FEASIBILITY ANALYSIS OF INTERIM FLOOD PROTECTION MEASURES ALONG THE EAST SIDE OF MANHATTAN

Executive Summary
July 2020

NYC Emergency Management

OEM

Agenda

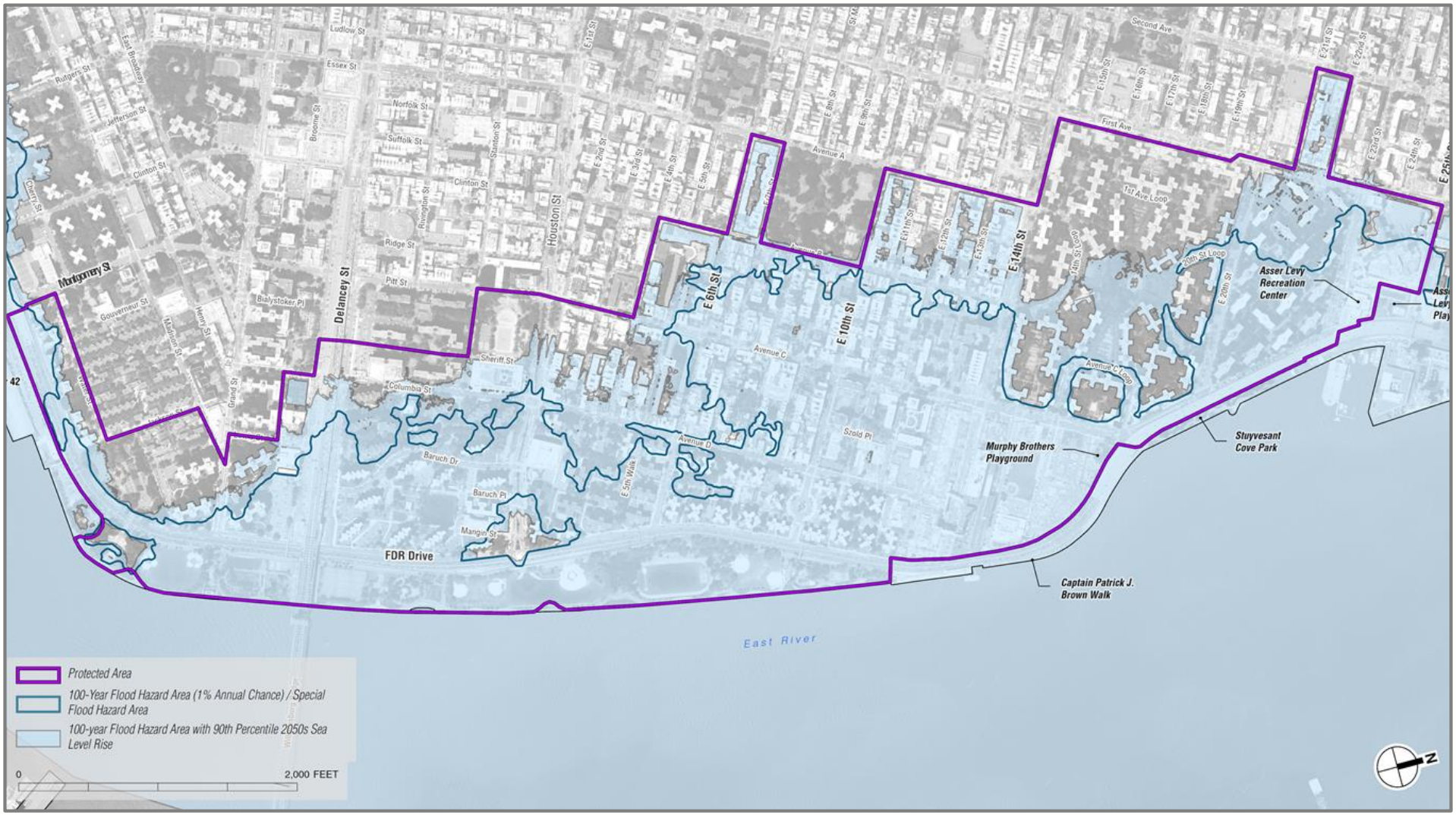
1. IFPM Program Overview
2. ESCR Flood Plain
3. IFPM Flood Plain
4. IFPM Feasibility
    a. Site Considerations
    b. Summary of Findings
    c. Drainage Analysis

IFPM Program Overview

- **Established**: 2016
- **Goal**: Reduce low-level, high recurrence coastal flood risks while NYC continues to advance longer-term coastal protection needs
- **Focus**: Protecting critical facilities and low-lying neighborhoods
- **Timeline:** Approx. 24 months from initial analysis to construction completion
- **Does <u>not</u>:**
  - Mitigate rainfall flooding
  - Protect for severe events like Sandy
  - Fully eliminate flood risks
  - Activate for nor'easters due to limitations in forecasting timelines and confidence
  - **<u>Serve as a life safety program</u>**
    - Measures are intended for infrastructure protection so residents can get back to their homes faster
    - Residents must follow all evacuation orders issued by NYC

ESCR Flood Plain

The blue shading shows the 100 year flood extent with 2.5 feet of sea level rise, the area of protection to be provided by ESCR



