denver and led by the Greenway Foundation, have completed detailed plans for the South Platte corridor (River North (RINO)⁸ and River South (RISO)⁹ Greenway Master Plans), and the River Vision Implementation Plan (RVIP)¹⁰ which is a unified set of project priorities for the River corridor.

The Sun Valley Neighborhood Revitalization

The Sun Valley Community is a low-income community with little greenspace or recreational areas and disproportionately high rates of crime and illness compared to the rest of the Denver area. Denver’s Sun Valley neighborhood is the poorest neighborhood in the Denver region. The poverty rate in Sun Valley is five times higher than the city of Denver as a whole, with 71.5% of its residents living in poverty. Seventy percent of the households have children under the age of 18. Sun Valley is a 45-acre neighborhood, although much of Sun Valley’s population

³ [Section 1135 ecosystem restoration study: Integrated feasibility report and environmental assessment: Southern Platte Valley, Denver, Colorado](#), US Army Corps of Engineers, Omaha District, September 2018.

⁴ [Overview of EPA’s Brownfields Program](#), US EPA webpage.

⁵ [“Making a Visible Difference: Colorado”](#), US EPA webpage.

⁶ [“Working to Make a Visible Difference in Communities”](#), Performance.gov webpage

⁷ [“Denver Wetlands: Wet and Wild in the City”](#) Brochure; Natural Heritage Program Colorado, US EPA, City of Denver, Warner College of Natural Resources, Colorado State University.

⁸ [River North Plan](#), City and County of Denver, June 2003.

⁹ [The River South Greenway Master Plan](#), The Greenway Foundation, Greenwood Village, CO.

¹⁰ [River Vision Implementation Plan Projects](#), The Greenway Foundation, Greenwood Village, CO.

(94% according to the 2000 census) resides in 10 blocks dominated by affordable housing operated by the Denver Housing Authority (DHA). Only about 5% of the neighborhood's population live in owner-occupied units. Much of the rest of the neighborhood consists of industrial areas, parks, city service buildings and [Empower Field at Mile High](#) and its surrounding parking lots.

A primary goal of the master planning effort is to explore EcoDistrict¹¹ solutions for multiple sustainability issues such as energy, water management, food production, and wastewater management. One of the projects is centered on the Sun Valley neighborhood. RVIP projects near Sun Valley include a Sun Valley Riverfront Park and Weir Gulch improvements¹².

Improving conditions within the South Platte River corridor was the project focus for the City and County of Denver's brownfields area-wide planning effort, which started in 2010. The Sun Valley neighborhood is one of only 3 neighborhoods directly on the South Platte River, due largely to several industrial uses along the river including dry cleaners, former gas stations, rail lines, and highways. DHA is an extremely innovative affordable housing developer that designed the award-winning Mariposa/South Lincoln development which EPA also supported through various programs. Sun Valley is their next redevelopment that they want to be even more innovative. DHA has completed a master plan and started construction and demolition for a large infill redevelopment of the Sun Valley study area for 80 acres along the South Platte that will incorporate the Decatur-Federal light rail station. DHA, which owns 35 acres of mostly obsolete affordable public housing at Sun Valley and has acquired additional property, worked with Denver to develop a Station Area Plan for the light rail station, a General Development Plan, and the Sun Valley Transformation Plan for the study area.

The Sun Valley Choice Neighborhood Transformation Plan includes residents, community members, businesses, local, state federal government agencies and stakeholders that are invested and driven towards the revitalization of the Sun Valley Neighborhood. The Department of Housing and Urban Development (HUD) has committed \$30 million to a phased redevelopment project that will involve razing the existing housing stock and replacing with it a mixed-income development that will include new low-income units. Millions have also been invested in Sun Valley and nearby South Platte River restoration to improve safety, reduce flooding and provide recreational access. These and additional improvements in green infrastructure are expected to provide a variety of new ecosystem goods and services that will improve health and well-being for the community.

EPA supported the Plan with technical assistance and grants in the areas of energy efficiency, storm water and green infrastructure. DHA brought on an engineering firm that will develop cost estimates for the various components of a district energy system: four pipe network, ground source geothermal, solar, biomass boiler, etc. The National Renewable Energy Lab (NREL) created estimates of energy load.

