

Schematic Designs

Biddle Parking Lot

Site Introduction & Existing Conditions

The Biddle Avenue parking lot sits at Frick Park's eastern edge in Regent Square, serving as one of the park's primary access points for trail users and park visitors. The lot consist of 0.X acres of unmanaged asphalt with no existing stormwater controls: runoff from the parking surface and adjacent impervious areas drains to Fern Hollow Creek via an existing MS4 outfall. While this drainage already reaches the stream, it arrives unmanaged—at volumes and velocities that contribute to streambank erosion and channel instability in the receiving reach. Existing trees adjacent to the lot must be protected, and the park-edge terrain immediately west of the lot falls within the City's steep slope and landslide-prone overlays, precluding in-situ infiltration and requiring careful management of any new discharges to the hillside.

Proposed Solution

The schematic design proposes a bioretention GSI retrofit of the existing parking lot—a system of vegetated, engineered planting beds that capture, filter, and slowly release stormwater runoff. Bioretention cells are sized to capture runoff from the lot and its directly connected impervious drainage area, providing stormwater quality treatment, volume reduction, and peak rate and temperature control before flows are released to the existing MS4 outfall and on to Fern Hollow Creek. By attenuating peak flows the project reduces the erosive impact of parking lot runoff on the receiving stream channel and its banks. The design prioritizes preservation of existing mature trees surrounding the parking lot and avoids grading and infiltration within the steep slope buffer.

Expected Performance & Implementation Considerations

The Biddle Lot GSI project is among the most straightforward of the five project areas from a regulatory standpoint, because the intervention avoids work both right-of-way work requiring coordination with DOMI and instream work in Fern Hollow itself requiring DEP/ACOE Chapter 105 permitting. Chapter 105 review could be required for any modifications to the existing MS4 outfall connection to the creek. Key implementation steps could include subsurface utility investigation and/or CCTV to confirm pipe condition and capacity, tree protection planning during construction, and coordination with the City on parking lot modifications.

DESIGN FEATURES:

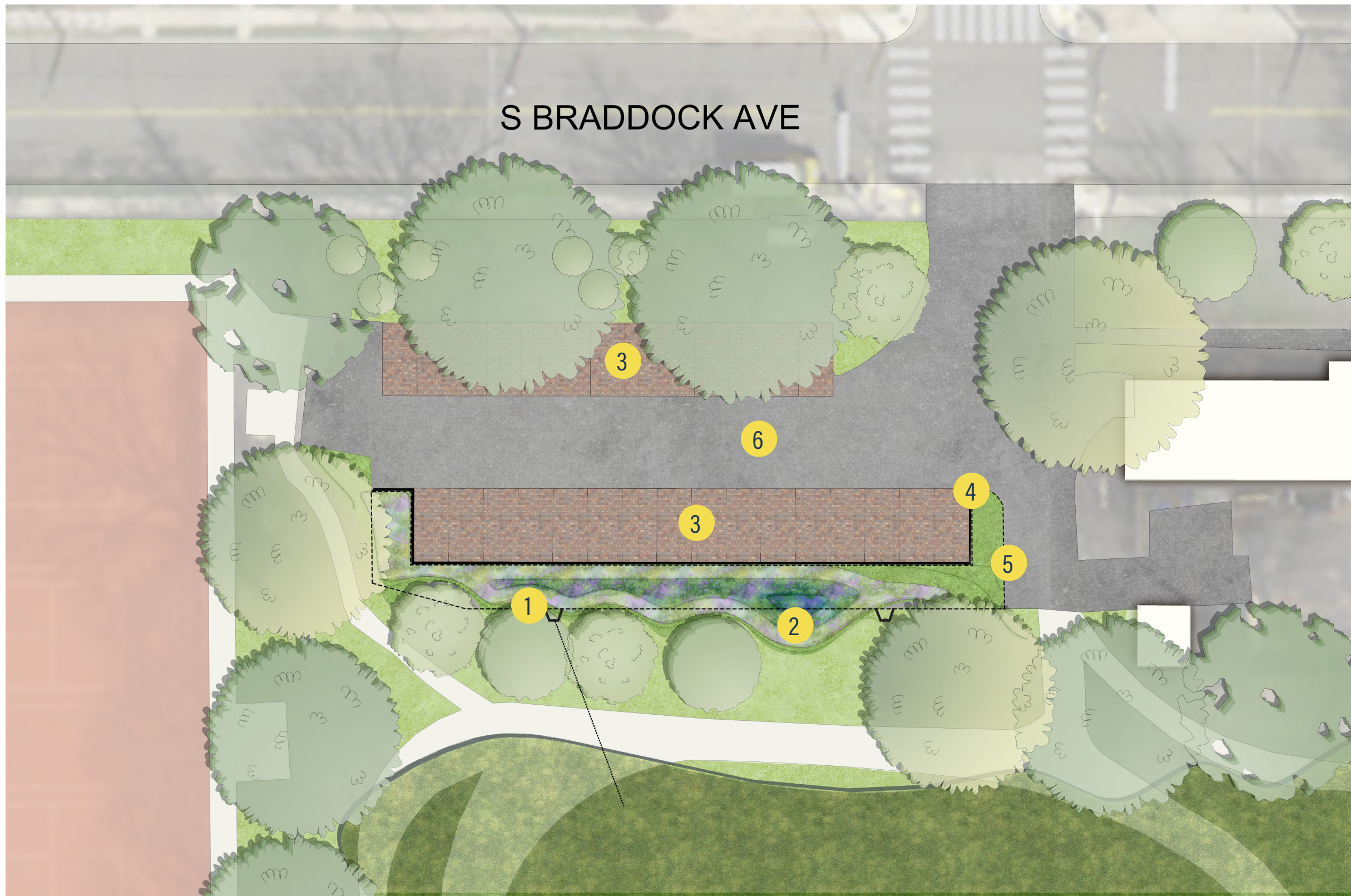
- Bioretention GSI retrofit of existing parking lot
- Provides stormwater quality, volume, and rate control to existing MS4 outfall tributary to Fern Hollow
- Reducing erosion of hillside

