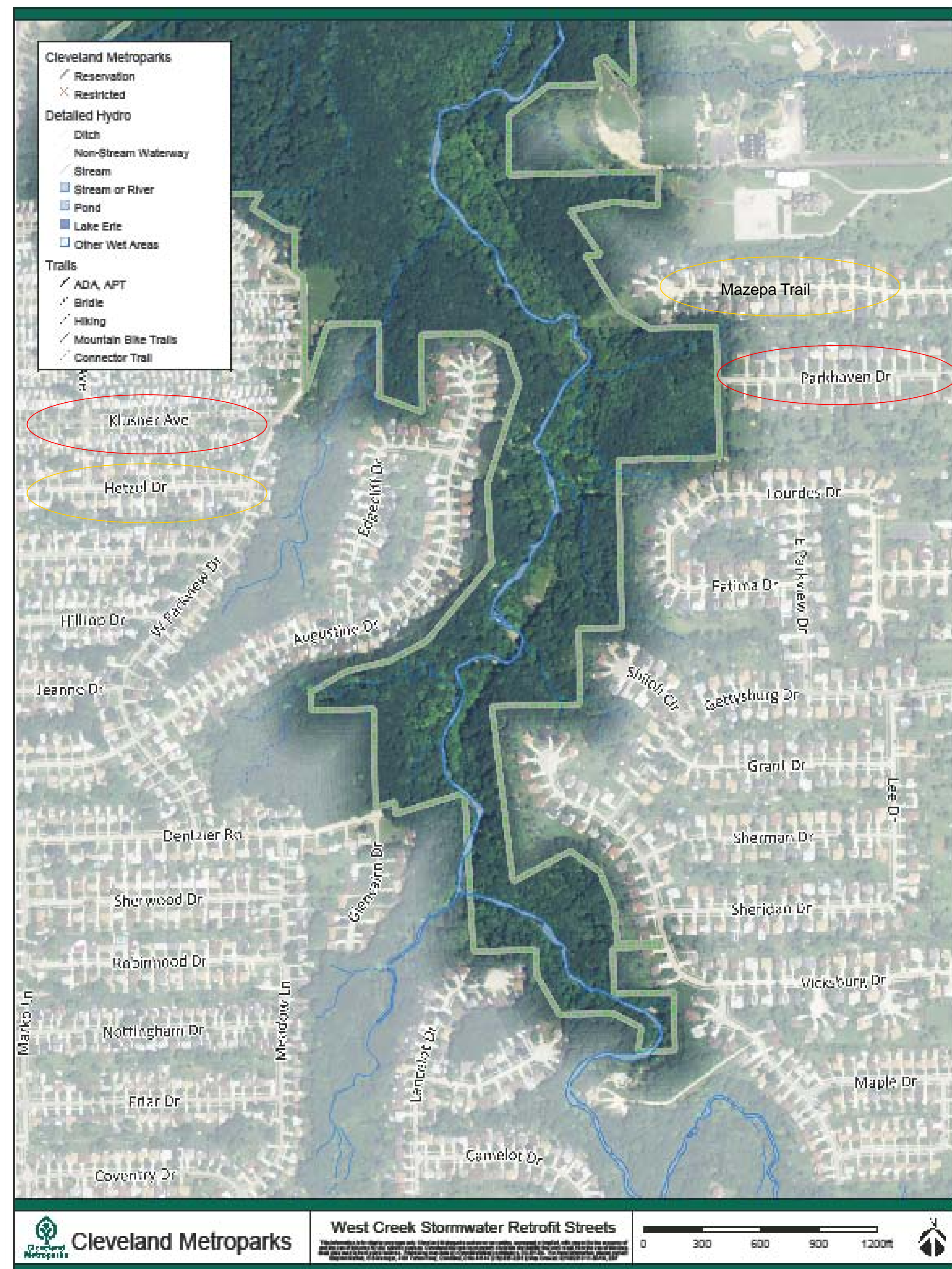


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Introduction

The West Creek Ecosystem Restoration Project is part of an overarching protection and restoration planning process where identifiable impairments have been clearly established, solutions to impairments have been identified, and broadly supported activities have been designed, resulting in high probability of significant, positive measurable results.

