

Improving Resiliency in an Urban Industrial and Commercial Area Through Green and Grey Stormwater Infrastructure Planning and Assessment

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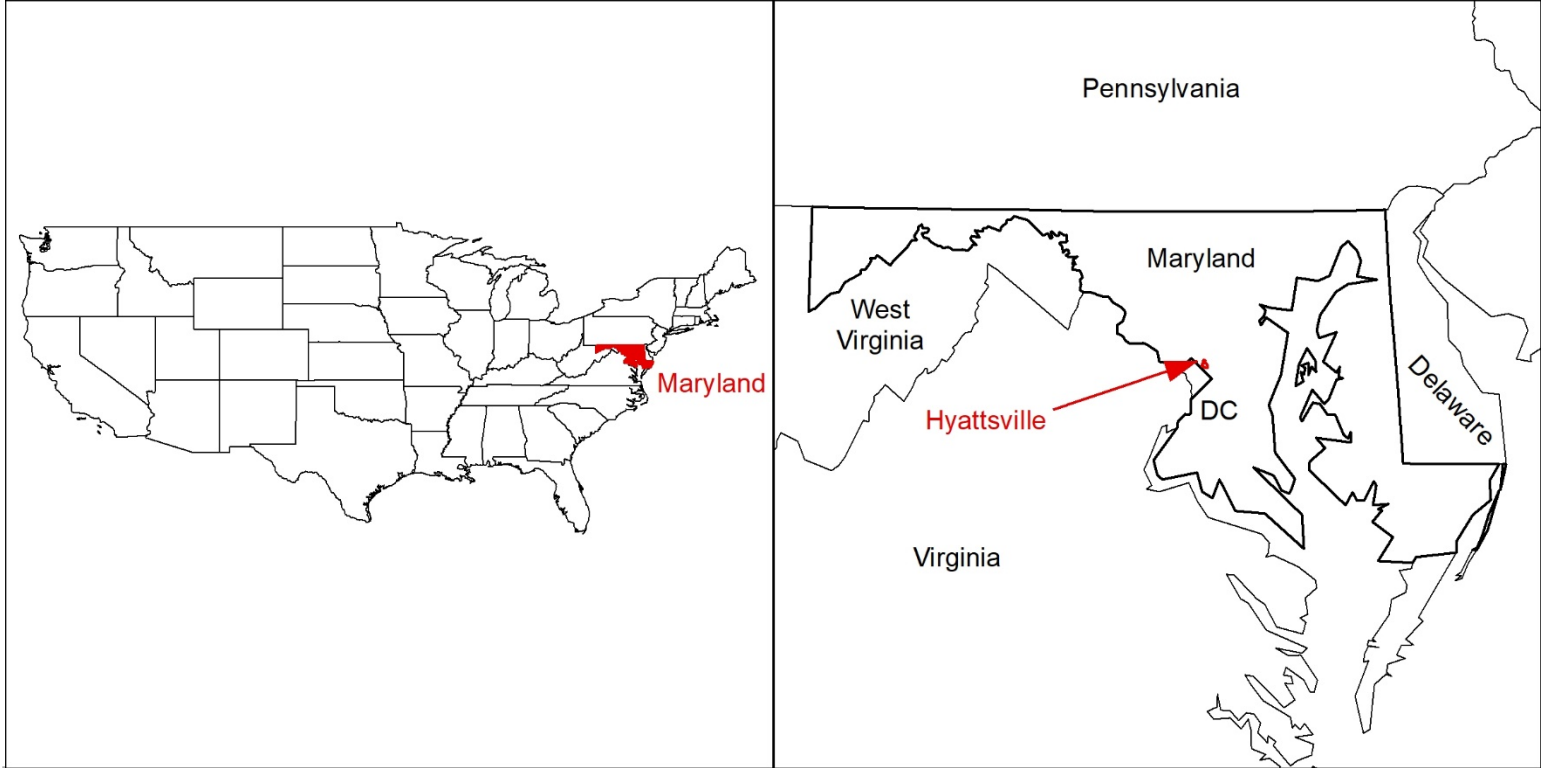