IFPM Flood Plain

Measures available in the IFPM program would provide protection to the 15 year flood extent

IFPM Feasibility: Site Considerations

Factors to Consider		Entire Site Level	Multi-Block Level	Site Level
Drainage	• Work with DEP to determine potential for backflow flooding. • Where can water enter the site from underground sewers? • Is there backflow prevention on DEP outfalls? • Can water enter sewer system from other parts of the sewershed?	?	?	?
Timeline	• Average facility site can take 18 months for design/construction; neighborhood sites often 24+ months. • How many seasons of protection will IFPM provide before permanent mitigation is in place?	?	?	?
Risk Reduction Benefit	• What level of protection is provided by IFPM measures? • Can IFPM measures reduce risk of flooding to asset(s)? Are there other pathways? • What is exposed? Are buildings or critical equipment already elevated? • Will measures be installed in time to provide multiple-hurricane season protection before permanent work is completed?	?	?	?
Complexity	• Neighborhood, block, or building level, with differing constraints and benefits.	?	?	?
Operational Impacts	• Will measure impede traffic or site operations during deployment? • Will measures affect other construction activity? • Are measures on City-owned or private property?	?	?	?
Estimated Costs	• Estimates based on potential alignment lengths • Estimates include engineering, materials, installation • Estimates do NOT include maintenance/adjustments for construction or deployment	?	?	?

IFPM Feasibility: Summary of Findings

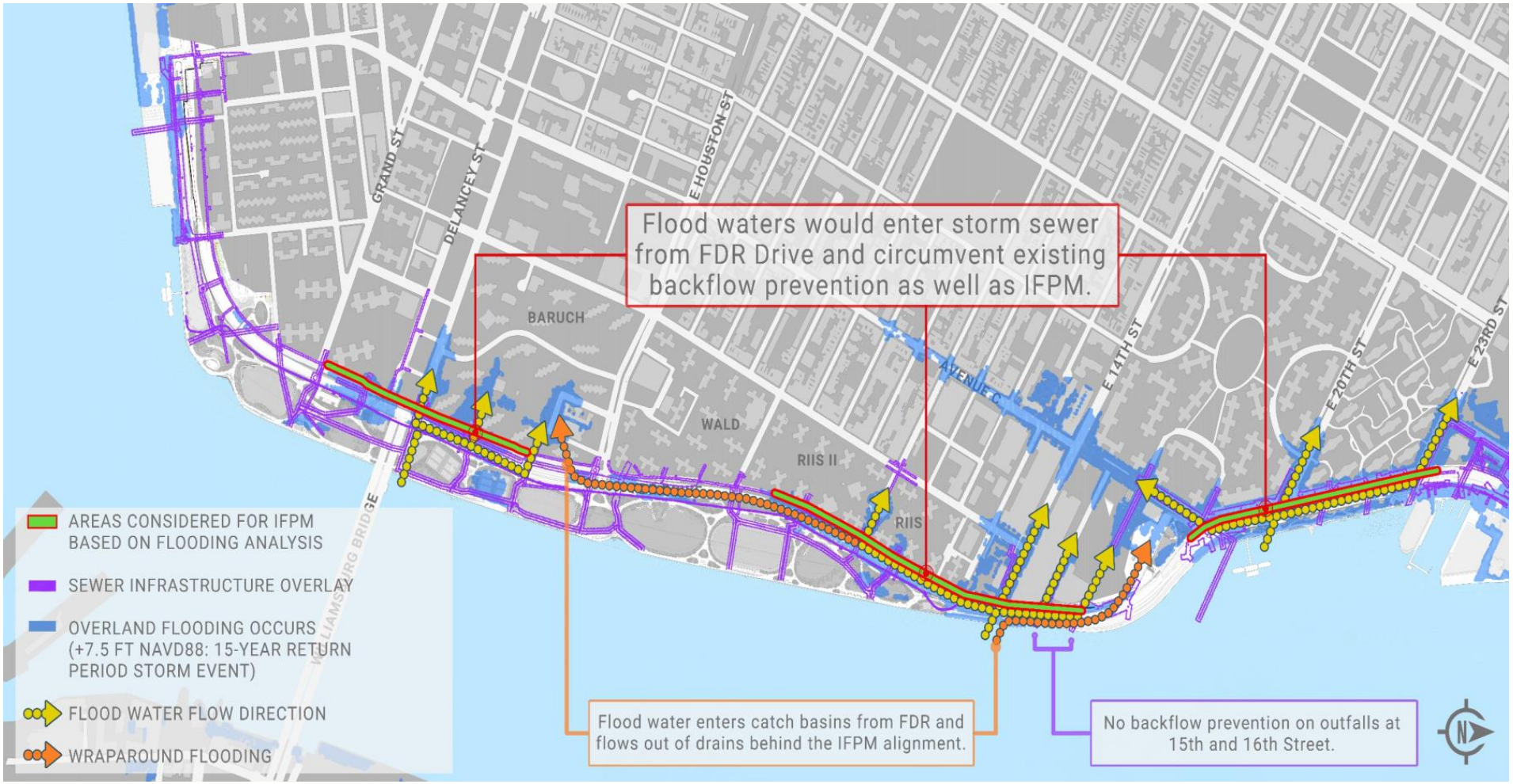
IFPM faces many constraints in the ESCR area resulting in no viable option from the engineering analysis.