SITE CONSTRAINTS:

- Existing mature trees
- Adjacent to steep and landslide prone slopes
- Infiltration not permitted

PERFORMANCE METRICS:

- Note



DESIGN NOTES

- 1 CONVERT EXISTING STORM INLET TO OUTLET CONTROL STRUCTURE WITH SLOW RELEASE OUTLET TO EXISTING MS4
- 2 LINED BIORETENTION RAIN GARDEN
- 3 POROUS PAVER PARKING STALLS
- 4 CONCRETE CURB WITH CURB CUTS TO BELGIAN BLOCK FOREBAYS (PER YWCA DETAIL)
- 5 ASPHALT DEPAVING
- 6 ASPHALT MILLING & REPAVING

Biddle Parking Lot



Wetland

Site Introduction & Existing Conditions

The Wetland project area is located mid-valley within Frick Park, roughly midway along the Fern Hollow Creek corridor. It encompasses one of the most ecologically significant habitats in Pittsburgh’s urban park system: a functioning wetland complex supporting hydrophytic vegetation, seasonal ponding, and a range of wetland-dependent wildlife. The wetland and adjacent stream valley also serve as a natural floodplain, providing important water storage and flow attenuation during storm events. Despite its ecological value, the area is crossed by existing aggregate pathways and trail and sewer infrastructure that restrict the natural course of Fern Hollow Creek, concentrate surface flows, and contribute to erosion of both the trail surfaces and adjacent streambanks. Biddle Trail side drainage runnels are inadequate, leading to erosive flow across trail surfaces and into the wetland. The project area falls within the City’s landslide-prone overlay and within 50 feet of the steep slope overlay, and existing sewer infrastructure in the area is shallow and incompletely mapped. The shallow sewer infrastructure running beneath and adjacent to Tranquil Trail is a defining constraint at this site: it limits grading options, influences boardwalk foundation design, and — as the hydraulic barrier between the surrounding groundwater and the stream channel — is a primary driver of the altered hydrology that the project seeks to partially address.

Proposed Solution

The schematic design addresses the wetland area’s trail and hydrology problems through three coordinated interventions. First, existing aggregate pathways that restrict the course of Fern Hollow Creek through the wetland are replaced with elevated fiberglass boardwalks, removing physical obstructions from the stream channel and wetland and allowing natural floodplain inundation to occur without trail damage. Second, Tranquil Trail’s grade is raised above the floodplain elevation and fitted with cross drains, allowing the wetland and stream valley to flood naturally during storm events without eroding the trail surface. Third, Biddle Trail side drainage runnels are reinforced and improved with cross drains to intercept and manage erosive side flows before they reach the trail and wetland. Together, these interventions restore more natural hydrology to the wetland complex, improve ecological conditions, and provide an accessible, low-impact trail experience through one of the park’s most distinctive habitats. Seating, educational signage, and a small outdoor classroom space are incorporated into the boardwalk design.

