Strategize, Prioritize and Capitalize! Advancing Municipal Green Infrastructure Programs

Case Study: GI Capital Improvements Feasibility Plan

Photo provided by Emily Vail, Hudson River Estuary Program





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Project Background

Project Funding

Barton&Loguidice

- Study funded by \$45k grant from HREP
- Round 28 HREP Grants for Local Stewardship Planning closed July 10, 2019
- Round 29 availability anticipated summer 2020 through Grants Gateway



A Program of the New York State Department of Environmental Conservation

Hudson River Estuary Grants Program Boundaries http://www.dec.ny.gov/lands/5091.html SCHOHARIE COLUMB ULSTER DUTCHE PUTNAM ORANGE NESTCHEST Estuary Grant Boundar Estuary Grant Boundaries: Jersen For purposes of protecting tributaries and upland habitat, the area eligible for estuary grants includes the counties within New York State bordering the New, Hudson River from the Verrazano Narrows bridge to the Troy dam and tributaries including the East River to Hell Gate. the Harlem River and Kill Van Kull, A boundary of approximately 4,600 feet has been established as a general guideline for projects in Richmond, Kings and Queens counties.

Project Goals

- Improve local drainage and reduce SSO;
- Enhance stormwater quality and increase land value;
- Support sustainable development, highlight local resources and plans;
- Align spending for **long-term management**;
- Develop cooperation, capacity and address operational requirements; and
- Advance/incentivize private GI projects.



- Public Outreach to increase knowledge of GI benefits and opportunities;
- Engage Local Stakeholders and Elected Officials to increase cooperation, commitment and capacity;
- Develop a robust approach to Site Prioritization and selection;
- Prepare Stormwater Management **Design Standards** for up to 3 practice types;
- Complete Feasibility Analysis (grant ready) for up to 3 sites; and
- Finalize Capital Improvements Feasibility Plan and Map.

Green Infrastructure *What is it? What are the benefits?*



What is "Green Infrastructure"?

Green infrastructure is an approach to stormwater management that protects, restores, or mimics the natural hydrologic cycle, using natural and aesthetically pleasing green practices that promote infiltration, detention, reuse, and uptake of stormwater that would otherwise leave the site as runoff.



Green Infrastructure Benefits





Pollutant load and high volume runoff from impervious surfaces





SSO Reduction

Stormwater entering sanitary sewer





Types of Green Infrastructure Examples of green solutions & real world applications

Permeable Pavement





Permeable Sidewalks





Tree Plantings & Tree Pits



Rain Gardens & Bioretention



Initial Site Screening Selection of 15 priority sites

Preliminary Site Selection

New Paltz GI Site Inventory Developed by: New Paltz GI Steering Committee

Table1 - GI 40 Candidate LocationsWednesday, January 10, 20184:35:33 PM									16 30									
ID	Loc_Name	LocationDescription	VDPWCOMT12287	DPW EVAL	DPW Mostly Public	DPW Poten SW Quality	DPW_ SSO Bene	PLAN NER 20	PLANNERCOMMENT	Sub- water shed	Acres	Planner's Site Context N		36	3			
A. 1	Base of Henry W. D. Dr.	No. Chestnut St. & HWDD - private and public spaces	We concur with Plnr positive assessment although limited public lands may be an issue.	YES	No	-	Yes	YES	The local administration and NYS has vested a lot in aiding positive transformation of this area	Trib 13	6.30	Public spaces in streets redevelopment opportu community node; imper and transportation enhi opportunities in an area enhanced and which is economic development coordinated infrastructi development	29	15 12 14 4	41 0	18	12	
B. 1	North Front St. & WVRT	North Front Street (west) by WVRT	We concur with Plnr positive assessment although limited public lands and OPRHP requirements in this area may be an issue.	YES	No	-	-	yes		Core	3.27	Open space character a private impervious land lands; infrastructure ch density upstream	9 34 1 5	10 8 7	38 6 20 ²⁵	21	4	
C. 1	Wastewater Treatment Plant Driveway	Entrance off Huguenot St.	This is not a viable candidate as the tributary area to area is limited and there are no SSO opportunities as this is the main trunk line entering the WWTP. There are also potential OPRHP issues at this location	NO	yes	No	No	mayb e		Wallkill Main stem	2.45	Open space character a control; adjacent to Wa mainstem; wet soils adj (presumed); public recr enhancements planned	19 2 39		7 Er	17 17 23	27	28