	Entire Site Level	Multi-block Level	Site Level
Drainage			
Timeline			
Risk Reduction Benefit			
Complexity			
Operational Impacts			
Estimated Cost	$4 MM	$3.5 MM	Wald: $2.25 MM Baruch: $2 MM

Drainage is the primary technical constraint in determining that IFPM is not an effective solution

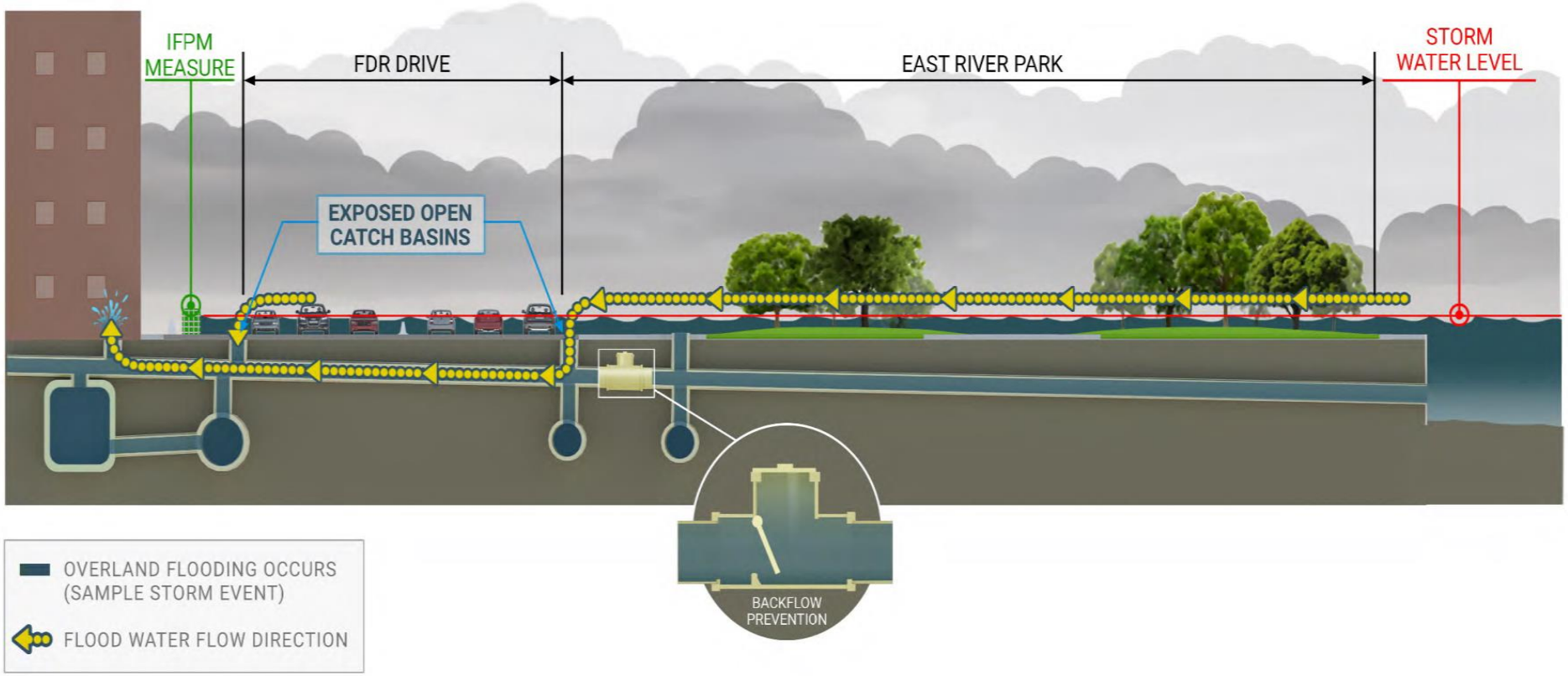
IFPM Feasibility: Drainage Overview

During a storm event, flood waters would enter the storm sewers from FDR Drive circumventing existing backflow preventers and IFPM



