HOBOKEN
GREEN INFRASTRUCTURE
STRATEGIC PLAN

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EE&K a Perkins Eastman company

2014 New Jersey Planning Conference
PROJECT PARTNERS

• Project Partners
  - City of Hoboken
  - Hudson County
  - Hoboken Quality of Life Coalition
  - HOPES Community Action Partnership
  - North Hudson Sewerage Authority
  - Stevens Institute of Technology
• Rutgers and HUD
• EE&K, a Perkins Eastman Company
• The Louis Berger Group
• Clarke Caton Hintz
• Combined sewer system overtaxed during storm events

• 80% impervious coverage

• Interrelationships between the system’s sewersheds may aggravate flooding.

• H1, which handles almost 40% of the total storm-water volume in the City.
Defining the Problems:

Hoboken’s Seven Main Sewersheds

- STORMWATER VOLUME GENERATED DURING 1-YEAR RAINFALL EVENT
  (Millions of Cubic Feet)

- Hoboken’s combined sewer system service area is organized into seven main sewersheds
- Of these, H1 handles almost 40% of the total volume in the City
- Total: 4.74 Million Cubic Feet
Areas Most Affected by Flooding

- No Respondents
- Some Respondents
- Many Respondents

Flooding Intersection
Flooding Street
IDENTIFYING WHAT WE NEED TO PROTECT:
Vulnerable communities
IDENTIFYING WHAT WE NEED TO PROTECT:

Transit

To Newark
Suburban Counties

2nd Street
Station

9th Street
Station

NJ TRANSIT

2nd Street HBLR

To Newark

HBLR

To Bayonne

Observer HW

PATH

To NYC

HBLR

To North Bergen

¼ Mile Walk Radius

Transit Station

Bus Depot

Ferry

Emergency Routes

Transit Routes

Hoboken Terminal

Hoboken

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OPPORTUNITIES

Potential North End Rehabilitation Area
• Redevelopment and Rehabilitation areas provide larger scale opportunities to integrate green infrastructure for significant stormwater retention.

• 29.1 acres of publicly owned land in Hoboken present smaller scale opportunities to implement green infrastructure, specifically at parks, public buildings, transit facilities, and roadways.

• Critical Transit infrastructure is concentrated at the borders of H1, H2, H4, H5, and H7
Most cost-effective BMPs by capital cost are
1. constructed wetlands
2. permeable pavements and
3. stormwater trees

Swales and rainwater harvest & reuse are highly cost effective over their lifetime.
### Potential Stormwater That Can Be Captured Using Green Infrastructure

- **H1, H4, H5 and H7** present the biggest potential opportunities to capture stormwater using Green Infrastructure BMPs.

<table>
<thead>
<tr>
<th>BMP</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
<th>H4</th>
<th>H5</th>
<th>H6</th>
<th>H7</th>
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<tbody>
<tr>
<td>Basins or Ponds</td>
<td>574,096</td>
<td></td>
<td></td>
<td>297,338</td>
<td></td>
<td>218,041</td>
<td></td>
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<tr>
<td>Constructed Wetlands</td>
<td>172,229</td>
<td></td>
<td></td>
<td>89,201</td>
<td></td>
<td>65,412</td>
<td></td>
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<tr>
<td>Swales</td>
<td>114,819</td>
<td>5,179</td>
<td></td>
<td>28,681</td>
<td>59,468</td>
<td>43,608</td>
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<tr>
<td>Stormwater Tree Pits</td>
<td>57,410</td>
<td>1,726</td>
<td>6,871</td>
<td>9,560</td>
<td>29,734</td>
<td>1,926</td>
<td>21,804</td>
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<tr>
<td>Rain Gardens</td>
<td>229,639</td>
<td>10,359</td>
<td></td>
<td>76,482</td>
<td>118,935</td>
<td></td>
<td>87,216</td>
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<tr>
<td>Subsurface Storage</td>
<td>172,229</td>
<td>12,949</td>
<td>154,586</td>
<td>57,361</td>
<td>89,201</td>
<td>43,337</td>
<td>65,412</td>
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<tr>
<td>Stormwater Planters</td>
<td>344,458</td>
<td>10,359</td>
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<td>57,361</td>
<td>89,201</td>
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<td>65,412</td>
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<tr>
<td>Permeable Pavements</td>
<td></td>
<td>2,762</td>
<td></td>
<td>15,296</td>
<td>23,787</td>
<td></td>
<td>17,443</td>
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<tr>
<td>Rainwater Harvest &amp; Reuse</td>
<td>12,968</td>
<td>634</td>
<td>3,547</td>
<td>5,006</td>
<td>9,984</td>
<td>1,810</td>
<td>4,780</td>
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<tr>
<td>Green Roofs</td>
<td>25,936</td>
<td>2,535</td>
<td>14,189</td>
<td>20,024</td>
<td>19,968</td>
<td>7,240</td>
<td>9,561</td>
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<td><strong>TOTAL</strong></td>
<td>1,703,784</td>
<td>46,504</td>
<td>179,193</td>
<td>269,771</td>
<td>826,817</td>
<td>54,313</td>
<td>598,690</td>
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Gray signifies that a BMP is not recommended in a given Sewershed.
Detention