Initial Screening

Mapped Site Site ID# Identii		Site Site Location Name		Planner / DPW / Engineer / Committee Average Approval Rating	Majority Ownership al		SSO Benefit		Cor	Context for Potential Improvement *		Initial Site Screening	Top 15 Sites		
					Public	Private	Unknown / Mixed / Non- profit	Yes	No	Unknown	Yes	No	Unknown		
1	D	1	Core of Village	3.00	3			3			3			12.0	Top 15
2	G	1	Southside Ave./ So. Chestnut St.	3.00	3			3			3			12.0	Top 15
3	A	1 1	Moriello Park/ Mullberry & Church St. Vicinty	3.00	3			3			3			12.0	Top 15
4	T	1	Colonial Drive	3.00	3	<u> </u>		3	<u> </u>		3			12.0	Top 15
5		0 1	So Chestnut/Mohonk Intersection	2.67	3	<u> </u>		3	<u> </u>		3	<u> </u>		11.7	Top 15
6	N	1	West Center St	2.33	3			3	-		3	<u> </u>		11.3	Top 15
7	н	<u>.</u>	Hasbrouck Park Locus	3.00	3			3	-		3	<u> </u>		12.0	Top 15
		; H	Municipal Properties & Pit	3.00	3	<u> </u>		- ×	+	2	3	<u> </u>		11.0	Top 15
		.	Pagail Hill/Mater St. Visipity	3.00	5		2	2	-		2			10.7	Top 15
10		.	Perior Hill Water St. Vicinity	2.07	2		2		+	2	3	<u> </u>		10.7	Top 15
10			115 125 Main Visiolity	2.07	3			-	+	2	3	<u> </u>		10.7	Top 15
		r +	110-120 Main Violinity	0.00		+			<u> </u>			<u> </u>		10.0	100-10 Tee 15
11	5		HVVD, Harrington & Colonial Drive Vicinity	2.07		1		3			3			9.7	10p 15
12	R		Mill Brook Preserve-Gateway @No. Manheim	2.67	3	1	1	1	1 1	1	3	1	1	9.7	100.15
13	U	1	Fire Station#2 (117 HWDDr) & Adjacent Area	2.33											
14	A	K 1	Church and No. Front Streets Location	2.33	+										
15	A	1	Base of Henry W. D. Dr	3.00	+	Droli	minar	T C	oro	oning	Cri	tor	ia (cal	action o	f 15 nr
	A,	J 1	No. Chestnut Complete Street Segment	2.33	∔ ∎	гтеп	mmai	yы	cre	ening	UII	ler	ia (sei	ection (n 15 pro
	ĸ	1	Hasbrouk PI./ Middle School Vicinity	1.00	+			-		-					-
	Q	1	No. Manheim Blvd (Complete Green Street)	1.00	4		1 /	0	nor	chin (r	mbl	io 11	orence	nrivata)	
	F	1	Plains Road/ Sojourner Park Property	1.00	4		1.	Ow)	ners	որ (ե	uor	IC V	ersus	private)	
	A	D 1	South Oakwood Complete St.	1.67	1										
	0	1	Dedrick's Plaza & Main Overlay	2.33	\downarrow		2	Son	itor	N Som	ar C).	flow ((CCO) 1	anafit
	В	1	North Front St. & WVRT	2.33	1		Ζ.	San	nar	y Sew		ve	now ((330) 0	enem
	L	1	Cherry Hill/ Cicero Ave/ So. Joalyn	1.00											
	X	1	Empire Trail/Rte 299	1.00	\downarrow		2	Com	tor	t for D	otor	atic	1 Terrer	ouomor	+
	A		Center St.	1.00	+		5.	COL	nex	a for P	oter	itia	1 impr	overnen	ll l
		A 1	Eastern Sunset Ridge/MBP Gateway/Duzine School	1.00	+										
		- 1	Cooper St Vicinity	1.33	+		4	Duia		antion	has	ad	on Vil	laga Dia	man E
	2	1 1	Van Alst / Hummel Rd./NYSRte3 2 Streets Grid	1.00	+		4.	PT10	or it i	zation	oas	ea	on vil	lage Pla	inner, El
	P	1	Rite Aid Plaza & Adjacent Private Lands	1.67	† 1									-	
	A	E 1	Upper Main - incl. by Shoprite & NYSDEC	1.67											
	V	1	Trib. 13 Headwater by No. Putt	1.67											
	W	1	Ohioville Hamlet	1.67											
		8 1	Main, Water, & Huguenot Sts & WVRT Vicinity	1.33		4		-		1	-	-	2	5.0	
	Y		South Putt (GLas aid for future buildout)	1.00		1	-						2	5.0	
		G	Sunset Ridge/ No. Chestnut (NYS Rte 32 No)	1.00		1	+	+			<u> </u>	<u> </u>	2	5.0	
		ĭ 1	Vicinity of 144-154 Main St.	1.33		1		<u> </u>	1		<u> </u>	1	-	4.3	
	A	M 1	Village Border by So. Chestnut/ VFW	1.00		1		1	1	1		1		4.0	
	Δ.	N 1	Porspect Stret by Slate & HWD **		l			-	-	1					