DHA is a progressive and nationally recognized housing authority. They won the EPA Smart Growth Award for their previous low-income housing redevelopment in Denver – “The Mariposa Neighborhood”. They are taking a bold new approach to this development by creating an “Eco-District” model to provide holistic, shared water, energy, and stormwater solutions at the district level instead of building by building. This will reduce the cost of living for families and provide an advantage to businesses as well. The Infrastructure component of the Transformation Plan is designed with “resource smart” systems at the site, building, and district level with consideration or focus on various standards including LEED, Energy Star, and Enterprise Green Communities. Denver Housing Authority spun off an organization called the Sun Valley EcoDistrict (SVED LLC) to take over the complete redevelopment of the site. SVED is looking at EcoDistrict solutions to energy, water, and stormwater. The green infrastructure study funded by EPA was early key information that was utilized at a partner meeting put on by the Natural Resources

¹¹ EcoDistrict - An urban plan that aims to integrate objectives of sustainable development and social equity and reduce the ecological footprint of a neighborhood, urban area, or region. This notion insists on the consideration of the whole environmental issues by way of a collaborative process.

¹² [Sun Valley Riverfront Park, Neighborhood Park and Wier Gulch Improvements](#), City of Denver, Great Outdoors Colorado, The Trust for Public Land and The Greenway Foundation.

Defense Council. The area will need all new infrastructure including street grid, water, stormwater, and energy.¹³ SVED is collaborating with the stadium district on their entertainment district plans. A Riverfront Park is planned.

This Sun Valley neighborhood redevelopment is part of the greater Decatur-Federal Station Area Plan (funded through a HUD Sustainable Communities Grant), which guides future growth near the light rail station and the ~1,500 resident Sun Valley neighborhood, and adjacent to the South Platte River. The Partnership for Sustainable Communities (HUD-DOT-EPA) has been supporting planning work within this area for many years.¹⁴ EPA has funded design of some visible stream restoration improvements at the site along Weir Gulch. The area has also been the focus of the South Platte River Urban Waters Partnership.¹⁵

Weir Gulch

In 2012, EPA worked with The Greenway Foundation, City and County of Denver, and other stakeholders to find funding and implement the top 5 River Vision Implementation Plan Projects including Sun Valley Riverfront Park for the River Vision Coordination Committee. EPA put \$262,500 of hometown funding into contract with DHM Design Corporation to support green infrastructure design in Sun Valley Regional Park and Weir Gulch and Johnson-Habitat Park along the South Platte River.

EPA provided \$73,895 in Hometown funding in 2012 to the City and County of Denver through a contract with DHM Design Corporation to do the green infrastructure design work for this project and all the construction has been completed^{16 17}. The work is also part of the South Platte Urban Waters Partnership. The project is important because this is a high-profile area near Sports Authority Field at Mile High so it will attract positive attention. The environmental justice component of this project is attractive, and there is additional leveraging for the project including a Great Outdoors Colorado grant and funding from Denver and Mile High Flood District. HUD gave a Choice Neighborhoods grant to Denver Housing Authority for Sun Valley and there has also been light rail station planning efforts funded by HUD and DOT. EPA also provided \$188,605 for green infrastructure design work upriver at Johnson/Habitat Park. Aspects of green infrastructure include:

- Green infrastructure improves water quality, reduces flood impacts, improves wildlife habitat, and improves the quality of life and aesthetics for local residents.
- Partnering with other entities in a collaborative way achieves bigger results.
- Multi-benefit designs and infrastructure are more cost effective.
- Green infrastructure will have a bigger impact when it is holistically integrated with the other infrastructure (systems thinking).
- Green infrastructure can be integrated into greenways and bicycle transportation.

The Sun Valley/Weir Gulch plan includes rehabilitation of the riparian area with habitat (including a backwater improvement) and green infrastructure improvements along with park lands, and it will provide direct access to the river, a nature trail, and other significant improvements including a fishing jetty. The green infrastructure and stream rehabilitation will help to improve water quality.

