The Monroe Avenue Green Innovation Grant Program (GIGP) is designed to re-integrate natural systems into the Monroe Avenue corridor. Through the use of rain gardens, vegetated swales and the introduction of permeable paving surfaces, the Town of Brighton is retrofitting this vital corridor with cohesive and sustainable green technologies.

There are two key objectives for this project in order to meet the goals of the Vision Plan and the GIGP project:

- Engage the local community and the affected business owners along the street and continue to solicit input, build consensus, transfer “ownership,” and clarify the methods of beautification improvements to the key stakeholders.
- Develop designs that are aligned with the community’s desires which function as sustainable infrastructure practices that can be completely understood, constructed, and maintained by the Town.

Water Quality Benefit Goals

- Runoff Volume Reduction
- Sediment Reduction
- Road Salt Reduction
- Phosphorus Reduction
- Nitrogen Reduction
- Increased Linear Feet of Streambank/ Shoreline Protection
- Increased Linear Feet of Stream Channel Stabilization

NEW YORK STATE
Environmental Facilities Corporation
Andrew M. Cuomo, Governor Matthew J. Driscoll, President and CEO

The Green Innovation Grant Program (GIGP) supports projects across New York State that utilize unique stormwater infrastructure design and create cutting-edge green technologies.
GIGP-funded projects may be found from Buffalo to the end of Long Island, and range from rain gardens to stream "daylighting" projects.

GIGP provides funding for highly-visible projects which:

- Protect and improve water quality
- Spur innovation in stormwater management
- Build capacity locally and beyond by inspiring others to build and maintain green infrastructure
- Facilitate the transfer of new technologies and practices to other areas of the State.

SCAN to find out more about the GIGP program or visit www.efc.ny.gov

PROJECT LOCATION MAP

Monroe Avenue Green Innovation Grant Program (GIGP)