*Context for Potential Improvement = anecdotal/qualitative based factors such as land use, planned redevelopment, drainage / localized flooding, location within water shed, impervious area and opportunity to reduce impervious, etc.

Map of 15 Preferred Sites



Opportunities and Constraints (cont.)

Environmental

- Reduce Sanitary Sewer Overflow (SSO)
- Wetlands, buffers
- Brownfield / contaminated sites
- SHPO / SEQR

Physical

- Footprint / building location / basements
- Topography / slopes
- Underground utilities, private wells
- Municipal ROW

Stormwater Management

- Pollutant load / impervious area
- Address localized drainage issues

Fundable / Aligns with Policies

- High visibility
- Educational opportunity
- Increased aesthetic value
- Opportunity for 'complete streets'
- Preferred GI type

Site Visit



Large impervious areas

Potential for 'Complete Streets'





Drainage issues;

Site Visit (cont.)





High pollutant load

Rail Trail Easement





Next Stage Scoring Matrix Selection of up to 3 preferred sites

Next Stage Scoring Criteria – Soil Characteristics

USDA NRCS Web Soil Criteria	Rankings							
 Capacity to transmit water / permeability 	 Very low to moderately low (0.00 to 0.14 in/hr) Moderately low to moderately high (0.06 to 0.20 in/hr) Moderately high to high (0.57 to 1.98 inch/hr) 							
 Drainage class / frequency & duration of wet periods 	 Excessively drained. (e.g. rocky, shallow) Somewhat excessively drained (e.g. pervious, steep) Moderately well drained. (e.g. medium textured, supports growth) Somewhat poorly drained (high rainfall, low pervious layer) Poorly drained. (e.g. high water table, continuous rainfall) Very poorly drained. (e.g. depressed, ponded) 							
3) Depth to water table	 6 to 18 inches 24 to 37 inches 36 to 72 inches more than 80 inches 							
 Pesticide and nutrient movement 	 Not Limited (0.0 - 0.2) = restricted movement of nutrients Somewhat limited (0.4 - 0.6) = potential to leach nutrients Very limited (0.8 - 1.0) = high movement of nutrients 							
5) Hydrologic Soil Group	 A: Soils with low runoff potential B: Soils with low to moderate runoff potential C: Soils with moderate to high runoff potential D: Soils with high runoff potential. 							