Partners included City and County of Denver Parks Department, The Greenway Foundation, Capitol Representatives, Urban Drainage and Flood Control District, DHM, and the Environmental Protection Agency. Naranjo Civil Constructors was the contractor. The jetty on the South Platte provides handicapped access

¹³ [Community Planning and Development](#) – Sun Valley Neighborhood, City of Denver webpage.

¹⁴ [Making a Visible Difference in Communities: Colorado](#), US EPA webpage.

¹⁵ [Urban Waters and the South Platte Watershed from the Headwaters to the Denver Metropolitan Area \(Colorado\)](#), US EPA webpage.

¹⁶ [“Denver Investing in Parks along the South Platte River”](#), The Denver Post, August 5, 2014.

¹⁷ [“From What River? to River Vision: South Platte Getting \\$25 Million Upgrade”](#), Confluence Denver webpage, September 10, 2014.

to the River for the public and residents of Sun Valley. Weir Gulch has gone from a concrete conveyance emptying into the South Platte River into a safe attractive open space with a more natural flowing channel.

Brownfields:

A \$175K Brownfields Area-Wide Planning grant pilot was awarded to the City and County of Denver in 2010 for South Platte River corridor planning. An additional \$87,500 was added to the grant with EPA hometown funding to extend the grant to evaluate two additional catalytic brownfields sites along the South Platte River for a total of 5 sites. This funding was used to facilitate a community-driven systematic planning analysis of the identified brownfields impacted areas to assess information that will inform the assessment, cleanup and appropriate re-use opportunities of the sites based on the realities of the contamination levels, economic feasibility and the results of community design workshops. The funding will also be used to identify and prioritize catalytic brownfields clean-up and re-use projects along the river and complement the river and greenway improvements taking place as a result of the River Vision Implementation Plan¹⁸.

Under its \$400K South Platte RiverPlace Initiative, Denver used EPA Brownfields Assessment grant funds to conduct sampling activities in the Stadium parking lots beginning September 24, 2019. In partnership with the EPA Brownfields and Redevelopment Branch and the Stadium District, the City and County of Denver conducted Phase II fieldwork near the Denver Broncos stadium and Sun Valley neighborhood to inform largescale infill development by understanding any potential subsurface environmental concerns within the future rights-of-way as part of the Stadium District master plan. The master plan outlines redevelopment goals which include mixed-use development within the Sun Valley neighborhood and the existing Stadium parking lots. The redevelopment area is to be composed of both market-rate and affordable housing, along with other neighborhood destinations that are walkable and connected to a multimodal transportation system¹⁹. Historical operations in the area include a rug and upholstery cleaner, a coal yard, a filling station, paint and varnish businesses, an oil company, several junk yards, the Denver Pressed Brick Company and an area of historical landfill. Previous environmental studies indicated that there may also be an unknown source of tetrachloroethene (PCE) in groundwater and that the landfill may include asbestos-containing debris and landfill gases that could pose a risk.

The Region 8 Brownfields program has been assisting the Sun Valley EcoDistrict redevelopment since 2018 by using EPA contractors to conduct Targeted Brownfield Assessments (TBAs) to help SVED and DHA acquire new properties including the Xcel Energy Tank Farm. By September 2021, 15 properties received Phase I environmental assessments and 7 of those properties also received Phase II environmental assessments at a total cost of approximately \$170,000. These assessments will facilitate SVED/DHA adding over 19 more acres to the project. The additional land will allow for more park space, a community center and a jobs hub, as well as much needed income-qualified housing. On October 10, 2019, EPA's Assistant Administrator for the Office of Land and Emergency Management, Peter Wright, received a tour and briefing on brownfields efforts at Sun Valley from EPA and DHA staff.

EPA also brought in the National Renewable Energy Lab to assist SVED/DHA in developing energy design strategies for integrating high levels of energy efficiency and renewable energy into the project. The strategies are tailored towards an all-electric district that would be connected to move thermal energy between buildings as needed and shift energy demand to best utilize renewable energy, energy storage and even energy capture from the large metro wastewater line that runs along the side of SVED. The NREL effort was a multi-year project, funded largely by EPA HQ's former Office of Sustainable Communities, now the Office of Community Revitalization for a cost of \$80,000. This [publication](#) has more information.