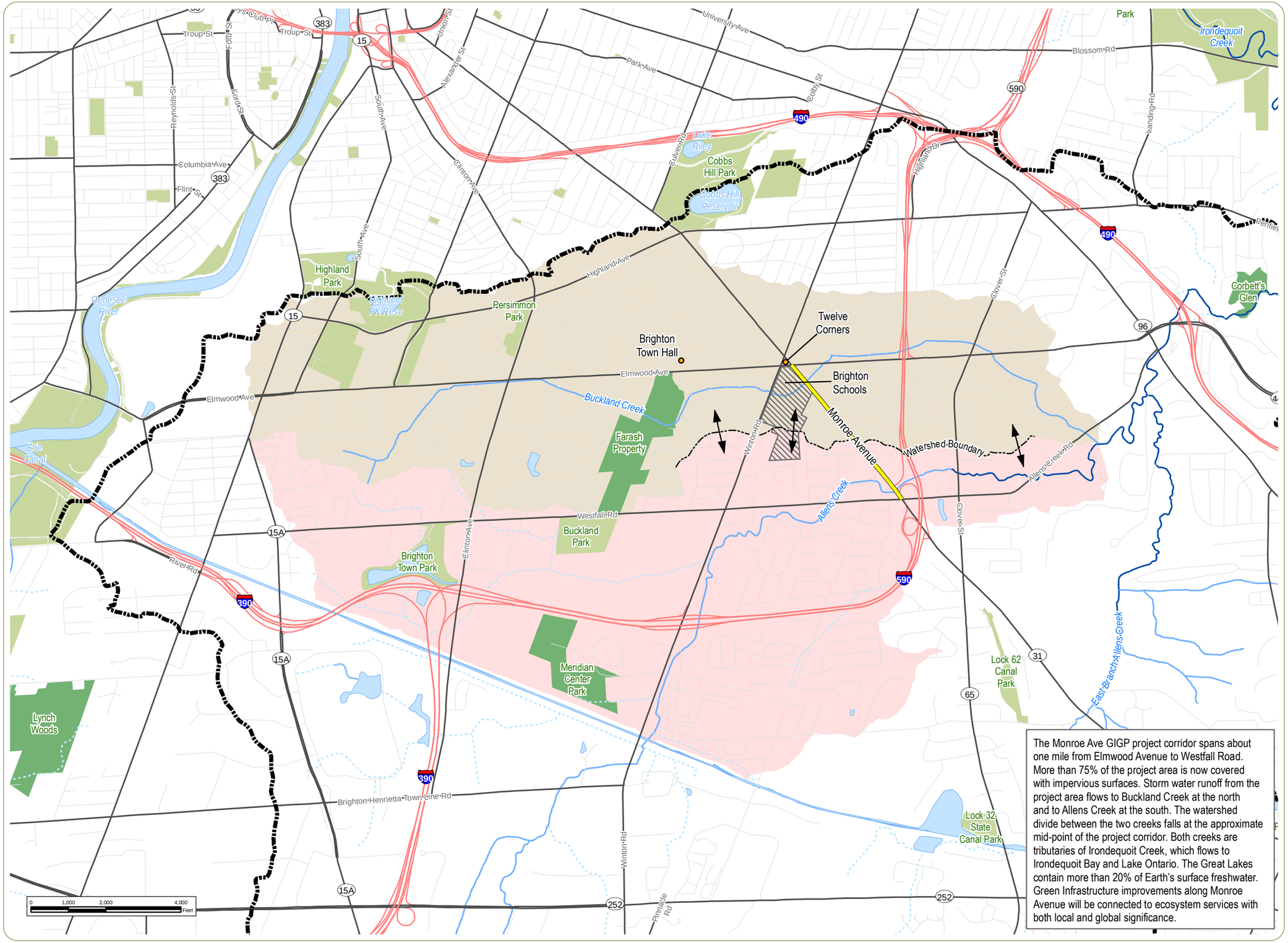
Brighton, Monroe County, New York

Monroe Avenue Green Innovation Grant Program

Town of Brighton,
Monroe County

Allens Creek Watershed

March 2013



The Monroe Ave GIGP project corridor spans about one mile from Elmwood Avenue to Westfall Road. More than 75% of the project area is now covered with impervious surfaces. Storm water runoff from the project area flows to Buckland Creek at the north and to Allens Creek at the south. The watershed divide between the two creeks falls at the approximate mid-point of the project corridor. Both creeks are tributaries of Irondequoit Creek, which flows to Irondequoit Bay and Lake Ontario. The Great Lakes contain more than 20% of Earth's surface freshwater. Green Infrastructure improvements along Monroe Avenue will be connected to ecosystem services with both local and global significance.

- GIGP Project Area
- Allens Creek Watershed
- Class B Stream
- Class B(T) Stream
- Class C Stream
- Park
- edr Park Project Area
- Allens Creek Subbasin
- Buckland Creek Subbasin

Allens Creek Watershed - 20,188 acres
Buckland Creek Subbasin - 2,450 acres
Allens Creek Subbasin - 2,500 acres

Notes:
1. Basemap: ESRI StreetMap North America, 2008.
2. Waters classified as C(T) and higher are protected by the NYSDEC.

N W E S

edr COMPANIES

www.edrcompanies.com

Brighton, Monroe County, New York

MONROE AVENUE CORRIDOR COMMUNITY VISION PLAN

The Brighton/Monroe Avenue Corridor Vision Plan is based on the ideas generated in the Brighton/Monroe Avenue community Charrette held on June 5th and the feedback gathered at the subsequent Town Hall meetings held on July 27 and November 4, 2010. The vision plan provides written and visual design plans reflecting the goals and ideas of local residents and community stakeholders for the future development of the Monroe Avenue Corridor.

“A goal for the Charrette and Vision Plan was to create a plan for the future of Monroe Avenue, a major thoroughfare in the Town of Brighton.”

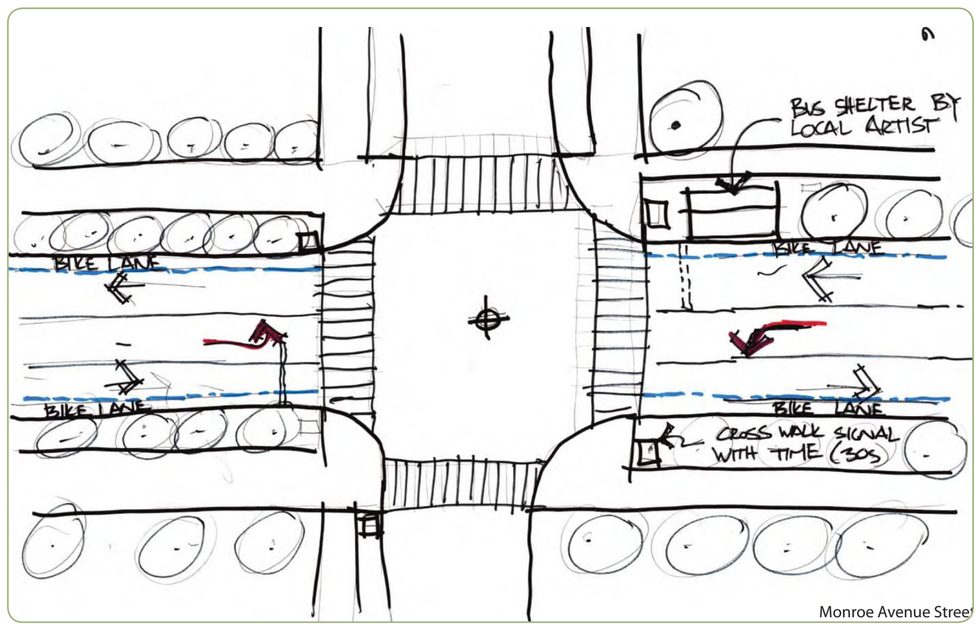
Some of the goals for the vision plan include:

- Place a buffer zone between the sidewalk and through traffic, especially near schools;
- Realign existing streets, resulting in a more defined green space and interface with pedestrians;
- Use landscape and trees to beautify and screen parking areas from the street, increase the number of trees along the avenue;
- Respecting, reclaiming and preserving existing historical buildings and green space;
- Enhance and utilize the local and natural resources of Buckland Creek and Allens Creek - utilize existing natural resources such as creeks and green spaces, providing access and improved landscaping and maintenance;
- Integrate and highlight neighborhoods using gateways and improved access;

“Green, sustainable practices should be incorporated where possible along with an emphasis on greening the streets and sidewalks with landscaping and planting.”

“The goal of community members is to make Brighton and Monroe Avenue a destination with gateways defining its identity.”