Expected Performance & Implementation Considerations

The Wetland project carries the most significant regulatory complexity of the five project areas. All three design interventions involve work within or immediately adjacent to a jurisdictional wetland and regulated waterway. While some of the trail improvement work could possibly be completed through a Chapter 105 GP-7 Minor Road Crossing permit, realizing the full extent of proposed improvements would require a joint Individual Permit from PA DEP (Chapter 105) and the U.S. Army Corps of Engineers (Section 404), including a formal alternatives analysis and wetland impact mitigation assessment. Phasing and coordination with multiple agencies—including DPW, PA DEP, and USACE—will be essential. A tree survey and geotechnical investigation are required before design can be finalized. On the performance side, the USACE hydraulic model indicates that removing trail fill from the floodplain will increase wetland storage capacity and reduce flood inundation extents—measurable hydrologic benefits that complement the ecological restoration goals of the project.

DESIGN FEATURES:

- Existing aggregate pathways restricting the course of Fern Hollow to be replaced by elevated boardwalks
- Tranquil Trail grade raised above floodplain with cross drains permit wetland and stream valley to flood without eroding the trail
- Biddle Trails side drainage runnels reinforced and improved with cross drains to mitigate trail erosion

SITE CONSTRAINTS:

- Existing mature trees
- Existing jurisdictional wetland and multi threaded watercourse
- Extensive network combined sewers and relief sewer connections crisscross the site just below the surface.
- Intersection of multiple major trails that serve park users, and maintenance and emergency access

PERFORMANCE METRICS:

- Linear feet of trail to boardwalk conversion
- Cubic yards of trail bed transferred from floodway
- Area of wetland vegetation restored
- Linear feet of trail runnels repaired
- Number of cross drain connections



DESIGN NOTES

- 1 WETLAND OVERLOOK DECK AND SEATING
- 2 EXISTING TRAIL BE REPLACED WITH BOARDWALK AND WETLAND RESTORATION BELOW
- 3 BELGIAN BLOCK DRAINAGE RUNNEL TO STREAM
- 4 HILLSIDE REVEGETATION / STABILIZATION
- 5 RIPARIAN ENHANCEMENT PLANTINGS
- 6 TRANQUIL TRAIL GRADING ADJUSTMENTS

Wetland



Confluence

Site Introduction & Existing Conditions

The Confluence stream restoration project area is located at the lower end of the Fern Hollow Creek corridor, where the creek’s main stem meets Falls Ravine Creek near the intersection of Tranquil and Falls Ravine Trails. This reach of Fern Hollow is among the most ecologically stressed in the corridor: the hillside to the northeast is steep, highly eroded, and actively delivering sediment to the stream through gully erosion and bank failure. Established trees line the existing streambanks and must be preserved to the greatest extent possible, as their root systems provide critical bank stabilization. To the southwest, a combined sewer and a popular event lawn run parallel to the stream channel, constraining how far restoration grading and riparian planting can extend in that direction and limiting the available footprint for stream restoration work. Despite these constraints, the confluence node is a high-visibility, high-traffic location that presents a meaningful opportunity to demonstrate what a restored and ecologically functional Fern Hollow Creek can look like.

Proposed Solution

The schematic design proposes a suite of nature-based interventions focused on stabilizing the stream corridor and restoring its ecological function. Streambank and hillslope stabilization techniques—including live staking, brush layering, log toe protection, and riparian buffer plantings—address active erosion on the northeast hillside and along the creek’s banks, reducing sediment inputs and rebuilding bank structure without hard armoring. The riparian buffer zone is restored and expanded where space allows, replacing invasive species with native riparian plantings that reinforce bank stability, improve habitat connectivity, and enhance the ecological character of the corridor. A streamside trail extension and a series of access nodes—modest, low-impact interventions that bring park users to the water’s edge at carefully selected points—provide opportunities for education and environmental engagement while concentrating foot traffic away from sensitive bank areas. The existing event lawn to the southwest is preserved as a community asset and incorporated into the design.