USDA

Natural Resources Conservation Service

Properties and qualities

Slope: 0 to 3 percent Depth to restrictive feature: More than 80 inches Natural drainage class: Well drained Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr) Depth to water table: About 36 to 72 inches

Next Stage Scoring Criteria – Non-Soil Characteristics

SMART GROWTH CRITERIA (I.E., SOCIAL, ECONOMIC, ENVIRONMENTAL IMPACT)

- 6. High profile / visible site, educational opportunity
- 7. Potential to improve existing drainage issues
- 8. Sanitary Sewer Overflow (SSO) benefit
- 9. Natural resource restoration and proximity to waterways
- 10. Aesthetic value / opportunity to improve landscaping

REGULATORY CONSTRAINTS

11. SEQR Constraints (i.e. National Register Buildings, Archeological/ Environmental Sensitive Areas)

12. Potential for contaminated soils

13. Proximity to drinking water wells

FEASIBILITY

14. Ownership

15. Depth to restrictive layer (i.e. bedrock, clay pan)

16. Design constraints (i.e., footprint, basement, topography, steep slopes)

WATER QUALITY IMPROVEMENT POTENTIAL

17. Pollutant Load, sediment, oils and metals

18. Cumulative effects (i.e. potential for runoff reduction)

19. Catchment Area

Next Stage Scoring Matrix

			Water	Quality Improvement Po	tential	Ranking Summary				
Map Site ID# Site Location Name		17) Pollutant Load, sediment, oils and metals (3 = high; intensive parking/loading, 2 = medium; busy road/parking/bare soil, 1 = low; quiet road/greenspace)	18) Cummulative Effects, i.e., high impervious, 'run-on' potential, potential for runoff reduction (3 = high, 1 = low)	19) Catchment area (3 = large, 2 = medium, 1 = small)	SUM of Water Quality Characteristics	Ratio to max score of 9	Weighting of Water Quality Characteristics	Weighted Total	Ranking	Top 3
3	Moriello Park/ Mulberry & Church St. Vicinty	2	3	3	8	0.89	0.3	0.94	1	Top 3
8	Municipal Properties & Pit	3	3	2	8	0.89	0.3	0.93	2	Top 3
2	Southside Ave./ So. Chestnut St.	2	2	3	7	0.78	0.3	0.86	3	Top 3
1	Core of Village	3	3	2	8	0.89	0.3	0.82	4	Top 6
7	Hasbrouck Park Locus	2	3	2	7	0.78	0.3	0.80	5	Top 6
5	So. Chestnut/Mohonk Intersection	2	2	1	5	0.56	0.3	0.79	6	Top 6
6	West Center St.	2	2	2	6	0.67	0.3	0.77	7	
9	Pencil Hill/Water St. Vicinity	2	1	3	6	0.67	0.3	0.76	8	
15	Base of Henry W. D. Dr	3	3	3	9	1.00	0.3	0.75	9	
10	Plattekill Ave Parking Lot & Vicinity	3	3	1	7	0.78	0.3	0.74	10	
14	Church and No. Front Streets Location	2	2	2	6	0.67	0.3	0.73	11	
4	Colonial Drive	2	2	2	6	0.67	0.3	0.70	12	
12	Mill Brook Preserve- Gateway @No. Manheim	1	1	1	3	0.33	0.3	0.60	13	
13	Fire Station#2 (117 HWDDr) & Adjacent Area	2	2	1	5	0.56	0.3	0.57	14	
11	HWD, Harrington & Colonial Drive Vicinity	2	1	2	5	0.56	0.3	0.52	15	