West Creek (14 mi²), a subwatershed of the Cuyahoga River Watershed, is part of the Cuyahoga River Area of Concern for Lake Erie. This urban watershed contains ~35% impervious surface. This Project aims to address directly connected impervious area (DCIA) with a street level, experimental approach by consolidating stormwater control measures such as rain gardens, right-of-way bioswales, rain barrels and street trees along two streets adjacent to West Creek Reservation, property of Cleveland Metroparks. One pair of streets – a treatment and a control street – has generally 0.1-0.2 ac. lots with homes circa 1950s, while the other pair of streets has 0.5-0.75 ac. lot with homes circa 1970s.



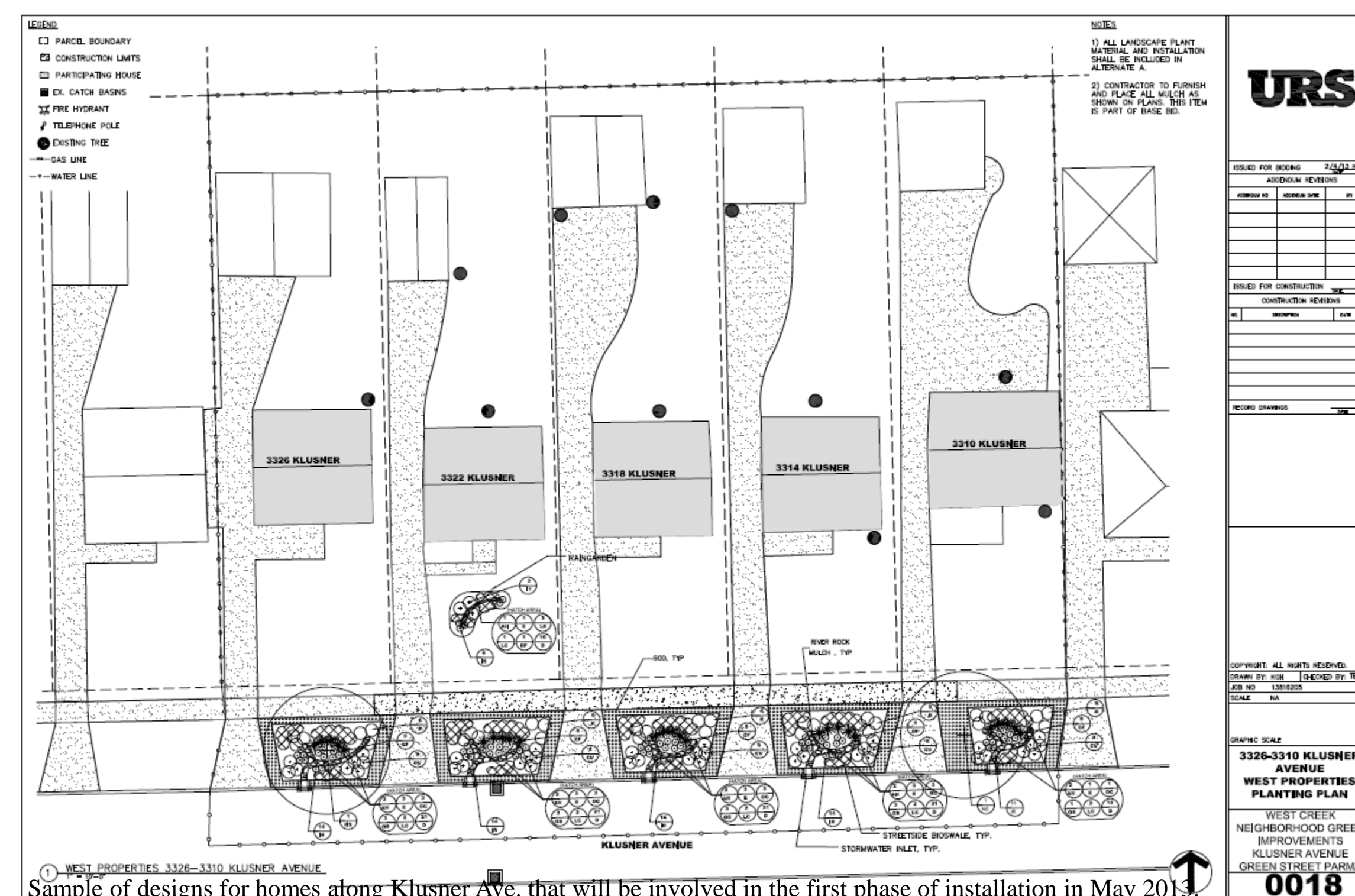
West Creek Reservation, Parma, OH. Treatment streets in red (Klusner Ave. and Parkhaven Dr.). Control streets in yellow (Hetzel Dr. and Mazepa Trail). Each street has separate stormwater pipes that flow towards West Creek and outlet as individual piped outfalls into primary headwaters of West Creek.