Expected Performance & Implementation Considerations

Performance at this site is measured in ecological and physical restoration terms rather than hydrologic metrics. Key indicators include linear feet of streambank stabilized, area of riparian vegetation restored and expanded, number of stream access points provided, and area of event lawn preserved. This project carries significant regulatory complexity: all streambank stabilization and riparian restoration work within or adjacent to the Fern Hollow Creek channel and its floodplain requires a joint Individual Permit from PA DEP (Chapter 105) and the U.S. Army Corps of Engineers (Section 404). The presence of the combined sewer infrastructure adjacent to the project area will require coordination with Pittsburgh Water throughout design development. A tree survey is needed to document existing bank trees before final stabilization techniques can be selected, and geotechnical assessment of the eroded northeast hillside is a prerequisite for hillslope stabilization design.

DESIGN FEATURES:

- Nature-based streambank and hillslope stabilization
- Riparian zone restoration and expansion
- Streamside trail extension and access nodes for education and engagement

SITE CONSTRAINTS:

- Existing watercourse with established trees along banks
- Steep and highly eroded hillside to the NE
- Combined sewers and existing popular event lawn to the SW run parallel to stream bound limits to space available for stream restoration

PERFORMANCE METRICS:

- Linear feet of trail to boardwalk conversion
- Cubic yards of trail bed transferred from floodway
- Area of wetland vegetation restored
- Linear feet of trail runnels repaired
- Number of cross drain connections



DESIGN NOTES

- 1 STREAMSIDE TRAIL
- 2 EXPANDED RIPARIAN BUFFER
- 3 ROCK SILL ACCESS NODES
- 4 SANDSTONE BOULDER TERRACE / SEATWALL WITH ACCESS RAMP
- 5 CROSS VANE
- 6 LIVE CRIBBING BANK STABILIZATION AT CULVERT
- 7 EXISTING BRIDGE / CULVERT
- 8 HILLSIDE REVEGETATION / STABILIZATION

Confluence



Confluence Enlargement

Site Introduction & Existing Conditions

The Confluence pavilion and restroom project focuses on the trail node at the intersection of Tranquil Trail and Falls Ravine Trail—the most heavily trafficked convergence point in Frick Park and a natural gathering place for trail users arriving from multiple neighborhoods. Despite its prominence as a park destination, the site currently lacks permanent restroom facilities, covered rest areas, and wayfinding amenities. Existing sewer and electrical utility connections that once served facilities at this location have been severed, leaving the site without the infrastructure needed to support new facilities. Mature trees are present adjacent to the trail and throughout the proposed facility area, constraining siting and requiring careful protection during construction. The intersection itself serves not only recreational trail users but also park maintenance and emergency access routes, a function that must be preserved throughout construction and in the permanent design.

Proposed Solution

The schematic design proposes reconstruction of an accessible restroom and picnic pavilion at the Confluence node, with restored water, sewer, and electrical utility connections. The facility program includes accessible restrooms, covered picnic shelter, a bike repair station, and a dog water fountain—amenities identified as priorities through the Fern Hollow Vision Plan community survey. An informational kiosk is sited at the confluence of Falls Ravine and Tranquil Trails, providing wayfinding, park history, and interpretive information at the point where most park users naturally pause. Additionally covered benches along Tranquil Trail offer respite, shelter, and views of the event lawn and Fern Hollow’s enhanced riparian border. The kiosk and shelter structures are designed to complement the natural character of the Fern Hollow valley, using materials and forms appropriate to a forested park setting.

Implementation Considerations

The utility restoration challenge is the central implementation hurdle at this site. Reconnecting water, sewer, and electrical service to a facility deep within Frick Park will require tracing, investigating, and likely reconstructing utility runs of significant length through established park land—a process that demands early coordination with Pittsburgh Water, Duquesne Light, and the City’s Department of Parks & Recreation. CCTV of the existing sewer lateral is a high-priority prerequisite before sewer tap-in plans can be finalized. Construction access and staging must be carefully planned to maintain pedestrian, maintenance, and emergency vehicle access through the active trail intersection at all times, and tree protection measures must be established early given the density of mature canopy at and around the facility site. Coordination with Parks & Recreation on design standards, long-term maintenance responsibilities, and operational requirements—including restroom hours and seasonal closures—will be essential before the project can be finalized.