Next Stage Scoring Matrix – Sensitivity Analysis

SENSITIVITY ANALYSIS TABLE												
	NO WEIGHTING	WEIGHTING A	WEIGHTING B	WEIGHTING C	WEIGHTING D	WEIGHTING E						
Soils	1	.1	.05	.15	.05	.15						
Smart Growth	1	.2	.05	.15	.25	.15						
Aesthetic	1	.05	.05	.075	.05	.1						
Regulatory	1	.05	.05	.075	.05	.1						
Feasibility	1	.3	.4	.3	.35	.25						
Water Quality	1	.3	.4	.25	.25	.25						
Top 6 Sites	 Moriello Park/ Mullberry & Church St. Vicinity Municipal Properties & Pit Core of Village So. Chestnut/Mohonk Pencil Hill/Water St. Vicinity Southside Ave./ So. Chestnut St. 	 Moriello Park/ Mullberry & Church St. Vicinity Municipal Properties & Pit Southside Ave./ So. Chestnut Core of Village Hasbrouck Park Locus South Chestnut /Mohonk Intersection 	 Moriello Park/ Mullberry & Church St. Vicinity Municipal Properties & Pit Southside Ave./ So. Chestnut Hasbrouck Park Locus Core of Village South Chestnut/ Mohonk Intersection (tie for 6th) Plattekill Ave Parking Lot & Vicinity (tie for 6tb) 	 Moriello Park/ Mullberry & Church St. Vicinity Municipal Properties & Pit Southside Ave./ So. Chestnut Core of Village South Chestnut/ Mohonk Intersection Hasbrouck Park Locus 	 Moriello Park/ Mullberry & Church St. Vicinity Municipal Properties & Pit Southside Ave./ So. Chestnut Core of Village South Chestnut/ Mohonk Intersection Hasbrouck Park Locus 	 Moriello Park/ Mullberry & Church St. Vicinity Municipal Properties & Pit Southside Ave./ So. Chestnut Core of Village South Chestnut/ Mohonk Intersection Pencil Hill/Water St. Vicinity 						

Selected weighting based on project specific goals and objectives

Preferred Sites for Feasibility Analysis



Figure 1 – Site Location Map – Site A – Plattekill Avenue



Figure 4 - Site Location Map - Site B - Southside Avenue

Feasibility Analysis Develop documentation for 2 grant ready projects

Feasibility Analysis

Scope:

- 1. Project Objectives
- 2. Existing Conditions
- 3. Project Description
 - i. GI Type
 - ii. Water Quality Volume
- 4. Project Schedule
- 5. Regulatory Approval and Permits
- 6. Cost Estimate
- 7. Concept Site Plans
- 8. Site Photographs

Barton&Loguidice

Green Innovation Grant Program (GIGP) requirements for grant applications https://www.efc.ny.gov/sites/default/files/uploads/ Green%20Innovation%20Grant%20Program/Required%20Documentation%20Guidance-

Required Documentation Guidance

Concept – Site A: Plattekill Ave



Concept – Site B: Southside Avenue





Planning Level Cost Estimate

SITE A – PLATTEKILL AVE											
GI PRACTICE	AREA (SQFT)	Unit Cost (\$/sq ft)	Subtotal estimated in 2018 dollars	Total cost estimate including contingency (25%)	Total cost estimate including contingency (25%) and engineering (25%)						
RAIN GARDEN / STORMWATER PLANTER	1,205	\$14	\$17,004	\$21,255	\$26,569						
PERMEABLE PAVER SIDEWALK / PARKING LANE / BIKE LANE	20,183	\$13	\$260,510	\$325,638	\$407,047						
	433,616										

SITE B – SOUTHSIDE AVE											
GI PRACTICE	AREA (SQFT)	Unit Cost (\$/sq ft)	Subtotal estimated in 2018 dollars	Total cost estimate including contingency (25%)	Total cost estimate including contingency (25%) and engineering (25%)						
RAIN GARDEN	258	\$22	\$5,565	6,956	8,695						
PERMEABLE PAVER SIDEWALK / PARKING LANE / BIKE LANE	3,770	\$20	\$73,994	92,492	115.615						
			Total Prelim	ninary Project Cost Estimate	124,311						

Green Stormwater Design Guidelines Porous pavement, Tree Pit and Roadside SW Planter

Permeable Pavers



Tree Pits





Roadside Stormwater Planters



Implementation Strategies

Land Use Considerations Maintenance Framework Existing Municipal Resources Advancing GI on Private Property



Land Use Considerations

Existing land use and development density and physical constraints (e.g. soils, slope, etc) will dictate best suited GI practices.