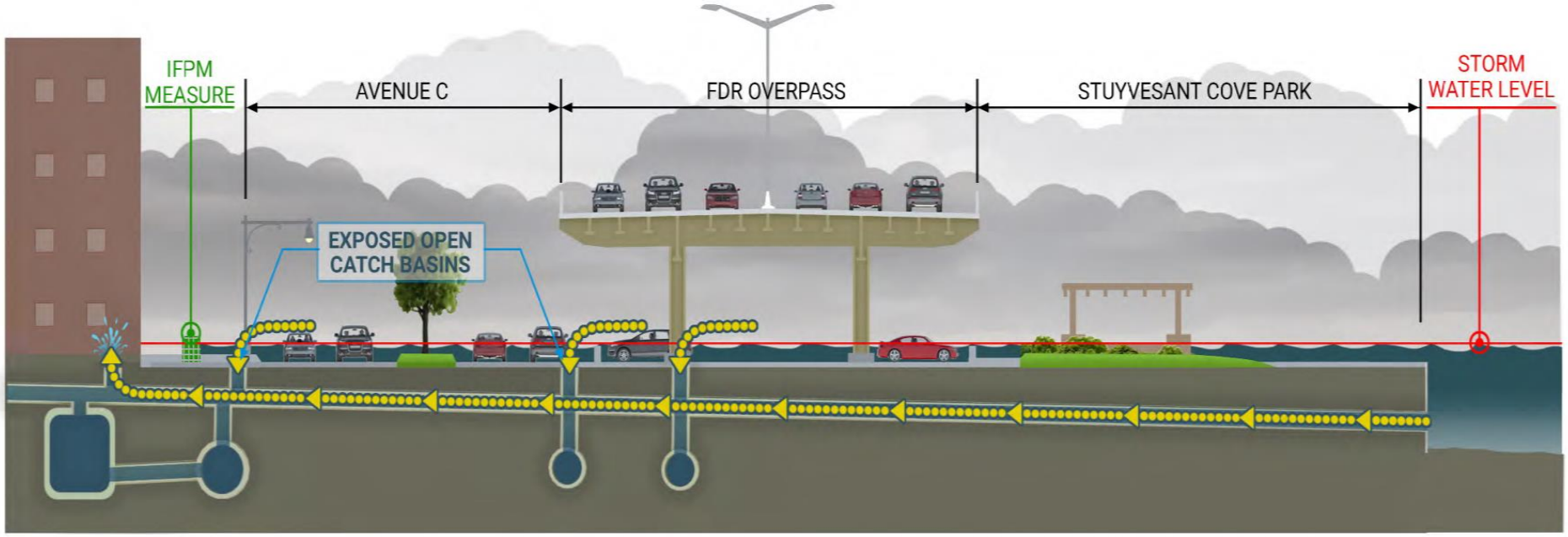
Drainage: Entire Site or Multi-Block Level

While some sewer lines have backflow prevention, water would flow into catch basins located upland of the backflow prevention allowing flood water to enter the protected side of an IFPM alignment.



Drainage: Entire Site or Multi-Block Level (continued)

Other sewer lines have no backflow prevention. Flood water would enter the protected side of an IFPM alignment through the sewer line and catch basins.



Drainage: Site Level – Baruch Houses

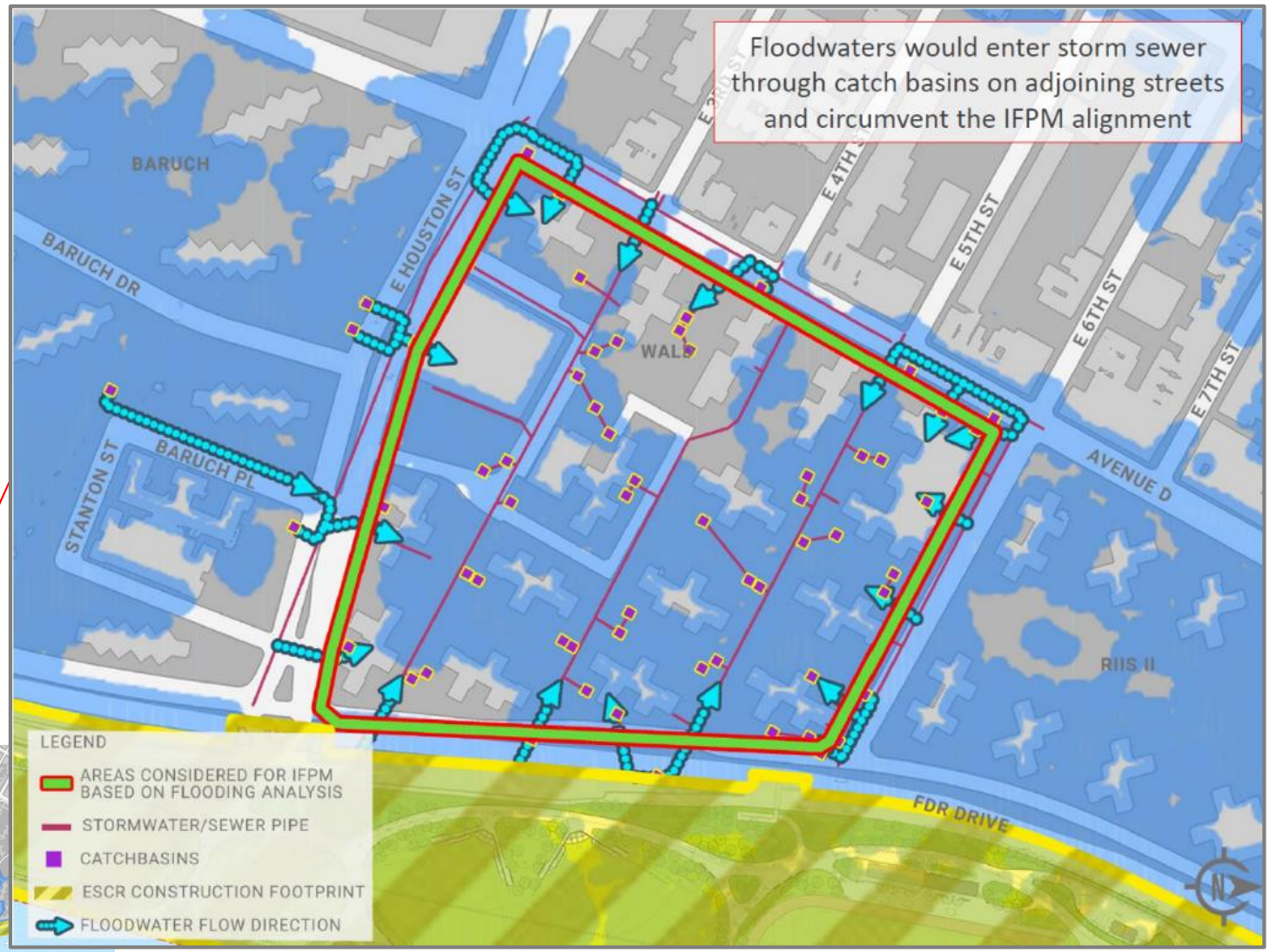
Drainage network would result in backflow flooding within the development through 21 catch basins.