SCAN to find out more about the project or visit www.townofbrighton.org



Monroe Avenue Corridor Community Vision Plan

PROPOSED BUCKLAND CREEK REVITALIZATION

Creating vistas at Monroe Avenue as well as rerouting the creek through the parking lot bring focus back to the natural resource.

Monroe Avenue Corridor Community Vision Plan

CHARRETTE AREA PLAN

Monroe Avenue Corridor Community Vision Plan

BIKE WALK BRIGHTON

The objective of the Brighton Pedestrian and Bicycle Master Plan is to develop a plan for a well-connected, safe, and functional active transportation network of sidewalks and on- and off-road trails to enhance the safety and circulation of pedestrians, bicyclists, and motorists. BikeWalkBrighton is the next step towards community sustainability. Overall concepts include:

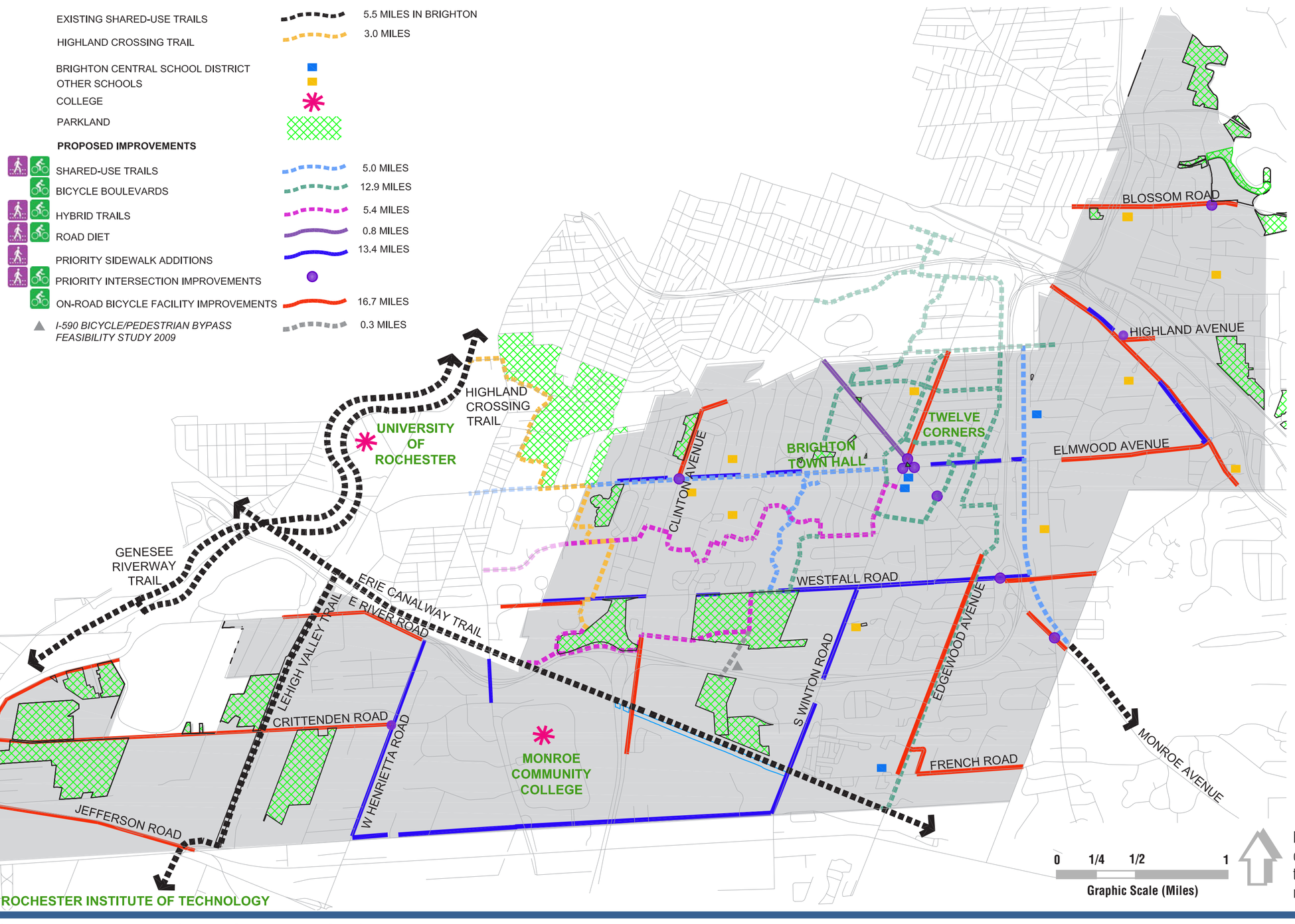
- Support the continued development of safe, functional and attractive facilities for biking and walking in Brighton;
- Emphasize the importance of connectivity to priority destinations within Brighton and synergy with parallel initiatives in nearby locales;
- Aim for an inclusive system that recognizes the wide range of mobility levels of all pedestrians and bicyclists in Brighton. Compliance with the American with Disabilities Act (ADA) is a priority for pedestrian facilities;
- Pursue a balance of on-road and off-road facilities that will meet the current needs of walkers and riders and create a supportive environment for progressing today's 'B' and 'C' riders to tomorrow's 'A' riders;
- BikeWalkBrighton studied Monroe Avenue as a key transportation corridor. Recommended improvements could reduce short distance car trips by increasing walking and bicycling, and decrease the amount of traffic and congestion along the corridor.
- With the development of this plan, the Town of Brighton is taking a progressive stance in addressing important issues, such as rising fuel prices, environmental degradation, and health problems related to inactivity;
- BikeWalkBrighton is an important step for the Town of Brighton's evolution as a safe and sustainable community.

