City of Hoboken Proposed Stormwater Management Plan Amendments Health Impact Assessment

> Healthy Decisions – Healthy Communities Sustainable Jersey[™] Webinar

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STAGES OF HIA

Step 6: Evaluation Monitor impacts. Did the HIA change the outcomes?

Step 5: Reporting Communicate findings. Who needs to know the HIA results?

The steps of the service of the serv **Step 4: Recommendations** Identify actions that protect health. Can the decision be designed to promote health?

Step 3: Assessment

Identify current and predicted health impacts. What changes may occur from the decision?

Step 2: Scoping

Develop a plan for the HIA. What health impacts will be considered? What populations will be affected?

Step 1: Screening

Determine whether an HIA will add value. Is an HIA needed? Will it be useful to the decision process?



Area: 1.2 Square Miles Population: 52,575 Households: 25,041 Real Property Ratable Base: \$9.7 Billion Combined Sewer System privately owned/maintained by No. Hudson Sewerage Auth.

Landmass within Flood Zone (A): 63.85% Landmass within Flood Zone (V): 7.41% Landmass within Flood Zone (X): 7.66% Hoboken NFIP Total Liability: \$1,922,187,500 Hoboken NFIP Annual Premiums: \$5,984,720



Observed Change in Very Heavy Precipitation



Source: 2014 National Climate Assessment

http://nca2014.globalchange.gov/report/our-changing-climate/heavy-downpours-increasing

Hoboken Floods Regularly (before and after Sandy)



Most Recent Flooding: May 31, 2015



Stormwater Management Strategy Green Infrastructure



Impervious 'hard' surfaces (roofs, roads, large areas of pavement, and asphalt parking lots) increase the volume and speed of stormwater runoff. This swift surge of water erodes streambeds, reduces groundwater infiltration, and delivers many pollutants and sediment to downstream waters.



Pervious 'soft' surfaces (green roofs, rain gardens, grass paver parking lots, and infiltration trenches) decrease volume and speed of stormwater runoff. The slowed water seeps into the ground, recharges the water table, and filters out many pollutants and sediment before they arrive in downstream waters.

Conceptual diagram illustrating impervious and pervious surfaces. Impervious surfaces are hard and increase stormwater runoff, causing pollutant and sediment delivery in downstream waters. Pervious surfaces are soft and decrease stromwater runoff, which filters out pollutants and sediments before they arrive in downstream waters. Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Chesapeake and Atlantic Coastal Bays Trust Fund, 2013. Stormwater Management: Reducing Water Quantity. IAN press, newsletter publication.

Hoboken Green Infrastructure Strategic Plan



Green Infrastructure Strategy for the City of Hoboken

Screening: Why do an HIA?

- Provide a forum for community discussion and engagement around health outcomes and flood mitigation
- Add value by providing decision-makers with data and information on the potential health benefits and risks of various stormwater management strategies
- Identify opportunities to maximize the benefits and reduce the risks of various strategies
- Hopefully influence decisions toward enhanced health outcomes for city residents over time

Scoping Phase

- **Decision:** Adoption of Revised Storm Water Management Plan and Ordinance
- Geography: Entire City
- Focus: Chronic repetitive flooding, sanitary sewer backups, combined sewer overflows (CSOs)
- Temporal Scope: Long-term (20+ years)
- HIA Timeline: Oct 2014 Dec 2015
- Impacted populations & potentially vulnerable groups:
 - Residents (in general)
 - Older adults
 - Low income individuals/families
 - Undocumented residents and
 - Populations with Limited English Proficiency
 - Renters
 - First responders

Public & Stakeholder Engagement

- HIA Advisory Committee (4-6 meetings)
- Structured interviews
- Resident focus groups
 - Seniors
 - Housing Authority Residents (low-income)
- Community-wide resident survey
- Public workshop/open house

Assessment Phase

- Document baseline conditions
 - Health status of residents
 - Flooding conditions
 - Current level of green infrastructure
- Identify health pathways & determinants
- Characterize anticipated health effects
 - Reduced flooding and Combined Sewer Overflows
 - Co-benefits and risks associated with green infrastructure solutions
- Evaluate the evidence and certainty of predicted effects

Baseline Conditions: Flooding



Storm	Total Rain (in)	Duration (hr)	Max Intensity (in/hr)	Storm Designation
May 8, 2013	2.44	11.3	2.28	1 year, 12 hr. / 1 year, 1 hr. peak
May 23, 2013	1.19	1.5	2.64	Almost 1 year
June 2-3, 2013	1.22	19.2	2.40	
June 6-8, 2013	3.99	31.5	1.08	Tropical Storm Andrea / 4 year, 12 hr.