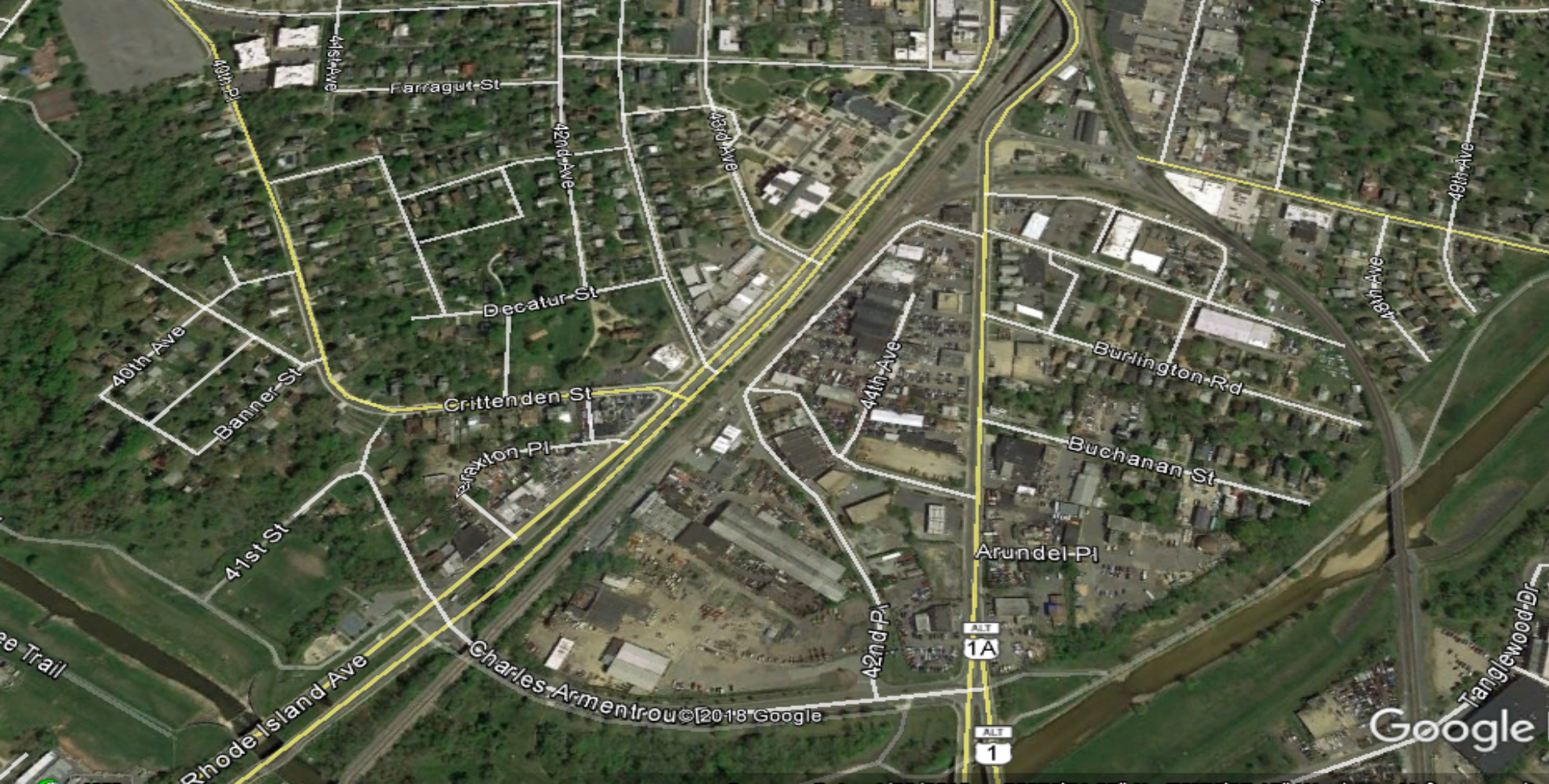
Project Objectives

- Identify green and grey stormwater infrastructure improvements
- Reduce localized flooding and costs
- Improve water quality
- Incorporate future climate assessment
- MDNR CoastSmart Grant

State: Maryland

Town: Hyattsville





Floods, Tornadoes, Droughts, SLR, Storm Surge, High Intensity Rainfall

- What impacts do these extreme events have on our stormwater, drinking water and wastewater infrastructure?
- How can we plan and adapt to become more resilient?
- What is the cost of doing nothing?