DESIGN FEATURES:

- Reconstruction of accessible restroom and picnic pavilion with restored water, sewer, and electrical utility connections.
- Additional covered rest areas and kiosk at the “confluence” Falls Rivine and Tranquil Trails.

SITE CONSTRAINTS:

- Intersection of multiple major trails that serve park users, and maintenance and emergency access
- Existing sewer and electric utility connections severed
- Mature trees adjacent to trail and facilities

PERFORMANCE METRICS:

- Note



DESIGN NOTES

- 1 EXISTING RESTROOM REPLACED WITH ACCESSIBLE CXT PREFABRICATED RESTROOM
- 2 LOW PITCHED GABLE WOOD SHELTER - 20X28' WITH RESTORED CONCRETE FOUNDATION
- 3 CONFLUENCE INFORMATION KIOSK
- 4 MILLED TIMBER BENCH WITH CANOPY COVERING
- 5 RESTORE ELECTRIC SERVICE TO RESTROOMS AND PAVILION
- 6 REPLACE BROKEN SEWER LATERAL CONNECTION FOR RESTROOMS

Confluence Enlargement



Henrietta GSI

Site Introduction & Existing Conditions

The Henrietta Street GSI project area encompasses the residential rights-of-way along Henrietta Street and LaClair Street in Regent Square, immediately adjacent to Frick Park’s eastern boundary. The project area drains a combined total of 6.27 acres, of which 3.70 acres is directly connected impervious surface—residential streets, driveways, a parking lane, and an alley whose runoff currently enters the combined sewer system via street catchbasins, bypassing Fern Hollow Creek entirely. The adjacent Environmental Charter School campus generates significant pedestrian and vehicular traffic pressure during school pickup and drop-off, a factor that constrains both construction sequencing and the design of right-of-way features. Existing utilities within the ROW, mature street trees, and the steep and landslide-prone slopes along the flow path from the street to the park are additional constraints that shape where and how GSI features can be placed.

Proposed Solution

The schematic design proposes a “street creek” networked ROW GSI retrofit—a connected series of green infrastructure features distributed along Henrietta Street and LaClair Street that collectively capture, treat, and slowly release stormwater that currently flows to the combined sewer. Features include curb bumpout stormwater planters, a porous paving parking lane, a porous paving “green” alley retrofit, and subsurface stormwater storage with slow release. Together, these features intercept combined-sewer-bound runoff at or near its source and route treated stormwater to a new, energy-dissipating MS4 outfall within Frick Park, restoring flow to Fern Hollow Creek while reducing the volume of stormwater entering the combined sewer system. This reduction in combined sewer inflow directly lowers the risk of CSO discharges to Nine Mile Run during storm events. The networked design is intentionally phased and expandable, allowing individual features to be constructed incrementally as funding and right-of-way coordination allow.

Expected Performance & Implementation Considerations

Based on schematic-level analysis, the project is sized to detain approximately 15,908 cubic feet of stormwater during the 95th percentile storm event across a contributing drainage area of 6.27 acres. Implementation requires DOMI coordination for all right-of-way work; DPW coordination for connection to the existing MS4 outfall in the park; and Pittsburgh Water coordination for work around and/or relocation of existing combined sewer catchbasins. Subsurface utility investigation and CCTV inspection of existing infrastructure are prerequisites before design can be finalized. Construction phasing should be coordinated with the Environmental Charter School academic calendar to minimize disruption during peak school traffic periods. The project’s networked, modular design allows individual features to be permitted, funded, and constructed in phases—an important advantage given the complexity of ROW coordination in an active residential neighborhood.

DESIGN FEATURES:

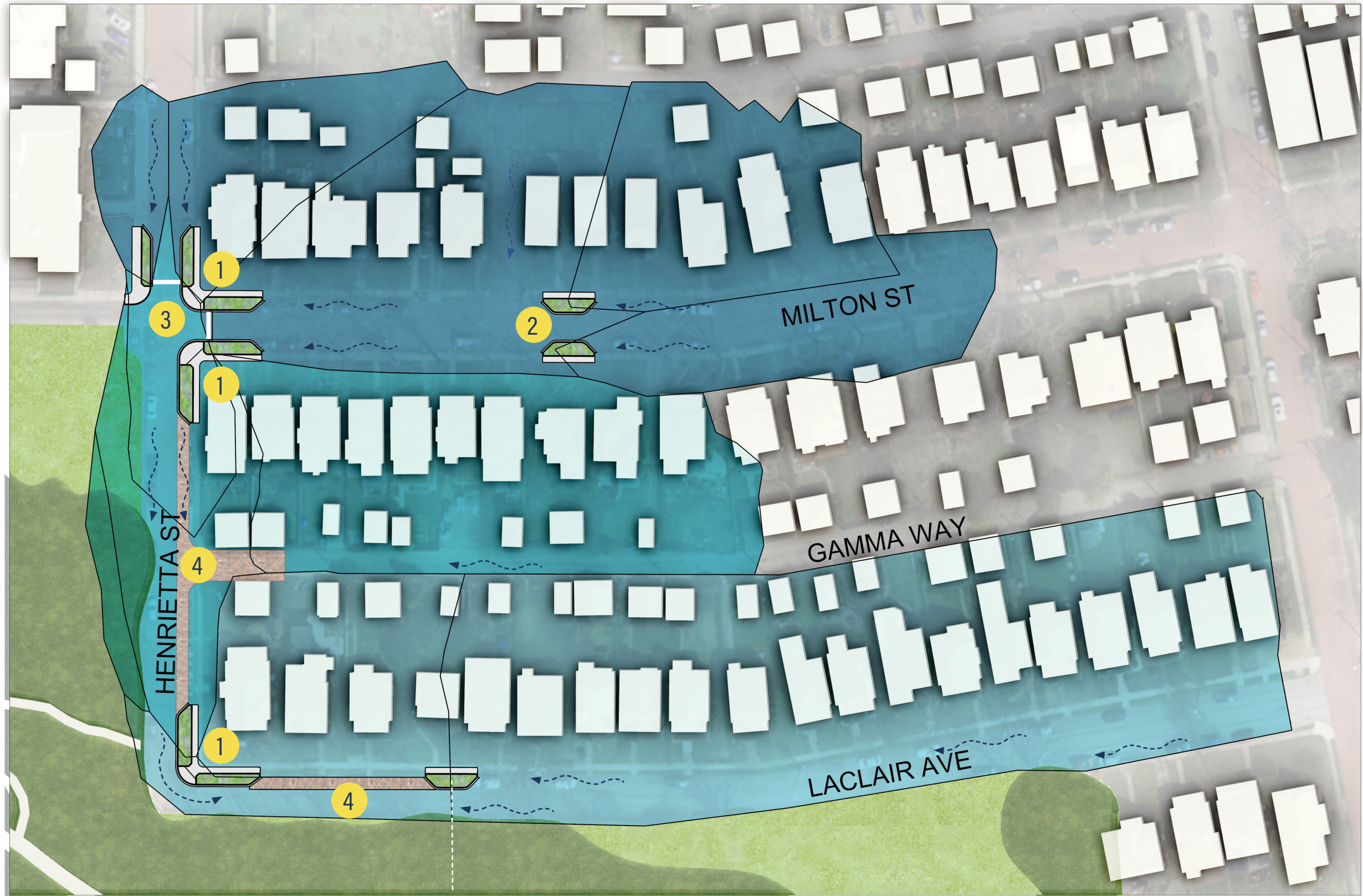
- “Street creek” networked ROW GSI retrofit
- Curb bumpout stormwater planters
- Porous paving parking lane
- Porous paving “green” alley retrofit
- Subsurface stormwater storage with slow release

SITE CONSTRAINTS:

- Steep and landslide prone slopes adjacent to project area and along flow path to stream
- Existing utilities within ROW
- Existing flood control level service within the neighborhood
- Mature trees along right of way
- Heavy pedestrian and vehicular parking and traffic pressure at school pickup / drop off times

PERFORMANCE METRICS:

- Total Drainage Area Captured: 6.27 Acres
- Directly Connected Impervious Area: 3.70 Acres
- 95th Percentile Storm Volume Detained: 15,908 CF
- GSI Footprint:
- Loading Ratio:
- Cost per Impervious Acre Managed:



DESIGN NOTES

- 1 CURBED BIORETENTION GARDENS WITH SIDEWALK RESTORATION AND CONCRETE GUTTER
- 2 FLOW THROUGH STORMWATER PLANTERS
- 3 TRENCH DRAIN CONVEYANCE
- 4 POROUS PAVER PARKING LANE CAPTURE AND CONVEYANCE SYSTEM
- 4 PIPE SLOPE OVERFLOW AND CONVEYANCE SYSTEM TO FERN HOLLOW CREEK