¹⁸ [River Vision Implementation Plan Projects](#), The Greenway Foundation webpage.

¹⁹ [South Platte River Initiative – Revitalizing the South Platte River](#), City of Denver webpage.

Green Infrastructure Study

In order to support the goal of implementing sustainable redevelopment solutions, DHA is receiving technical assistance from EPA under follow-up to a brownfields area-wide planning grant for the South Platte River to evaluate green stormwater management alternatives that was incorporated into the Sun Valley Homes master plan. Maximizing the utility of green infrastructure by helping to manage on- and off-site stormwater at the Sun Valley Homes site will help to reduce contaminant flow into the South Platte River and preserve/improve water quality. DHA consultant, Design Workshop, prepared the master plan, including a conceptual plan for the green infrastructure and centralized stormwater detention alternatives for the project. The stormwater management alternatives will need to meet the local Mile High Flood District requirements, complement the overall vision for the redevelopment project and the South Platte River Greenway, and improve water quality for Weir Gulch and the South Platte River. Hydrologic modeling had already been performed by the civil engineering firm of Wilson & Company to support the preliminary master plan layout.

EPA provided brownfields land revitalization funding of \$50,000 under a technical support contract to ICF International, Inc. and Van Meter Williams and Pollack to identify green stormwater management alternatives that can be incorporated into the Sun Valley Homes master plan as part of a Sun Valley Green Infrastructure Study. The funding was follow-up support to the South Platte River brownfields area-wide planning grant/river corridor study. In order to support the goal of implementing sustainable redevelopment solutions, Denver and DHA requested technical assistance from EPA to identify green stormwater management alternatives that could be incorporated into the Sun Valley Homes master plan. Different conceptual green infrastructure and stormwater management options were evaluated and compared. For each option, a conceptual stormwater plan, a conceptual system performance assessment, and a conceptual cost estimate was completed. Each option was compared based on the following metrics: Performance (Water Quantity and Water Quality) and Cost (Capital Cost, Operating Cost, and Total Cost of Ownership [20-yr term]). A Green Infrastructure and Drainage Options report was completed. This report was intended to complement the master plan.

The completed study was a groundbreaking comparison of 4 different alternatives for managing stormwater that demonstrated the cost effectiveness of green infrastructure through looking at capital and 20-year maintenance costs²⁰. This study was some of the early work performed to assess the massive infrastructure needs for the redevelopment. Maximizing the utility of green infrastructure by helping to manage on- and off-site stormwater at the Sun Valley Homes site will help to reduce contaminant flow into the South Platte River and preserve and improve water quality. The stormwater management alternatives would need to meet the local Mile High Flood District requirements, complement the overall vision for the redevelopment project and riverfront park and the South Platte River Greenway, and improve water quality for Weir Gulch and the South Platte River. The work was completed at the end of 2015 and the report finalized in 2016. A fourth option was added in 2017.²¹

Children's Health 2015-2016

EPA has worked with the Rocky Mountain Pediatric Environmental Health Unit on outreach to Sun Valley residents particularly around asthma. The EPA Region 8 Children's Health Program worked with the Pediatric Environmental Health Specialty Unit (PEHSU) located at Denver Health. The PEHSU doctor, Dr. Mark Anderson, facilitated a community volunteer effort that included the following organizations:

- Denver Health Medical Center
- Sun Valley kitchen
- Denver Housing
- Mercy Housing
- Fresh Start Denver
- Sun Valley Youth Center

²⁰ [Evaluating Options for Green Infrastructure on a Brownfield](#), EPA Pub # 560 -F-19-005- O

²¹ [Sun Valley Stormwater Options](#), US EPA webpage.

The group determined that a community health needs assessment was necessary to focus any future work in the community. Dr. Anderson created a needs assessment as a guide for the volunteers to use during conversations with individuals in the community.

The PEHSU assembled a group of interested individuals, including EPA and HUD, for a community event Saturday December 19th, 2015, to conduct a needs assessment. Each winter a toy give-away function, called “Toys in the Hood”, is held in the Sun Valley, an event guaranteed to draw large crowds since donated presents are given away by Santa himself. The interview team met with 104 families and used the information collected to develop themes to guide subsequent interventions. The community expressed concerns about diet & exercise and general health, their mental health, asthma in children, water quality, and the upcoming changes to smoke-free housing. Languages covered by the group included: English, Spanish, French, and Somali.