Note: Flood water depth above ground in the flood extent illustrated would reach approximately 3 feet.

Drainage: Site Level – Wald Houses

Drainage network would result in backflow flooding within the development through 15 catch basins.

Note: Flood water depth above ground in the flood extent illustrated would reach approximately 3 feet.



QUESTIONS

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FEASIBILITY ANALYSIS OF INTERIM FLOOD PROTECTION MEASURES ALONG THE EAST SIDE OF MANHATTAN

Annex Slides
July 2020

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Feasibility Findings: Drainage

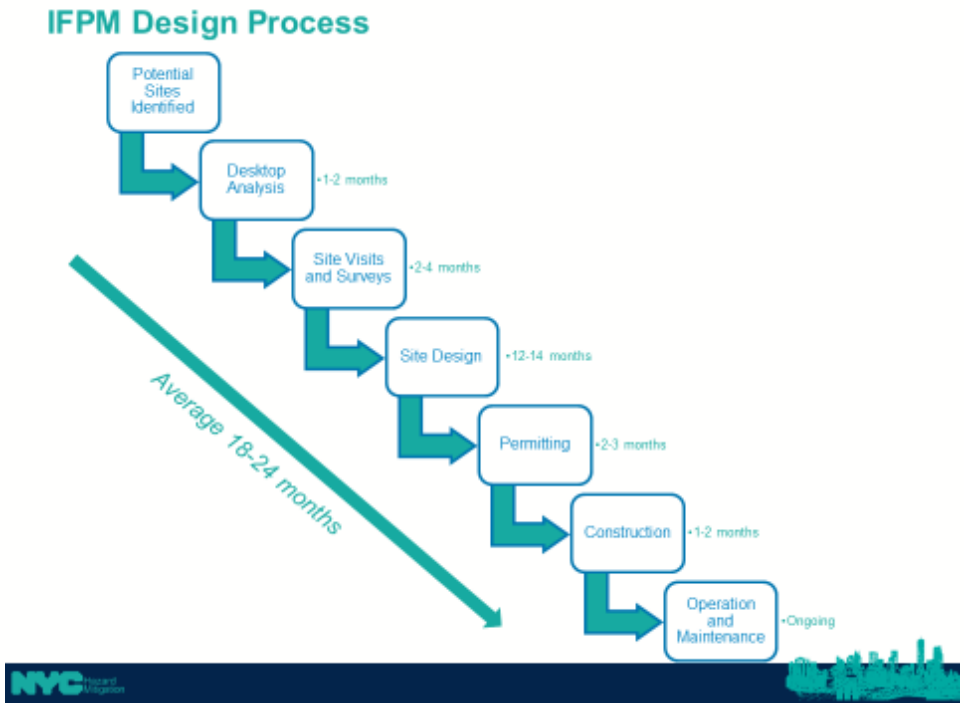
	Factors to Consider	Entire Alignment	Multi-Block	Site Level

Drainage	• Analysis with DEP shows complex drainage system with numerous pathways for backflow flooding.
	  • Water could bypass outfalls with backflow prevention
	  • Water would enter through outfalls with no tide gates
	  • At the Site Level, number of catch basins that would result in backflow flooding is prohibitive to feasible deployment.
		●	●	●

Timeline		?	?	?
Risk Reduction Benefit		?	?	?
Complexity		?	?	?
Operational Impacts		?	?	?

FEASIBILITY: IFPM TIMELINE

IFPM Feasibility: Timeline



IFPM projects can
take 18-24 months to implement

Neighborhood scale sites
typically take 24+ months

- Many building and site level resiliency projects within the project area will be completed before IFPM could be installed

- IFPM measures cannot be deployed where they will conflict with ESCR or NYCHA construction

Feasibility Findings: Timeline

	Factors to Consider	Entire Alignment	Multi-Block	Site Level
Drainage		●	●	●
Timeline	• 24+ month process • IFPM timeline estimates potential installation mid to late 2021, possibly after Coastal Storm Season. • ESCR construction beginning in 2020 • IFPM would be in conflict with ESCR construction • NYCHA permanent mitigation completion expected in 2021.	●	●	●
Risk Reduction Benefit		?	?	?
Complexity		?	?	?
Operational Impacts		?	?	?

IFPM Feasibility: Timeline

Site Level

NYCHA developments considered for localized solution.