BIKE WALK brighton

SCAN to find out more about the project or visit www.bikewalkbrighton.org

Figure 15

Overview



Brighton, Monroe County, New York

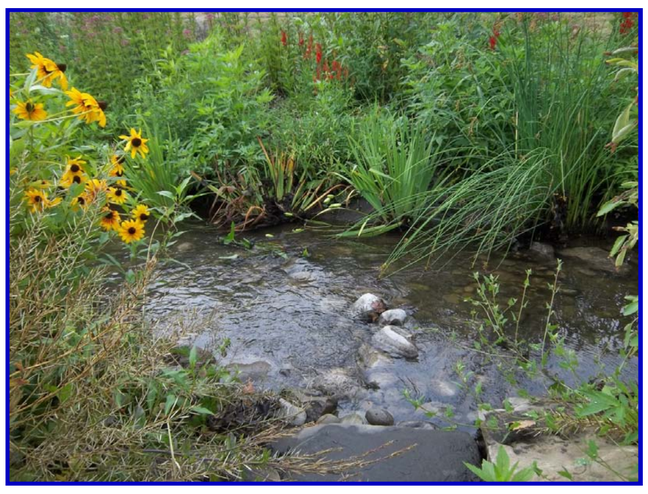
BUCKLAND CREEK RESTORATION

Buckland Creek flows through school campuses, backyards, and the 12 corners commercial area in Brighton before discharging into Allens Creek. The Buckland Creek Watershed / drainage area is 2,450 acres in size and contains almost 4,000 homes in central Brighton. The value of the creek had not always been recognized as the community developed. Sections of the creek are piped or channelized and the water quality has declined due to pollution from stormwater runoff.

“Inspired by the efforts of students at Brighton High School to study and protect the Creek, several community partners applied for and received grants from NYS and the Fish and Wildlife Foundation to support restoration activities.”

East Segment—August 2011

East Segment—July 2012

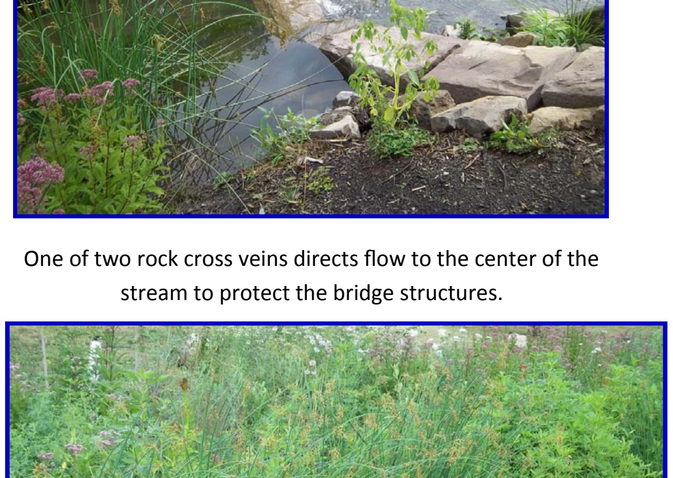


Riffle areas were created to improve habitat.

Rock weirs were constructed to protect the stream banks .

One of two rock cross veins directs flow to the center of the stream to protect the bridge structures.

A diverse plant community has been established including *Eupatorium purpureum*, *Monarda didyma,* and *Lobelia cardinalis.*



A dense stand of *Scirpus validus* and *Iris versicolor* protects the streambank and provides habitat.

West Segment (adjacent to Winton Road) - August 2011

The Creek had been straightened and the riparian vegetation re-moved.

Pontederia cordata

West Segment—July 2012

The riparian vegetation has become well established despite serious drought conditions. The stream meander that was created is also visible.

The site will become dominated by trees and shrubs ,such as *Cornus sericea,* as it matures.

Conclusions:

Over the course of a single growing season, a diverse riparian plant community has become established despite serious drought conditions. The use of larger plant material (1 gallon pots or larger), leaf compost, and mulch were likely contributors to success. Large numbers of volunteer plants have appeared but invasive, exotic species have not yet been a serious problem. Some limited infill planting is being planned for the Autumn of 2012.

The streambanks appear to be stable with no signs of significant erosion. The rock cross veins, rock weirs, and jute netting are functioning as planned. Seeding in the steeper slope areas was successful.

BENEFITS OF GREEN INFRASTRUCTURE

Monroe Avenue Green Innovation Grant Program (GIGP)

Brighton, Monroe County, New York

More and more communities throughout the region are using green infrastructure to incorporate the valuable ecological services that nature provides. Green infrastructure is crucial to combating climate change, creating healthy built environments, and improving quality of life.

Green infrastructure improvements that can be made along Monroe Avenue in the Town of Brighton include: bioretention areas, porous pavement, street trees, rain gardens, vegetated swales, and riparian buffers. These changes will complement the active transportation efforts planned for the community, providing a synergy towards the Town's commitment to sustainability.