Key strategy elements:

- 1. Incorporating a **maintenance plan** into design Staff responsibility, activities, frequency, cost of routine and replacement maintenance
- 2. Planning for a **second planting** Should occur 3 to 5 years from planting
- **3.** Track GI projects and maintenance Inventory practices and maintenance
- 4. Training Maintenance Staff, Highway Dept., Building Dept., Panning Board, Community Groups
- 5. Knowledgeable construction crew Experienced contractor and engineering oversight

Maintenance Requirements

TREE PIT	Recurrence	Trained staff available within DPW?	Needed equipment available within DPW?
Establishment Maintenance (as per routine plus			
Activities as per routine	Monthly		
Watering	As required (weather		
Routine - Aesthetic			
Litter removal Weeding	3 monthly (location dependent)		
Routine - Functional			
Visual inspections Weeding, pruning and removal diseased vegetation Litter/organics/debris removal Sediment removal from inlets	6 monthly		
Renewal - Damage			 !
Vandalism and miscellaneous (eg. traffic)	As required		
Removal blockages	As required		
Renewal - Horticultural			
Reset replace tree / filter media / cover	As required, assume 10 yrs		
Soil additives and amendment			
Pest control	As required		
Watering	J I		
Decommissioning			
Removal, waste disposal and landscaping	As required, assume 50 yrs		
Monitoring / Auditing			
Infiltration test	6 monthly		
Observation after storm event	о попину		
Other			
Civil maintenance and parts replacement	As required		
Traffic management (TM)	As required		

Examples of local law amendments within NY municipalities:

- Land disturbance > 5,000-SF and where impervious cover created > 1,000-SF
- **Post development peak runoff** not to exceed existing for the **10-year storm** event;
- detain the first 1" rainfall and direct 100% of rooftop and 75% of surface flows to a SWP; or install a green or blue roof;
- Increase the 25% wQv treatment for existing impervious on redevelopment sites;
- Prioritize **stream day-lighting**, where feasible;
- Adopt minimum **20-foot buffer** from streams;
- Adopt wetlands local law;

Advancing GI on Private Property – Small Urban Sites

- Reference Alternative Design Guidelines i.e., Capital District Regional Planning Commission GI toolkit
- Developed to evaluate opportunities to alter current standards, adapted to small urban sites

Green Infrastructure Toolkit

Changes from NYS DEC Stormwater Design Manual

Examples:

- Reduces pretreatment requirements.
- Reduces separation distance to groundwater from 3' to 2'.
- Increases maximum time to drain practices to 3 days.
- Increases allowed ponding depth for bioretention areas from 6" to 1'.



Shallow Soil System

https://cdrpc.org/wp-content/uploads/2017/12/Green-Infrastructure-Toolkit.pdf

- Adopt GI Plan and Standards provide guidance to developers for local GI preferences
- Planning Board Review knowledgeable PB members and engineering review
- Leverage Municipal Policies e.g. MS4 SWMP Plan, Hazard Mitigation Plan, Complete Streets ordinance, municipal budgetary process, etc.

Funding Strategies and opportunities



Funding Opportunities – Strategies for Success

GI Capital Improvements Feasibility Capital Plan!



Funding Opportunities –

- Example Grant Programs
 - <u>Design + Construction</u>
 - GIGP Green Innovation Grant Program (NYS EFC)
 - CDBG Community Development Block Grant (NYSHCR)
 - CSC Climate Smart Communities (NYSDEC)
 - Design Only
 - EPG Wastewater Engineering Planning Grant (NYSDEC)
 - <u>Construction Only</u>
 - WQIP Water Quality Improvement Program (NYSDEC)
 - ISC Integrated Solutions Construction (NYSEFC)

• Loan Financing

- Design + Construction
 - CWSRF Clean Water State Revolving Fund (NYSEFC / US EPA)

Apply annually through NYS Consolidated Funding Application (CFA) Portal

Lessons Learned

- **1. Communication** is essential between municipal departments Elected officials, Planners, Engineers, DPW, Highway Department, etc.
- 2. Prioritize projects where **redevelopment** or **capital improvements** are planned
- **3. Capital planning** is needed to **forecast** (3 to 5 yrs) municipal improvements and **seek opportunities/funding** to incorporate GI for planned projects
- **4.** Shared Resources Opportunity for shared equipment, training and staff between adjacent Village/Town/City

Learning Assessment

Q1: Name 3 considerations to increase fundability of a GI project



Q2: Name 2 soil characteristics that impacts GI type and design



Q3: Name 3 critical components of a feasibility assessment for GI



Thank you



A Program of the New York State Department of Environmental Conservation

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