Source: EmNet 2013

Baseline Conditions: Combined Sewer System Impacts

North Hudson Sewerage Authority:

- Hoboken
- Union City
- Weehawken
- West New York



Source: US EPA, 2014

During wet weather, the combination of wastewater and stormwater can exceed the capacity of the system, resulting in:

- Sanitary sewer backups in streets and basements
- Discharge of effluent into Hudson River
 - Five outfalls located in Hoboken
 - No data available on actual number of overflow events
 - 1996 study predicted 45-224 annual overflow events depending on outfall

(Source: Tri-City Sewerage Authority Study, CH2M Hill, 1996)

Potential Health Determinants

- Flooding:
 - Death, injury/mental health
 - Damage to buildings, dampness, mold, dust
 - Disruption/reduced access (transport, job/work, school, fresh food, medical care, medications)
- Combined Sewer Overflows
 - Exposure to toxics/pathogens
- Sanitary sewer back-ups
 - Exposure to toxics/pathogens
- Access to natural features and green landscape
- Air quality
- Water quality

- Urban heat island
- Standing water
- Contaminated soil
- Economic conditions:
 - Access to "green jobs"
 - Change in property values
 - Change in rents
 - Change in taxes
- Other exposure hazards:
 - Trip and fall
 - Pests/vermin
 - Graffiti/crime
 - Accumulation of trash/litter

Most Frequent Flooding Impacts



In the past two years, I experienced and/or sought medical attention at least one time for the following conditions after coming in contact with flood waters or sewer back-ups: headaches; vomiting; abdominal cramping, nausea, or diarrhea; muscle aches; eye irritation/infection; asthma or other respiratory condition; or skin rash.





Flooding Impacts on Health/Well-being

Before, during of after flooding I...



Benefits & Risks of Moving Forward with Green Infrastructure Solutions













Benefits of Green Infrastructure BMPs

	FLOODING MITIGATION		ECOLOGICAL BENEFITS		PUBLIC HEALTH		OPEN / GREEN SPACE		
BMP	Volume	Peak Discharge	Water Quality	Wildlife Habitat	Air Quality	Heat Island Effect	Noise Pollution Reduction	Beautification	Expanding Recreation
Basins or Ponds									
Constructed Wetlands									
Vegetated Swales									
Stormwater Trees									
Rain Gardens									
Subsurface Storage									
Rainwater Harvesting/Reuse									
Stormwater Planters									
Permeable Pavements									
Green Roofs									

Source: Hoboken Green Infrastructure Strategic Plan Final Report, 2013

Using green infrastructure in Hoboken can/will...



Percent Disagree

Opinions of Green Infrastructure

Concerns about green infrastructure include:

- Costs/higher taxes
- On-going maintenance
 - Standing water (smells)
 - Increase mosquitos and vermin
 - Pet refuse
- Increased allergies
- May encourage loitering/crime
- Reduction in parking

Health Effect Characterization

Health Determinant	Direction	Likelihood	Magnitude	Duration	Distribution	Evidence
Flooding	+	Very likely	High	Long	Restorative effects	Strong
Combined sewer overflows	+	Very likely	High	Long	Restorative effects	Strong
Sanitary sewer back-ups	+	Very likely	High	Long	Restorative effects	Strong
Access to natural features and green landscape	+	Very likely	Moderate	Long	Neutral	Limited
Air quality	+	Likely	Moderate	Long	Neutral	Limited
Water quality	+/-	Possible	Moderate	Long	Neutral	Mixed
Urban heat island	+	Likely	Moderate	Long	Neutral	Strong
Standing water	+/-	Likely	Moderate	Long	Disproportionate harm	Limited
Contaminated soil	-	Possible	Moderate	Long	Neutral	Mixed
Economic conditions:						
 Access to "green" jobs 	+	Possible	Moderate	Medium	Restorative effects	Limited
 Property values 	+	Possible	Moderate	Long	Disproportionate harm	Limited
– Rents	-	Unlikely	Moderate	Long	Disproportionate harm	Limited
– Taxes	+/-	Possible	Moderate	te Long Disproportiona		Limited
Other exposure hazards:						
 Trip and fall 	-	Possible	Moderate	Long	Neutral	Limited
 Pests/vermin 	-	Likely	Moderate	Long	Neutral	Limited
 Graffiti/crime 	_	Possible	Moderate	Long	Disproportionate harm	Limited
 Accumulation of trash/litter 	-	Likely	Moderate	Long	Neutral	Limited

Preliminary Recommendations

- Magnify benefits by expanding green infrastructure implementation throughout NHSA service area.
- Ensure green infrastructure benefits accrue evenly throughout the City.
- Manage potential risks with careful design and public education.
- Ensure longevity of benefits with a robust program of on-going maintenance.
- Expand public outreach and education to ensure more residents are aware of the City's efforts to expand green infrastructure and understand potential benefits and risks.

Next Steps

- Document baseline conditions
 - Health status of residents
 - Flooding conditions
 - Current level of green infrastructure
- Identify health pathways & determinants
- Characterize anticipated health effects
 - Reduced flooding and Combined Sewer Overflows
 - Co-benefits and risks associated with green infrastructure solutions
- Evaluate the evidence and certainty of predicted effects
- Finalize recommendations and prepare draft report
- Finalize and execute communication and dissemination strategy