Sample of stormwater control measures available to participants of the Neighborhood Stormwater Stewardship Initiative. From left: Right-of-way bioswale, rain garden, rain barrel. Not pictured: street tree.

Objectives

- Design & construct two paired neighborhood-scale projects
- Install consolidated stormwater control measures (e.g. rain gardens, bioswales, rain barrels & street trees)



Sample of designs for homes along Klusner Ave. that will be involved in the first phase of installation in May 2013.

Methods

- Utilize Before-After-Control-Impact design by pairing two streets with 0.1-0.2 ac. lots (control & treatment) and two streets with 0.5-0.75 ac. lots (control & treatment)
- Install flow meters and measure total volume, flow, velocity and water level pre- and post-construction
- Collect primary headwater habitat & macroinvertebrate data pre- and post-construction utilizing OEPA protocols

Projected Outcomes

- Restore biological integrity of West Creek watershed in attainment of warm water habitat designation
- Reduce directly connected impervious area of West Creek watershed to less than 8-12%
- Reduce peak and total stormwater discharges from project sites
- Transfer approach to other urban watersheds in Ohio and the Great Lakes
- Participating homeowners will receive 25% credit on stormwater utility fee

11 STREETSIDE BIORETENTION CELLS on Klusner Ave.

STREETSIDE BIORETENTION CELLS INDIVIDUAL DRAINAGE AREAS	INDIVIDUAL AREA STORM EVENTS (ACRE FEET)	INDIVIDUAL AREA STORM EVENTS (ACRE FEET)			DESIGN STORAGE VOLUMES
		Req. WQv (.75")	1 yr/24hr Vol.	2 yr/24 hr Volume	
Address	Drainage Capture Area	Req. WQv (.75")	1 yr/24hr Vol.	2 yr/24 hr Volume	DESIGN STORAGE VOLUMES
3326 to 3310 Klusner	1.05 ac	0.023 af (1,005 cf)	0.095 af	0.103 af	0.068 af
3203 Klusner (front)	1.06 ac	0.019 af (837 cf)	0.090 af	0.97 af	0.028 af
3203 Klusner (side)	0.20 ac	0.005 af (213 cf)	0.022 af	0.023 af	0.020 af
2603 Klusner	1.77 ac	0.047 af (2,037 cf)	0.141 af	0.152 af	0.014 af
2516 Klusner	0.32 ac	0.005 af (236 cf)	0.026 af	0.028 af	0.020 af
City of Parma Property	1.80 ac	0.020 af (880 cf)	0.144 af	0.156 af	0.092 af
Sub Total					0.242 af

Current Status

Due to low homeowner buy-in on Klusner Ave., the project team is taking a two-phased approach to include as many properties as possible. The first set of practices will be installed May 2013 with a second set installed May 2014. Until recently, Parkhaven Dr. properties were still on septic systems. The sewer hook-up work will be completed March 2013 and stormwater control measures will be installed October 2013.

Primary headwater analysis of habitat and biology of streams associated with the treatment streets indicate that while habitat is at the highest category (class III, scores = 72 & 74), biology lags behind as class II (scores = 9 & 18). This typically indicates negative impacts on stream biota from outside the study area.

The project designer, URS, has estimated potential benefits for the first phase of the Klusner Ave. installation. These include:

- **Volume reductions** - 49% reduction in water quality volume, 11% of 1 yr/24 hr storm, 10% of 2 yr/24 hr storm, 6% of 5 yr/24 hr storm
- **Pollutant load reductions** - 50% BOD, 40% COD, 73% TSS, 41% Lead, 60% Zinc, 40% TN, 45% TP
- **Reduction of I/I from sanitary sewers**

In other words, ecosystem services provided by these practices equal that of 5.25 acres of forest (see figure at right). To establish forest in this densely populated area would require buy-out and demo of 29 homes at a roughly estimated total cost of \$3,770,000. The current estimate of green street improvements at \$85,000 illustrates the cost/benefit to installing targeted, consolidated stormwater control measures in residential neighborhoods.



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Acknowledgements

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