LEGEND

- Drainage Area - Primary Capture
- Drainage Area - Secondary Capture
- Drainage Area - Tertiary Capture
- Stormwater Flow Direction

Henrietta GSI

Overton GSI

Site Introduction & Existing Conditions

The Overton Street GSI project area encompasses residential rights-of-way along Overton Street in Regent Square, north of the Henrietta Street corridor and closer to the upper portion of the Fern Hollow Creek watershed. The project area drains 5.37 acres, of which 3.01 acres is directly connected impervious surface whose runoff currently enters the combined sewer system via street catchbasins—bypassing Fern Hollow Creek and contributing to combined sewer overflow risk in Nine Mile Run downstream. As with Henrietta Street, steep and landslide-prone slopes run adjacent to the project area and along the flow path from the street to the park, existing utilities are present within the ROW, and mature street trees constrain feature placement. The existing combined sewer system provides a degree of flood control service to the neighborhood that the GSI design must account for—ensuring that stormwater intercepted from the combined system is managed in a way that does not increase flood risk for adjacent properties.

Proposed Solution

The schematic design proposes a “street creek” networked ROW GSI retrofit combining surface and subsurface stormwater management features. Curb bumpout stormwater planters capture and filter runoff along Overton Street, while a neighborhood “parklet” subsurface stormwater storage node at the corner of Overton and Macon Avenue serves as the project’s primary detention element. The storage node adapts an existing sloped parklet space—gently regrading to create a small “event lawn” at grade while providing subsurface detention volume below—and routes treated stormwater with slow release to the existing MS4 outfall within Frick Park and on to Fern Hollow Creek. By intercepting combined-sewer-bound runoff and returning it to the stream through a managed, attenuated release, the project restores flow to Fern Hollow while reducing combined sewer inflow and the associated risk of CSO discharges to Nine Mile Run.

Expected Performance & Implementation Considerations

Based on schematic-level analysis, the project is sized to detain approximately 12,812 cubic feet of stormwater during the 95th percentile storm event across a contributing drainage area of 5.37 acres. Implementation requires DOMI coordination for all right-of-way work; DPW coordination for connection to the MS4 outfall connection; Pittsburgh Water coordination for work around and/or relocation of existing combined sewer catchbasins. Subsurface utility investigation and CCTV inspection of existing infrastructure are prerequisites before design can be finalized. The subsurface storage node will require geotechnical assessment given the proximity of steep and landslide-prone slopes along the flow path to the park.

DESIGN FEATURES:

- “Street creek” networked ROW GSI retrofit
- Curb bumpout stormwater planters
- Neighborhood “parklet” subsurface stormwater storage node with slow release to existing MS4 outfall in park
- Storage node adapts sloped parklet space, flattening the grades slightly to create a small “event lawn” space at the corner of Overton and Macon ave

SITE CONSTRAINTS:

- Steep and landslide prone slopes adjacent to project area and along flow path to stream
- Existing utilities within ROW
- Existing flood control level service within the neighborhood
- Mature trees along right of way

PERFORMANCE METRICS:

- Total Drainage Area Captured: 5.37 Acres
- Directly Connected Impervious Area: 3.01 Acres
- 95th Percentile Storm Volume Detained: 12,812 CF
- GSI Footprint:
- Loading Ratio:
- Cost per Impervious Acre Managed:



DESIGN NOTES

- 1 CURBED BIORETENTION GARDENS WITH SIDEWALK RESTORATION AND CONCRETE GUTTER
- 2 FLOW THROUGH STORMWATER PLANTERS
- 3 TRENCH DRAIN CONVEYANCE
- 4 UNDERGROUND STORMWATER STORAGE SYSTEM WITH PIPED CONNECTION FROM BIORETENTION SYSTEM
- 5 MINOR GRADING OF EXISTING LAWN AREA TO ACCOMMODATE UNDERGROUND STORAGE SYSTEM
- 6 PIPE SLOPE OVERFLOW AND CONVEYANCE SYSTEM TO FERN HOLLOW CREEK

LEGEND

- Drainage Area - Primary Capture
- Drainage Area - Secondary Capture
- Stormwater Flow Direction

Overton GSI