Imbrium Systems Concept Graphic

WATER QUALITY AND QUANTITY

- Stormwater is reduced by retaining rainfall from small storms. Lower discharge volumes reduces combined sewer overflows and lowers pollutant loads. Stormwater not retained is treated.
- Flooding: Stormwater discharges are slowed and reduced, thus mitigating flood risk.
- Rainwater harvesting and infiltration-based practices increase the efficiency of the water supply system. Water can be reused, reducing water use. Infiltration can recharge groundwater.
- Cost Savings: Developers often experience lower capital costs by using green infrastructure. For communities with combined sewer systems, green infrastructure controls may cost less.

Concept Eco-Swale Graphic

AIR QUALITY

- Vegetation reduces ground level ozone by lowering air temperatures, reducing power plant emissions related to air conditioning, and removing air pollutants.
- Trees and parks can reduce particulate pollution by absorbing and filtering particulate matter.
- Increased tree canopy reduces ozone and pollution enough to reduce mortality, hospital admissions, and lost work days.

HABITAT AND WILDLIFE

- Vegetation in the urban environment provides habitat for birds, mammals, amphibians, reptiles and insects. Reduced erosion and sedimentation improves habitat in small streams.
- Habitat Connectivity: Large scale green infrastructure - such as parks and urban forests - help to facilitate wildlife movement and connect wildlife populations between habitats.

ENERGY AND CLIMATE CHANGE

- Urban Heat Island: Trees, green roofs, and other green infrastructure features can cool urban areas by shading building surfaces, deflecting solar radiation, and releasing moisture into the atmosphere.
- Energy Use: By reducing local temperatures and shading buildings, the heating/cooling demand of buildings is lessened, reducing energy needs and decreasing power plant emissions.
- Communities can adapt to climate change by increasing the drainage system capacity to handle large storms, increasing the resilience of water supply in drought, and mitigating the urban heat island effect. Vegetation reduces greenhouse gases.
- By reducing stormwater inflow into sewer systems, recharging aquifers and conserving water, green infrastructure can significantly reduce energy use related to treating and moving water and wastewater.

COMMUNITY

- Green Jobs: Green infrastructure can reduce a community's infrastructure costs, promote economic growth, and create construction and maintenance jobs. Demand for new skills has led to new training and certification programs.
- Health Benefits: More green space encourages outdoor physical activity, reducing obesity and preventing chronic disease.
- Vegetation and trees can increase recreation areas. Vegetation and permeable pavements reduce noise pollution.
- Property Values: By utilizing green infrastructure in construction and increasing vegetation and tree cover, green infrastructure can increase property values.

Source: US Environmental Protection Agency, 2013.

EXAMPLES OF GREEN INFRASTRUCTURE

Monroe Avenue Green Innovation Grant Program (GIGP)

Brighton, Monroe County, New York

Rochester Insitute of Technology (RIT) Perkins Green

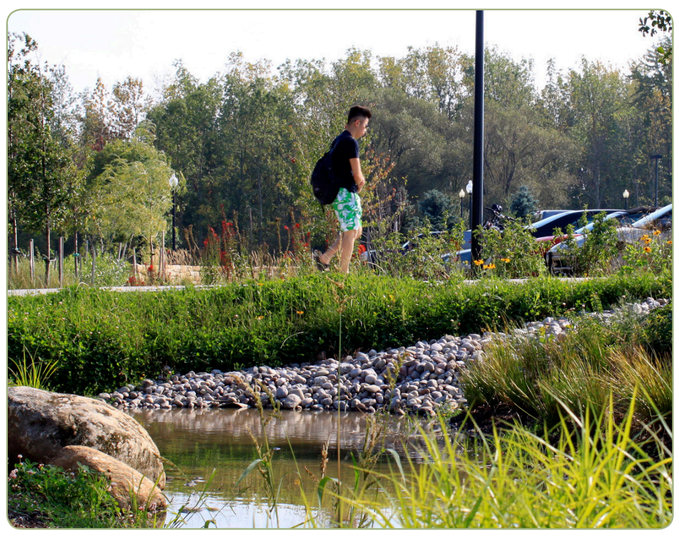
- Fusion of safe and efficient circulation of vehicles and pedestrians.
- Ecologically sensitive stormwater management.
- Layering of landscape elements to segregate the transition from roadway to housing access points.
- Bio-filtration swales
- Native trees and plants
- Curb cuts