Lead Program 2017-2018

In FY17 and FY18, EPA Region 8 continued implementation of the Denver Lead Renovation, Repair and Painting (RRP) Rule Place-based Initiative (PBI) that began in FY15 to protect the public and the environment from toxic lead-based paint hazards by increasing awareness and compliance of the RRP Rule in select geographic areas. The original pilot initiative concentrated outreach and education, compliance assistance, compliance monitoring and enforcement resources in six Northeast Denver neighborhoods over a three-year period. The FY17/FY18 effort focused on West Denver including the Sun Valley neighborhood. This area was selected after comparing demographic indicators across all states in Region 8 for the highest concentration and prevalence of risk factors that promote lead hazards and subsequent elevated childhood blood lead levels (BLLs).

Regional Sustainability and Environmental Sciences Research Program (RESES)

EPA’s Office of Research and Development and EPA Region 8 in Denver are partnering on a joint project under the EPA Regional Sustainability and Environmental Sciences (RESES) Research Program. The project is “Predicting/Modeling Improvements in Public Health and Ecosystems Goods and Services Associated with Major Urban Redevelopment and Infrastructure Projects at Sun Valley in Denver”. It was selected in 2012 as one of EPA’s 51 Making a Visible Difference Communities. About 30 acres is comprised of Denver Housing Authority’s (DHA) Sun Valley Homes, a public housing development that was built in the late 1950s. As a whole, Sun Valley has lagged substantially behind the growth, investment, and amenity improvements that have characterized metro Denver for the past two decades. It suffers notably from poor connectivity and street design, a lack of green and open space conducive to recreation and social interaction, high crime rates and overall lack of care compared to other neighborhoods in Denver. In 2015 DHA began undertaking a substantial Revitalization Effort to address these imbalances, and in doing so, to improve both the natural and built environment at Sun Valley as well as the lives, health, and well-being, for Sun Valley residents.^{22 23}

Rationale and methods:

The Sun Valley Revitalization Effort presents EPA with an unprecedented opportunity to study a community before transformation, and to model what can occur after a restoration project to improve our understanding of the connections between green space restoration, the environment, and human health outcomes. The concept of ecosystem goods and services (EGS) provides a useful framework for systematically exploring these connections.

Baseline levels and projected changes in EGS values in the Sun Valley neighborhood were estimated and evaluated in two ways. First, a base estimate of production for select ecosystem services was estimated based on land cover configuration present in 2018. Second, a projection of future changes in ecosystem service production was developed based on detailed architectural and landscape drawings obtained from DHA. The H2O²⁴ and i-Tree²⁵

²² [Teaming Up to Make a Visible Difference in Sun Valley, CO](#); US EPA website page.

²³ Eriksen, S; Nye, M, et. al.; [Predicting/Modeling Improvements in Public Health and Ecosystems Goods and Services Associated with Major Urban Redevelopment and Infrastructure Projects at Sun Valley in Denver](#), US EPA.

²⁴ [Ecosystems Services Scenario Assessment using EPA H2O](#), US EPA webpage.

²⁵ [Learn about i-Tree](#), itreetools.org.

models were used to produce these analyses. These were then connected to health endpoints in a conceptual model using a modified weight of evidence approach.

Findings:

Baseline (current) land cover in the Sun Valley neighborhood represents an urban residential configuration. The major categories are single/multi-unit residential, roads, and utility corridors. Lawn is also a dominant land cover feature in the current neighborhood. The lawn category is porous and dominated by ground vegetation such as grasses. Lawn areas contribute to some modeled services (e.g., stormwater retention) but do not contribute significantly to others (e.g., clean air). Other EGS providing land cover categories, such as trees and parks were all low in the baseline analysis. Projected change in land cover is high for several EGS providing categories. Lawn, vacant land, and utility corridors were all projected to decline by more than 10%, relative to area and in turn, open ground was projected to increase by more than 10%. Smaller relative increases were projected for trees and parks. The EPA H2O model estimates total ecosystem service benefits improvements of approximately \$24,000 per year from the proposed changes in land cover at Sun Valley compared to baseline, with a small positive change in EGS values from trees as predicted by iTree. ORD used the iTree and H2O models in a small geographic area and compared them to an alternative dataset developed by the South Platte River Urban Waters Partnership (South Platte Natural Capital Resource Assessment²⁶). The Natural Capital dataset had not been utilized in a neighborhood context before.