Ellicott City, MD July 30, 2016

6.6 inches in 3 hrs

Ellicott City MD May 27, 2018

6 inches in 2 hrs

Using Green and Grey Infrastructure

Design each site to **protect or restore the natural hydrology** of the site. This is done by creating a “hydrologically” functional landscape.

Make This



Function Like This



Objectives

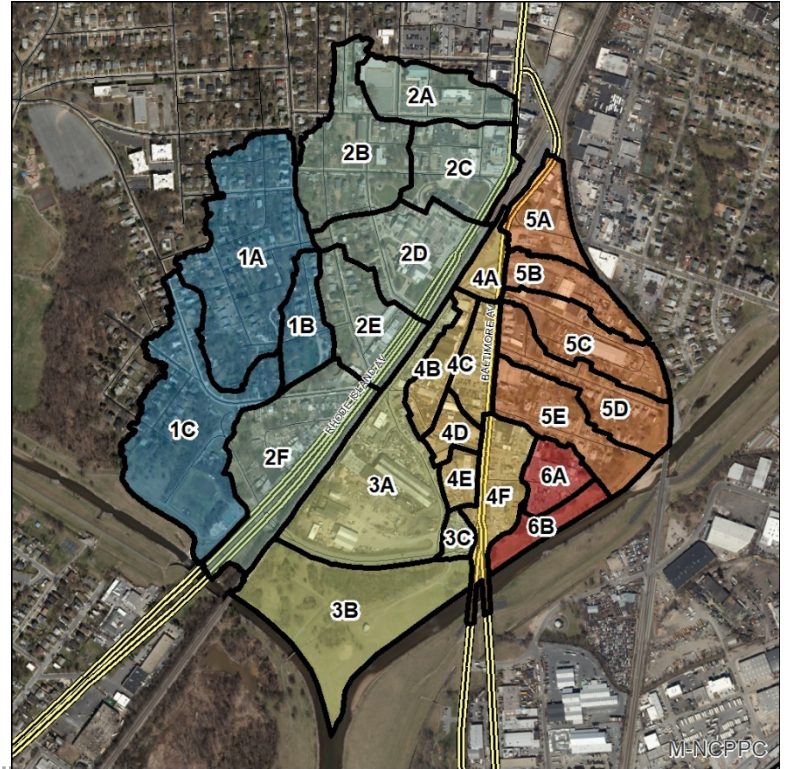
- Find Opportunities for Green Infrastructure
- Reduce Chronic Flooding



Project Area

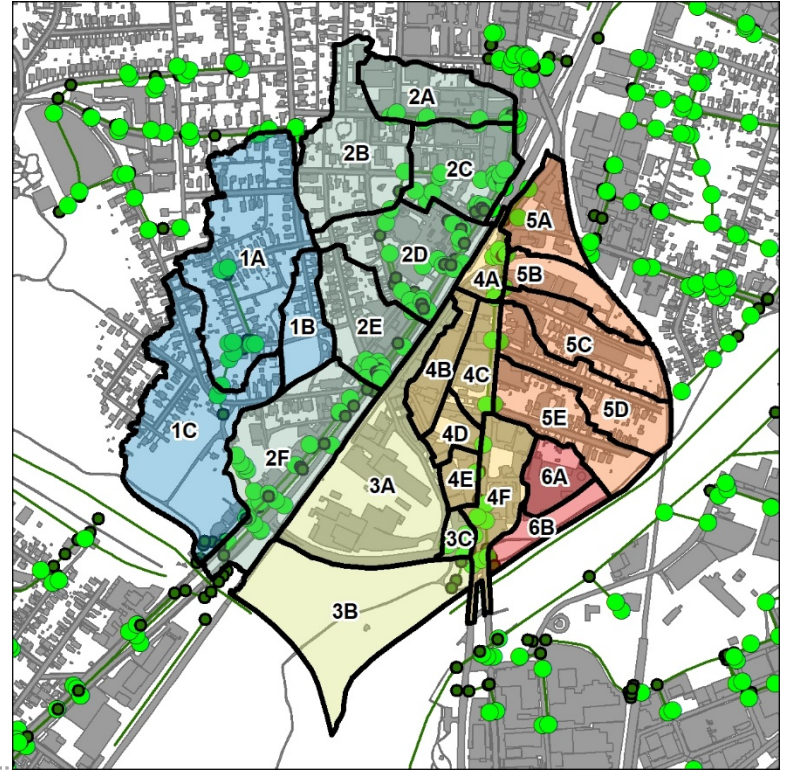
- 6 basins / 24 sub-basins
- Highly developed
- Mixed use