RIT Gleason Circle

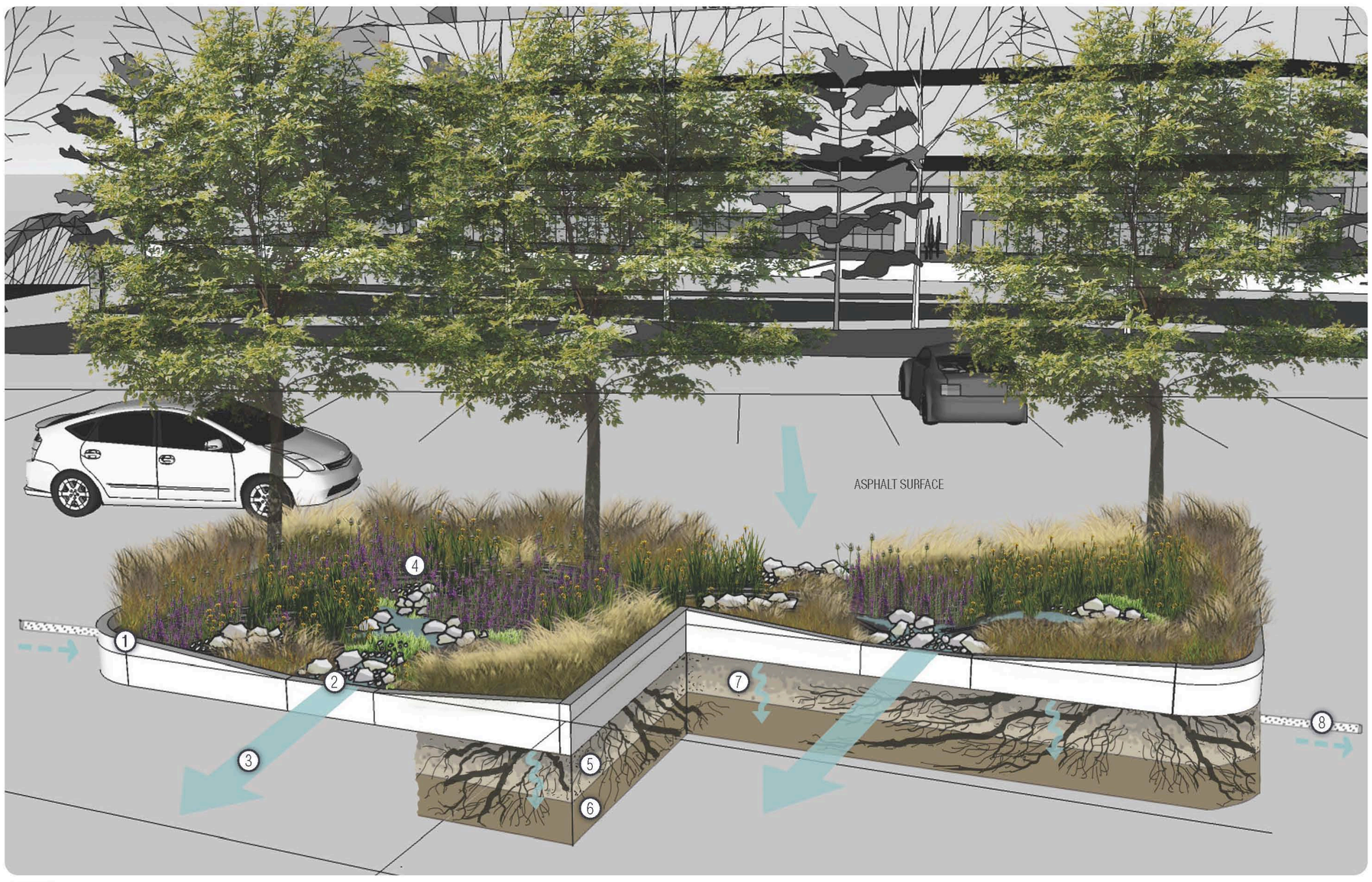
- Merger of active transportation, green infrastructure, and mass transit - integrating RIT's commitment to sustainability.
- Bio-filtration basins.
- Pervious concrete (1st application on the RIT campus).
- Use of recycled road base.
- Native trees and plants.
- CU structural soil (1st application on the RIT campus).

RIT S-Lot Expansion

- The parking area positevely contributes to RIT's evolution as a sustainable campus comminty through the stewardship of ecosystem services, reduced stormwater runoff, and reduced heat island effect.
- 12 rain islands with curb cuts.
- Pocket wetland.
- Bio-filtration swales.
- Native trees and plants.



RIT S-LOT EXPANSION RAIN ISLANDS



KEY

1. GRANITE CURB
2. CURB CUT
3. SURFACE RUN-OFF
4. BIORETENTION AREA
5. PLANTING MEDIA
6. UNDISTURBED SUBGRADE
7. INFILTRATION
8. PERFORATED PVC UNDERDRAIN (CONNECTS RAIN ISLANDS)

FEATURES

- 230 NEW PARKING SPACES
- 85,500 SF NEW IMPERVIOUS SURFACE
- 12 RAIN ISLANDS (AVG. 500 SF EACH) = **6,000 SF OF BIO-FILTRATION**

VEGETATION AND TREE BENEFITS

- VOLUME REDUCTION BY EVAPOTRANSPIRATION
- VOLUME REDUCTION BY INFILTRATION
- STORMWATER INTERCEPTION BY TREE CANOPY
- REDUCTION OF URBAN HEAT ISLAND EFFECT
- PHYTOREMEDIATION OF CONTAMINATED SOIL AND WATER
- REDUCTION IN ATMOSPHERIC CARBON
- INTERCEPTION OF PARTICULATE MATTER
- ABSORPTION OF OZONE, NITROGEN DIOXIDE, SULFUR DIOXIDE
- IMPROVED VISUAL QUALITY

TREE BENEFITS VALUES, PER YEAR

NEW PLANTINGS

- TREE CANOPY STORMWATER INTERCEPTION
  108- 6" CALIPER TREES: **35,925 GALLONS**
- ATMOSPHERIC CARBON REDUCTION
  108- 6" CALIPER TREES: **11,223 POUNDS**

MATURE PLANTINGS

- TREE CANOPY STORMWATER INTERCEPTION
  108- 12" CALIPER TREES: **145,854 GALLONS**
- ATMOSPHERIC CARBON REDUCTION
  108- 12" CALIPER TREES: **32,517 POUNDS**

Resource: www.treebenefits.com

Rain Island Concept Graphic

WHY IS STORMWATER RUNOFF AN ISSUE?