EPA also developed a conceptual model for translating and connecting EGS benefits to health endpoints for the Sun Valley population. EPA's model highlights a variety of *possible* health benefit pathways that can be traced first from priority neighborhood improvements to the EGS that could be affected by those improvements (e.g., tree planting to heat regulation). Pathways can then be further traced from EGS to health improvements that could be affected by improvements in EGS production (e.g., heat regulation to reduced incidence of heat-related illness). Further research is needed to understand how and why such pathways are mediated by other contextual factors and behavior not accounted for in this study²⁷.

EPA's Office of Research and Development (ORD) is conducting an additional effort. The effort is titled "Living Environment and Health: Designing an Impact Evaluation of Denver's Sun Valley Public Housing Redevelopment Project." The purpose of this pilot study is to understand and measure how housing and neighborhood conditions affect health outcomes for residents in two different public housing neighborhoods operated by Denver Housing Authority (DHA). Sun Valley is undergoing a complete transformation and revitalization effort linked to explicit health goals and outcome measures. ORD signed a Memorandum of Understanding (MOU) with the University of Colorado Denver (UCD), School of Architecture and Planning, to support health indicator and well-being assessment at Sun Valley ahead of and after planned revitalization. This work will leverage an existing grant received by UCD to perform a healthy neighborhood design assessment for Sun Valley. ORD will provide UCD access to their Human Well Being Index tool and perform analysis on data collected by UCD.

There is also potential future interest in supporting district level water treatment or greywater recycling, or both. EPA, Colorado State University and Colorado School of Public Health are already working with DHA to collect data on various environmental, built environment, and public health conditions and metrics at Sun Valley prior to revitalization. The aim of this project is to establish a baseline of measures for comparative outcome assessment once revitalization is complete. The proposed project extends these baselining efforts to include non-invasive saliva sampling and analysis of saliva for markers of stress, physiological status, and chronic infection and a survey for participants. Recent studies conducted by EPA at other project sites demonstrate a strong association between neighborhood environmental quality and allostatic load, a measure of stress hormones. The proposed study will collect and analyze samples of saliva from up to 50 residents from Sun Valley and 50 from Quigg Newton - another DHA neighborhood not undergoing revitalization that will represent the control for this study.

²⁶ [South Platte Natural Capital Project](#)

²⁷ [Modeling Improvements in Public Health in Sun Valley Denver, Colorado](#), US EPA webpage.

Progress on the Redevelopment

Soon this neighborhood will have new parks, streets with green infrastructure, an international food market, micro-restaurant cluster, community gardens, new mixed-income housing and a variety of educational opportunities for the youth and residents in the neighborhood. DHA has completed Phase I of the redevelopment as of January 2022. Phase I includes Gateway North and South with 187 units of affordable and market rate housing. Decatur Fresh, a local market, is now open, alleviating the food desert issues in Sun Valley. Phase II, GreenHaus and Thrive are currently under construction and will provide 264 units of affordable and market rate housing. Phases III and IV have structures that are being demolished. These phases will provide 401 units of affordable and market rate housing with 3 parcels for sale to other housing developers. Riverfront Park is slated to be completed in the summer of 2023. SVED LLC is wholly owned and controlled by DHA, but is currently dormant since staff have left. Current energy objectives are being pushed forward by DHA.

What's Next: EPA's Continuing Commitment to Urban Waters and Riparian Ecosystems

With EPA's partners, The City and County of Denver, the US Army Corps of Engineers, the Denver Housing Authority, and HUD, significant progress has been made to improve the South Platte River from an open sewer and center of industrial activity, to a place of economic vitality where people want to live and play. EPA looks forward to a continued commitment and effort to improve water quality, provide sustainable neighborhoods for low-income populations, create park and recreational opportunities, and make the river a city feature that Denver can be proud of.