Basin	Area (acres)	% Impervious
1	36.2	31
2	51.2	62
3	31.8	61
4	17.0	85
5	26.5	53
6	5.4	76



Existing Infrastructure

- State data (Rt. 1)
- County data (Baltimore)
- Field investigations to fill in data gaps



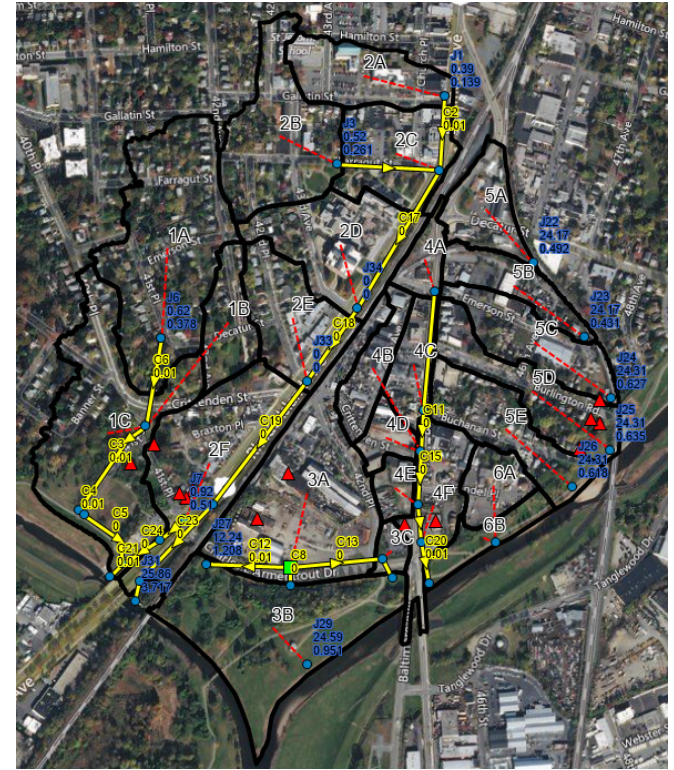
Field Investigation

- Melrose Park outfall, drainage ditch, and culvert
- Charles Armentrout Dr. culverts
- Baltimore Ave. outfalls



Model Development

- Existing Infrastructure
- Sub-basins: NRCS Unit Hydrograph method
 - Area
 - Curve Number
 - Time of Concentration