As stormwater flows over city streets and sidewalks and through parking lots, it collects debris, chemicals, sediment, and other pollutants that can seriously impair water quality. On the ground, rainwater mixes with these pollutants to create natural and human-made pollutants, which can include contaminants like:

- Oil, grease, metals, and coolants from vehicles
- Fertilizers, pesticides, and other chemicals from farms, gardens, and homes
- Bacteria from pet wastes and failing septic systems
- Soil from construction sites and other bare ground
- Detergents from car and equipment washing
- Accidental spills, leaky storage containers, and whatever else ends up on the ground

The polluted runoff then rushes into nearby gutters and storm drains, where it is eventually discharged into streams, lakes, rivers, bays, and oceans - the same bodies of water we use for swimming, fishing, and drinking water. In many areas, stormwater runoff enters vital surface waters without treatment, conveying contaminants that were collected along the way. Stormwater is a major contributor to urban non-point source pollution.

http://water.epa.gov/polwaste/green/upload/stormwater2streettrees.pdf

WATER QUALITY BENEFIT GOALS

RUNOFF VOLUME REDUCTION

- Stormwater discharges are slowed and reduced, thus mitigating flood risk;
- Lower discharge volumes reduces pollutant loads;
- Increases efficiency of the water supply system - water can be reused, reducing water;
- Stormwater discharges are slowed and reduced, allowing for a normal rate of infiltration - infiltration can recharge groundwater.

SEDIMENT REDUCTION

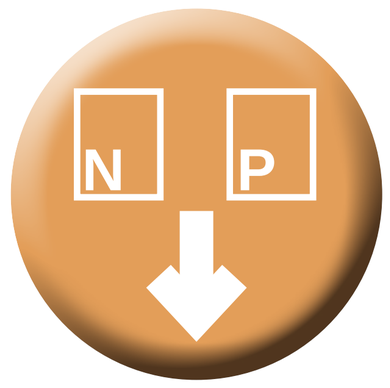
- High volumes and speeds of stormwater runoff increases the amount of sediment washing into storm systems and streams;
- By reducing the volume and speed of runoff through green infrastructure, the amount of sediment is reduced which improves water quality.

ROAD SALT REDUCTION

- Accumulation and persistence of chloride poses a risk to the water quality;
- Decreasing the amount of road salt utilized every season while increasing the amount of salt tolerant native plants and trees will help improve water quality.

NITROGEN & PHOSPHORUS REDUCTION

- Stormwater runoff contains nitrogen, phosphorus, and other pollutants - decreasing stormwater runoff reduces pollutant loads entering the storm system and streams;
- Incorporating larger quantities of plants and trees can assist with reducing pollutants - plants and trees absorb pollutants, such as nitrogen and phosphorus.



INCREASED LINEAR FEET OF STREAM BANK/SHORELINE PROTECTION

- High volumes of stormwater runoff increase the amounts of water, pollutants, and the temperature of water entering the streams;
- Protecting stream banks/shorelines reduces the speed of water entering the stream, allowing for proper infiltration and reduction of pollutants entering the streams.

INCREASED LINEAR FEET OF STREAM CHANNEL STABILIZATION

- High volumes of stormwater runoff increase the amounts of sediment that is washed into streams;
- Stabilizing stream channels through live plantings, bioengineering, and hard armoring reduces the amount of sediment washing into the streams, therefore improving the water quality and habitat.

GREEN INFRASTRUCTURE DESIGN PROCESS

APPROACH

- Water Quality Criteria: Capture and treat 90% of the annual runoff events
- Channel Protection Criteria: Morphological disruptions primarily due to changes in hydrology
- Over bank Flood Protection Criteria: Detain 10 year storm to pre-development rates
- Extreme Flood Control Criteria: Detain 100 year storm to pre-development rates

DESIGN PROCESS

1. Site Planning & Concept Design

Identify potential solutions for green infrastructure practices

Conserve Natural Areas

- Preservation of Undisturbed Areas
- Preservation and Enhancements of Buffers
- Reduction of Clearing and Grading
- Open Space Design
- Soil Restoration

- Reduce Impervious Surface Cover
- Maintain Access Parking and Vehicular Level of Service
- Enhancements for Pedestrians and Bicyclists

Green Infrastructure Precedent: Vegetated Swale

2. Determine Stormwater Volumes

- Project is Identified as Redevelopment (DEC requirements vary for redevelopment projects)
- Water Quality Volume Calculations
- Water Quantity Volume Calculations
- Runoff Reduction by Area Calculations
- Delineation of Catchment and Sub-Catchment Areas

Green Infrastructure Precedent: Porous Pavement

3. Final Design and Necessary Forms/Documents

- Final Selection of Green Infrastructure Practices
- NYS DOT Review of Drawings
- Produce Final Construction Drawings
- Notice of Intent (NOI) - Submitted to the NYS Department of Environmental Conservation (DEC) for Approval
- Stormwater Pollution Prevention Plan (SWPPP) - Submitted to the NYS DEC for Approval