- Baruch Houses
  - Estimated construction finish date: **2021 Q4**
- Wald Houses
  - Estimated construction finish date: **2021 Q2**
- Riis Houses
  - Boiler room **protected by IFPM since 2017**

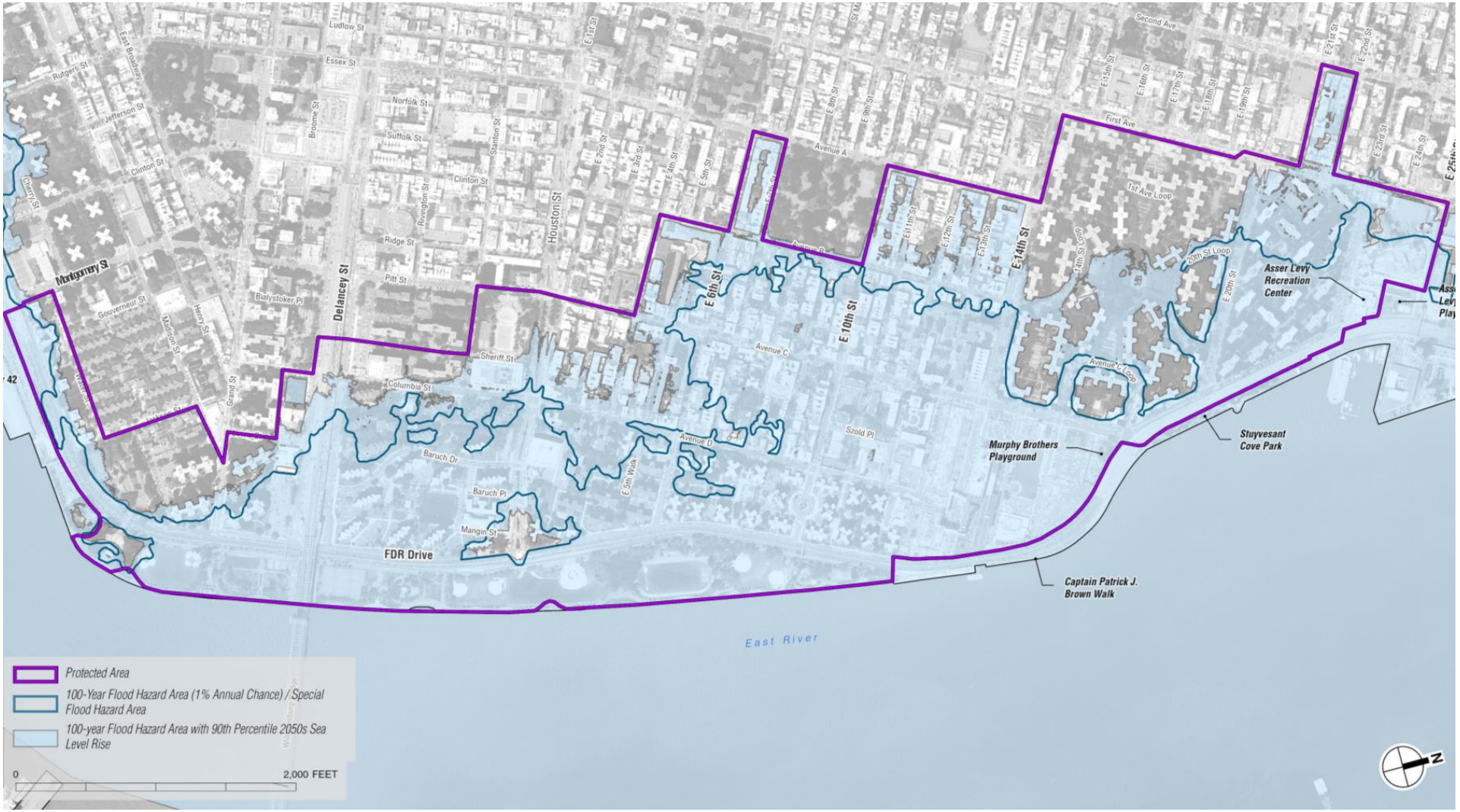
- IFPM Considerations
  - NYCHA's permanent mitigation work may be completed or have achieved elevation of at-risk infrastructure before IFPM can be installed.
  - IFPM cannot interfere with NYCHA's construction footprint and risk delays in permanent work.
  - If feasible, IFPM timeline would expect IFPM completion 2021 Q4 at best

FEASIBILITY: RISK REDUCTION BENEFIT

IFPM Feasibility: Risk Reduction Benefit

ESCR Area of Protection

ESCR will protect to the <u>100 year flood extent</u>, with 2.5 feet of projected sea level rise, protecting approximately 1,400 buildings.