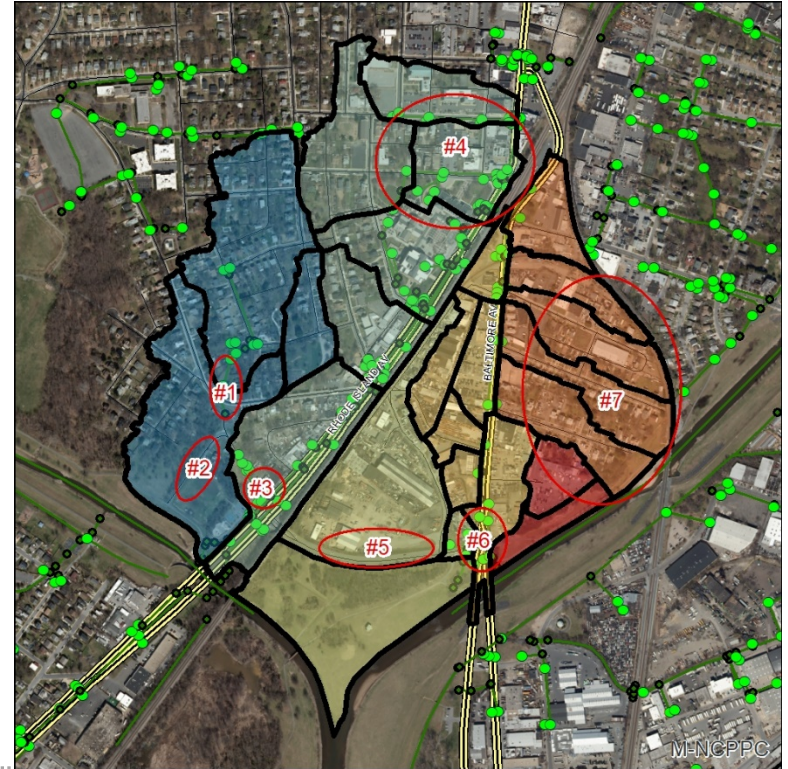
Model Calibration

- High intensity, short duration
- Compared simulated surcharging to:
 - County GIS of floodprone buildings
 - Anecdotal reports

Date	Rainfall (inches)	Duration
6/3/2018	4.39	8:47
5/14/2018	1.49	0:47
8/15/2017	0.3	4:23
7/28/2017	4.21	15:00
5/5/2017	1.71	5:00
8/15/2016	2.12	5:00
6/27/2015	2.51	16:00
6/1/2015	2.13	5:00
8/12/2014	2.96	5:30
6/10/2014	1.93	1:37
5/16/2014	2.52	9:00
4/30/2014	3.27	23:59
4/15/2014	0.92	1:30

Model Results

- Identified 7 potential BMP sites
- Variety of flooding causes
 - Undersized culverts/piping
 - Broken or low curbs
 - Insufficient catch basins and/or storm drain capacity
 - Isolated low spots
 - Neighborhoods with no stormwater infrastructure