4. Runoff Reduction By Applying Green Infrastructure Practices

- Conservation of Natural Areas
- Sheet flow to Riparian Buffers or Filter Strips
- Vegetated Open Swales
- Tree Planting / Tree Box
- Disconnection of Rooftop Runoff
- Stream Day lighting
- Rain Garden

- Green Roof
- Stormwater Planter
- Rain Tanks / Cisterns
- Porous Pavement
- Infiltration Basin / Trench
- Bioretention
- Dry Swale
- Underground Storage

5. SWPPP Inspections

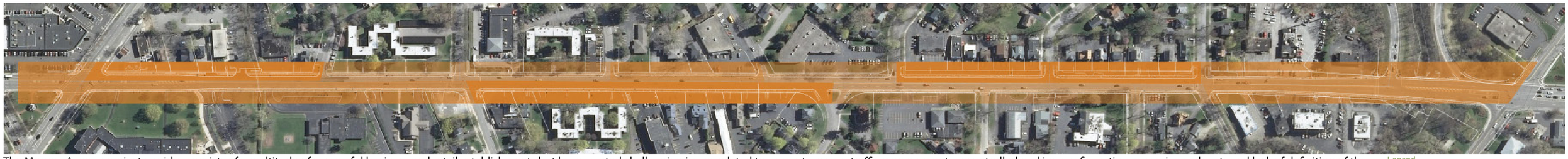
- Weekly inspections performed throughout the construction project to be sure best practices for stormwater management are being performed

6. Project Completion

- Submit Notice of Termination (NOT) to the NYS DEC when project is complete

Green Infrastructure Precedent: Bioretention

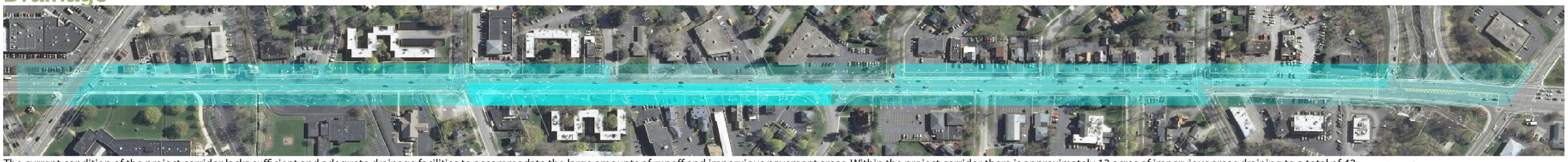
Access



The Monroe Avenue project corridor consists of a multitude of successful business and retail establishments but have created challenging issues related to property access, traffic management, uncontrolled parking configuration, excessive curb cuts and lack of definition of the pedetrian realm. These types of existing conditions present unsafe pedestrian conditions, large amounts of paved areas, undefined streetscape, and lack of maintaining a safe and inviting pedestrian environment.

Legend
- Needs Improvements
- Moderate Problems
- Satisfactory

Drainage



The current condition of the project corridor lacks sufficient and adequate drainage facilities to accommodate the large amounts of runoff and impervious pavement areas. Within the project corridor there is approximately 13 acres of impervious areas draining to a total of 42 catch basin structures. Both Buckland and Allens Creek are the lowest points within the Corridor and collect most of the stormwater runoff from the adjacent drainage areas.

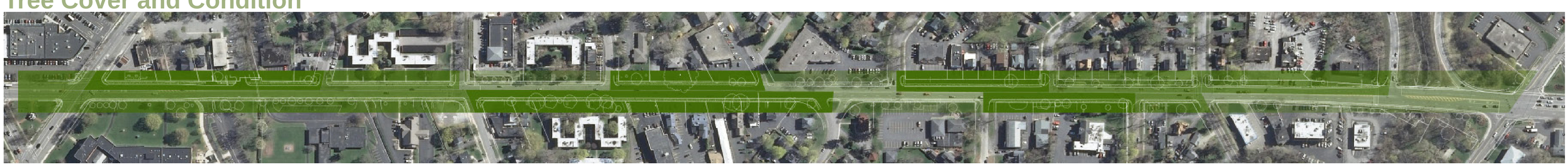
Legend
- Needs Improvements
- Moderate Problems
- Satisfactory

Stormwater Quality

Due to the amount of impervious areas, amount of runoff and lack of any sustainable drainage collection features along the project corridor, the stormwater runoff from rain and snow melt runs off from rooftops, paved surfaces, streets and parking lots picking up pollutants such as oils, fertilizers, soil, debris, and pet waste, often flowing directly into the closed drainage system or puddling in certian areas that do not allow sufficient collection and drainage methods. The addition of green infrastructure practices and reduction of impervious areas will improve the currnet condition and quality of the stormwater.

Legend
- Needs Improvements
- Moderate Problems
- Satisfactory

Tree Cover and Condition



The project corridor contains of a variety of species with the majority of trees consisting of Honey Locust (38%), Maples (22%), Ash (17%), and Linden (11%). Existing tree cover was measured as well as tree condition, some locations may have good existing cover but the condition of the trees in the area are poor which lead to a lower rating. Some locations lack adequate tree cover to provide a comfortable pedestrian environment, ease urban heat issues, promote economic viability and improve traffic and pedestrian safety by acting as a traffic calming feature.

Legend
- Needs Improvements
- Moderate Problems
- Satisfactory