IFPM Feasibility: Risk Reduction Benefit

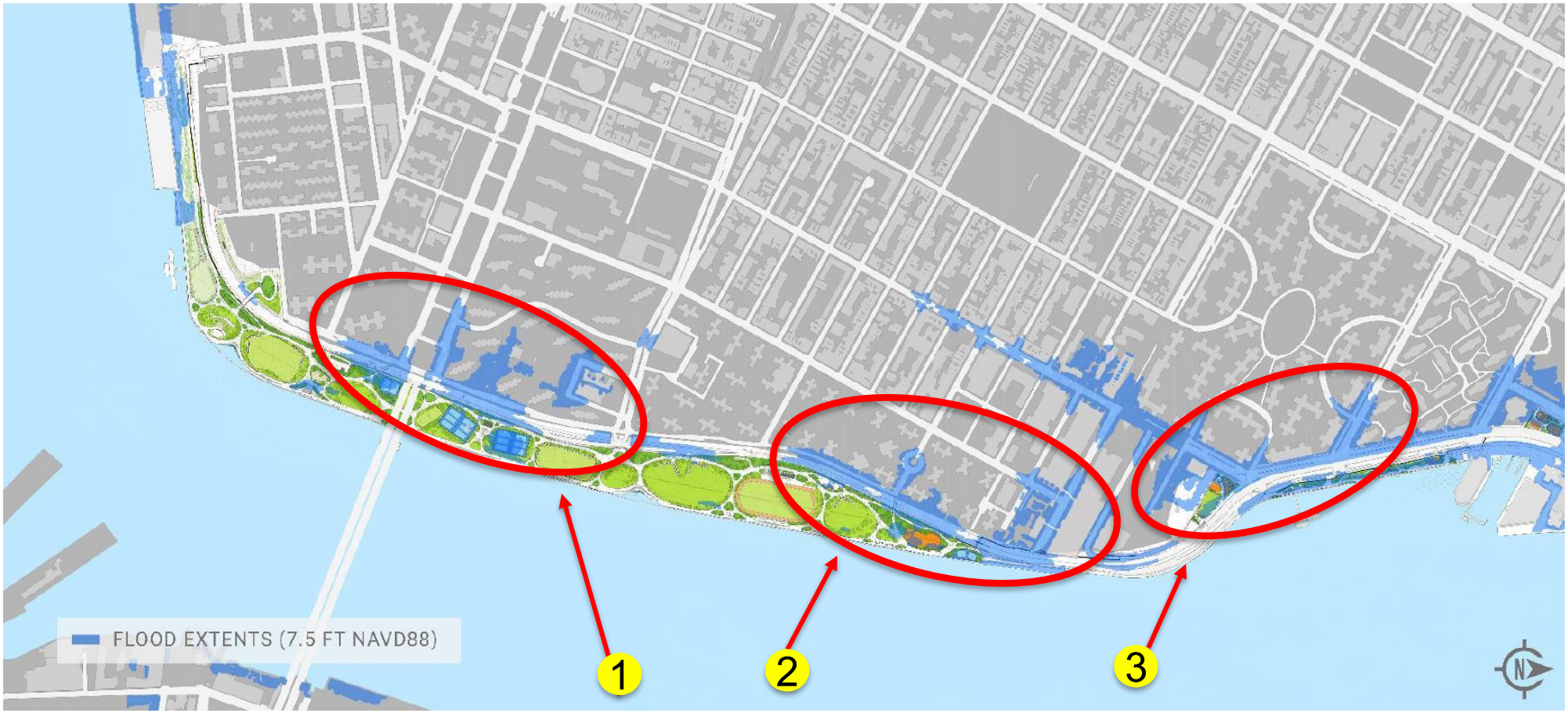
Potential IFPM Area of Protection

IFPM would offer protection to the 15 year flood extent, protecting approximately 227 buildings, less than 17% of the buildings protected by ESCR. Only 95 (less than 4%) are residential buildings.

IFPM Feasibility: Risk Reduction Benefit

Entire Alignment/Multi-block

Water enters at three low points along the alignment. The low points dictate the level of overland flooding that can be protected by a 4’ IFPM measure.



Based on the low points, along with height of measures, we can only provide protection **to 7.5”ft** NAVD88, a 15 year event.

IFPM Feasibility: Risk Reduction Benefit

Entire Alignment/Multi-block

Illustration of a low point in the ESCR alignment.