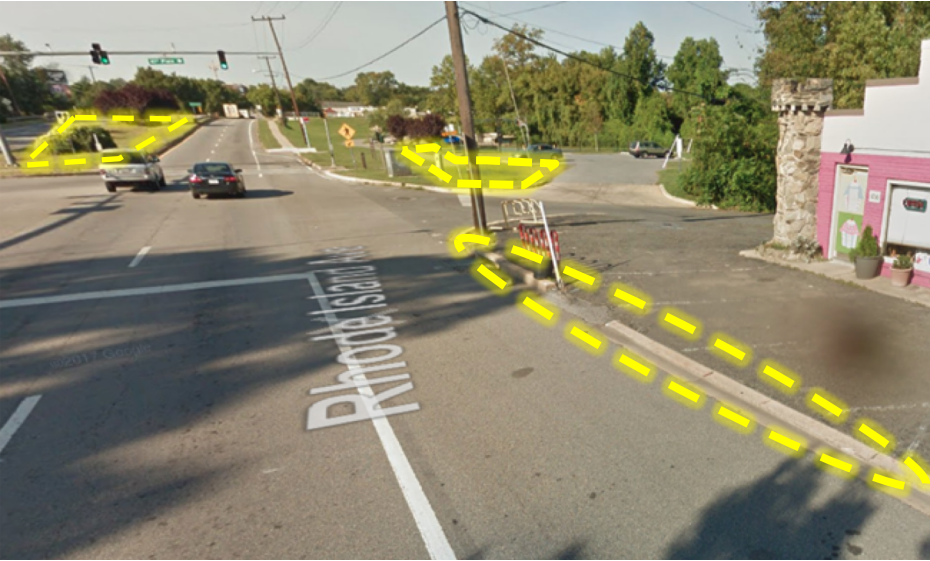
AREA #3: SHORTCAKE BAKERY CORNER



Existing Conditions

- Runoff jumps curb
- Insufficient catch basin/storm drain capacity

AREA #3: SHORTCAKE BAKERY CORNER



Potential Solutions

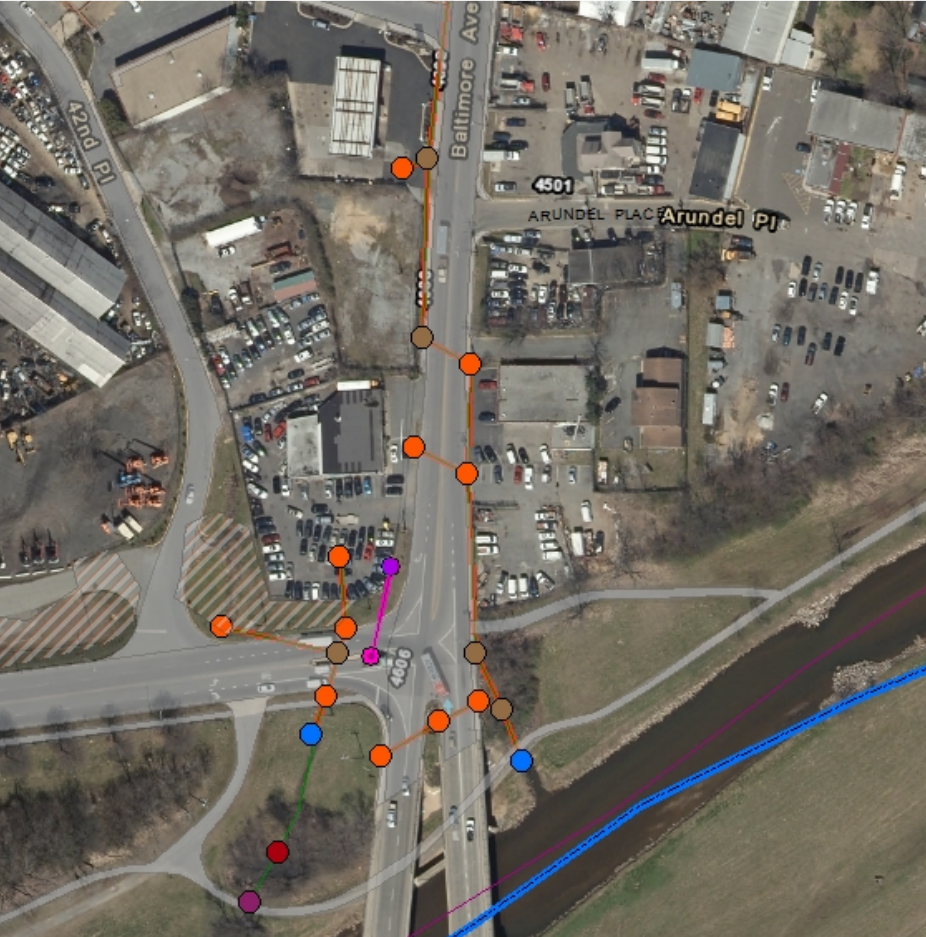
- Cape Cod-style curbs
- Bioretention basins in Rt 1 median or along Melrose Park's parking lot

Cost Estimate: \$150 - 250k

Expected Results

- ↓ hours flooded by 47 – 58%
- ↓ max flood rate by 3 – 8%
- ↓ total flood volume by 19 – 37%

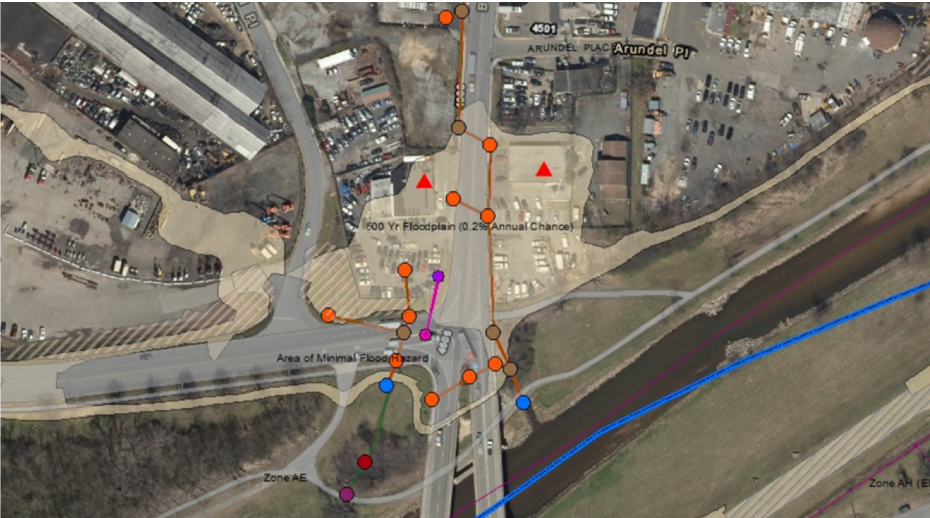
AREA #6: BALTIMORE AVENUE



Existing Conditions

- Baltimore Ave. storm drain system surcharges during some events
- Single catch basins on either side of road are undersized for runoff
- Flood-prone buildings with ineffective curbing on both sides of road