Detain stormwater through above-ground BMPs (rainwater harvesting and green/blue roofs) and subsurface storage)

Smaller-scale BMPs for long term incremental benefit:

• Daylighting areas
• Commercial Property Retrofits
• Public property including parks and schools
Infiltration

Infiltrate stormwater using vegetated BMPs, eg. rain gardens, swales, stormwater trees, infiltration planters and permeable pavements.

Large-Scale BMPs for more immediate Impact:
- Subsurface Storage under the Pino Site Park;
- Constructed wetlands or basin in the Northwest, Western Edge and Potential North End Rehabilitation Areas.
Retain stormwater focusing on the Western Edge and Potential North End Rehabilitation Areas (basins or ponds, constructed wetlands, subsurface storage)
CURRENT POLICIES AND REGULATIONS

Policies
• Emphasis on Stormwater Management
• Increase Open Space
• Utilize Redevelopment Areas

Regulations
• Zoning Ordinance
  – Building Coverage
  – Stormwater Regulations

• NJDEP Stormwater Regulations
  – County
  – North Hudson Sewerage Authority

Rotterdam Museumpark: Underground parking and stormwater storage

Plan for underground parking and stormwater management under the National Mall in Washington, DC
Opportunities

- Realize significant rainfall retention/treatment
- Ripe for immediate action
- Reduced cost to the public
- Incremental development supported
- Integrated Green Infrastructure

Challenges

- BMP Cost
- BMP Site Suitability
- BMP Implementation
- BMP Effectiveness
**Recommended Regulation Options**

**Performance/Incentive Zoning**
- Regulate: On-Site Rainfall Retained
- Incentives: FAR, Height, Density
- Factors:
  - % of Pervious Coverage
  - % of Impervious Surface treated by BMP

**Stormwater Trust Fund**
- District Wide Approach
- Site constraints/cost limit BMP
- Contribution of funds
- Funds used for BMP in public realm

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<thead>
<tr>
<th>Regulation</th>
<th>Rainfall Retained</th>
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<tr>
<td></td>
<td>1-25%</td>
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<tr>
<td>FAR</td>
<td>1.0</td>
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<tr>
<td>Height</td>
<td>2 story</td>
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<tr>
<td>Density</td>
<td>28 DU/ Acre</td>
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REDEVELOPMENT AREA CASE STUDY:
Western Edge Upper Monroe Street
REDEVELOPMENT AREA CASE STUDY:
Western Edge Upper Monroe Street

• H5 Sewershed: generates the second-highest volume of stormwater

• Identified as high flood risk area

• Protection of public infrastructure: 9th Street NJ Transit Station

• Designated with a Redevelopment Plan

• Capacity to retain rainfall based upon soils and depth to bedrock

• Connectivity to open space network
REDEVELOPMENT AREA CASE STUDY:
Western Edge Upper Monroe Street

- H5 Sewershed: generates the second-highest volume of stormwater
- Identified as **high flood risk area**
- Protection of public infrastructure: **9th Street NJ Transit Station**
- Designated with a Redevelopment Plan
- **Capacity to retain rainfall** based upon soils and depth to bedrock
- Connectivity to **open space network**