IFPM Feasibility: Risk Reduction Benefit

Entire Alignment/Multi-block

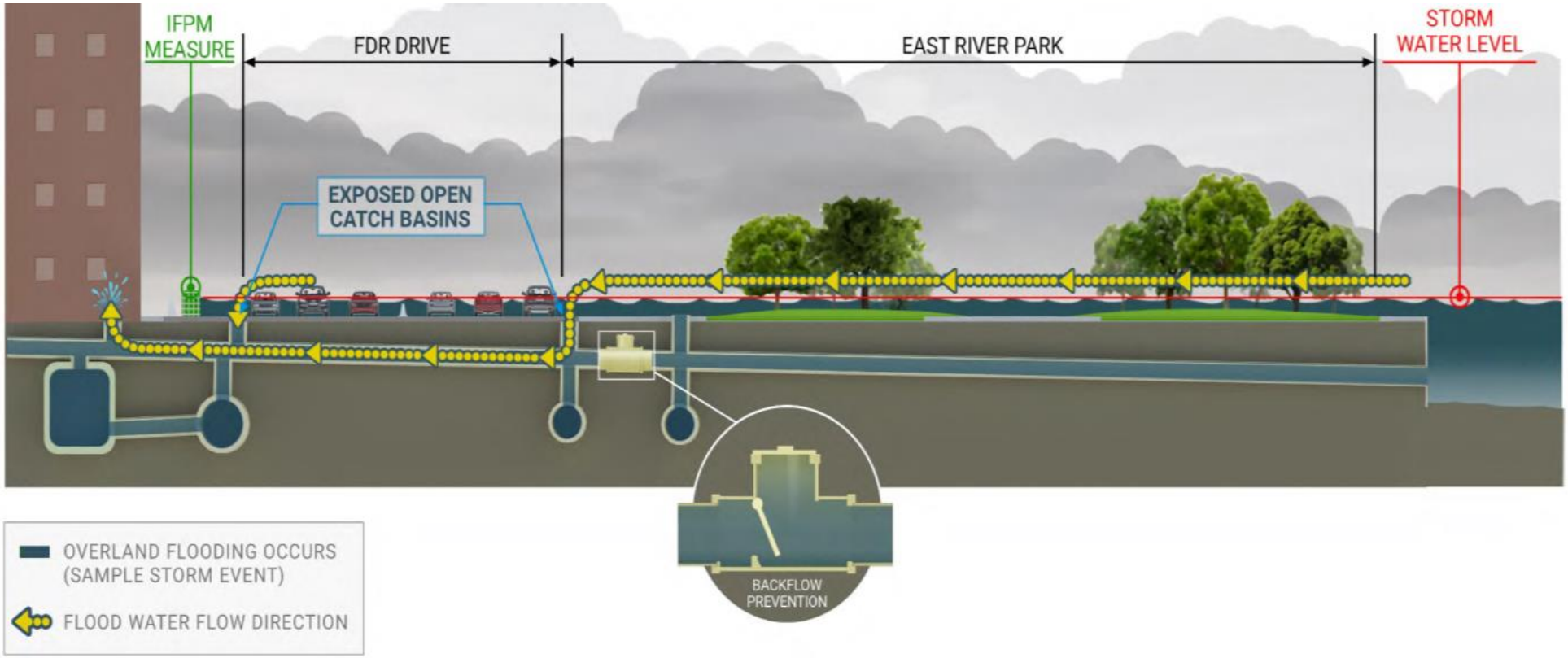
Illustration of HESCOs installed at a low point, during an approximate 15 year storm

Any storm more intense will overtop IFPM measures.
Most assets in the area are above this flood level. IFPM would provide very minimal benefit.

IFPM Feasibility: Risk Reduction Benefit

Entire Alignment/Multi-block

As in the Drainage discussion above, the existing drainage system would compromise an IFPM alignment, allowing floodwater into the “protected” side and providing no benefit.



IFPM Feasibility: Risk Reduction Benefit

Site Level

As mentioned above, the permanent mitigation timeline at NYCHA sites expects completion by the end of 2021.

IFPM would have the same estimated completion, providing no benefit.

Feasibility Findings: Risk Reduction Benefit

	Factors to Consider	Entire Alignment	Multi-Block	Site Level
Drainage		●	●	●
Timeline		●	●	●
Risk Reduction Benefit	• Level of IFPM protection will provide minimal benefit to 7.5 ft. and most assets in area are above this level. • Benefit is limited by timeline considerations above	●	●	●
Complexity	• Beyond scale of program.	?	?	?
Operational Impacts	• Numerous potential impacts/conflicts between construction for permanent work and IFPM.	?	?	?

FEASIBILITY: COMPLEXITY OF PROJECT

IFPM Feasibility: Complexity of Program

Remediation of the existing conditions would require measures and actions that are outside the scope, scale and timeline of the IFPM program parameters.

- Permanent construction work required to install Storm Sewer System Backflow Prevention

- Number of catch basins requiring JIT measures is not realistically achievable during a coastal storm activation

- Ongoing construction at ESCR and NYCHA developments would require numerous time-consuming re-designs, potentially leaving the site vulnerable during storm seasons

Feasibility Findings: Scale of IFPM Program

	Factors to Consider	Entire Alignment	Multi-Block	Site Level
Drainage		●	●	●
Timeline		●	●	●
Risk Reduction Benefit		●	●	●
Complexity	• Scope of entire alignment is beyond scale of program • Multi block scale might fit program • Site level scale might fit program but drainage issues would severely impact deployment.	●	●	●
Operational Impacts		?	?	?

FEASIBILITY: OPERATIONAL IMPACTS

IFPM Feasibility: Operational Impacts

IFPM measures in or near ESCR construction would be continually subject to removal, re-engineering and replacements

IFPM could interfere with NYCHA's construction footprint and risk delays in permanent mitigation.

Continually changing conditions may disrupt deployment capabilities before a storm

A multi-block alignment outside the ESCR project area would be likely to have significant impacts to traffic and site owners.

Feasibility Findings: Scale of IFPM Program

	Factors to Consider	Entire Alignment	Multi-Block	Site Level
Drainage		🔴	🔴	🔴
Timeline		🔴	🔴	🔴
Risk Reduction Benefit		🔴	🔴	🔴
Complexity		🔴	🔴	🟡
Operational Impacts	• Impacts/conflicts between construction for ESCR and IFPM • Mutli-block level likely to have significant impacts to traffic and site owners • Impact to NYCHA permanent mitigation • Constant changes to site conditions impact IFPM alignment and deployment	🔴	🟡	🟡