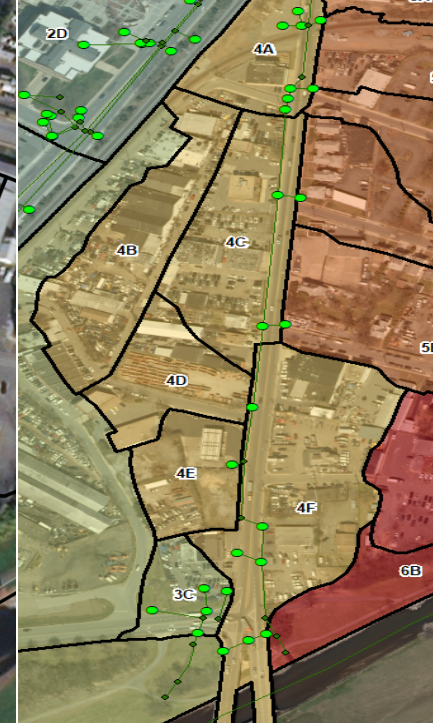
AREA #6: BALTIMORE AVENUE



Potential Solutions

- Regrade, use Cape Cod curbing
- Green parking lot on east side
- Engage business owners to combine façade improvements/stormwater BMP

Cost Estimate: \$208k



Expected Results

- Eliminate storm drain surcharging
- Improve drainage at Baltimore-Charles Armentrout intersection

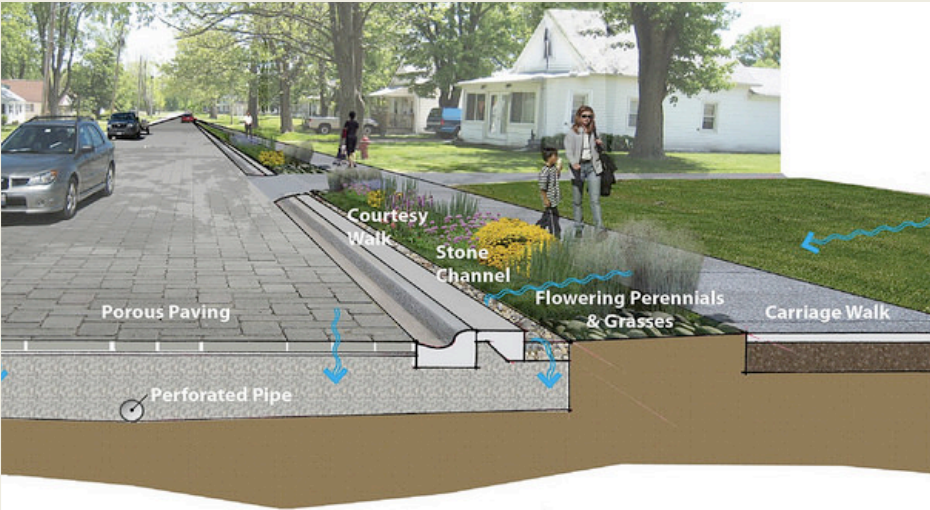
AREA #7: BALTIMORE EAST NEIGHBORHOODS



Existing Conditions

- No existing storm drain system
- Narrow, tight street network
- Runoff flows east down roadways

AREA #7: BALTIMORE EAST NEIGHBORHOODS



Potential Solutions

- Green streets: in-road hardscape and green solutions
- Detention basins / green solutions at ends of Burlington & Buchanan

Cost Estimate: \$972k

Weston(



Expected Results

- ↓ hours flooded by 45 – 83%
- ↓ max flood rate by 87 – 88%
- ↓ total flood volume by 9 - 78%
(especially effective for 6-hr event)

Conclusions

- Study Area
 - Highly developed
 - Very impervious
 - No/insufficient stormwater infrastructure
 - Undersized culverts
 - Low/missing curbs
 - High-intensity, short-duration rain events create the localized flooding
- Solutions
 - Bioretention basins - Oversized
 - Green streets
 - Private property stormwater retention
 - Pervious pavement
 - New curbing
 - Water quality BMPs
 - Partnering