New York City School Construction Authority

Built to Last:

Incorporating Best Practices in School Design for a More Sustainable Future

Overview

- Review legislation that has facilitated more sustainable building practices.
- Overview of green building strategies and practices for schools.
- Review Pilot projects addressing building resiliency.
- Oversee portfolio-wide energy management and sustainability programs to support the City's decarbonization goals.
- Review challenges and lessons learned.

Key Legislation

Local Law 86 of 2005

- Established sustainability standards for public construction projects in NYC. Design, Construction, and Operations.

Local Law 31 of 2016

- Requires city-funded capital projects for City-owned property to be built to consume less energy than buildings built under current standards.

Local Law 32 of 2016

- Updated LL86 and required equivalence with the most recent LEED standard
- 30% reduction in potable water consumption

Key Legislation

Local Law 97 of 2019

- Requires the City to meet stringent greenhouse gas emissions reductions
- City operations goal to reduce emissions by:
  - 40% by 2025
  - 50% by 2030

Local Law 94 of 2019

- Requires installation of green roofing or solar panels for new building construction and major roof renovations

Local Law 41 of 2021

- Mandates a 5-year pilot program to develop a resiliency scoring metric for certain projects
- Based on the standards in the NYC Climate Resiliency Design Guidelines (CRDG)

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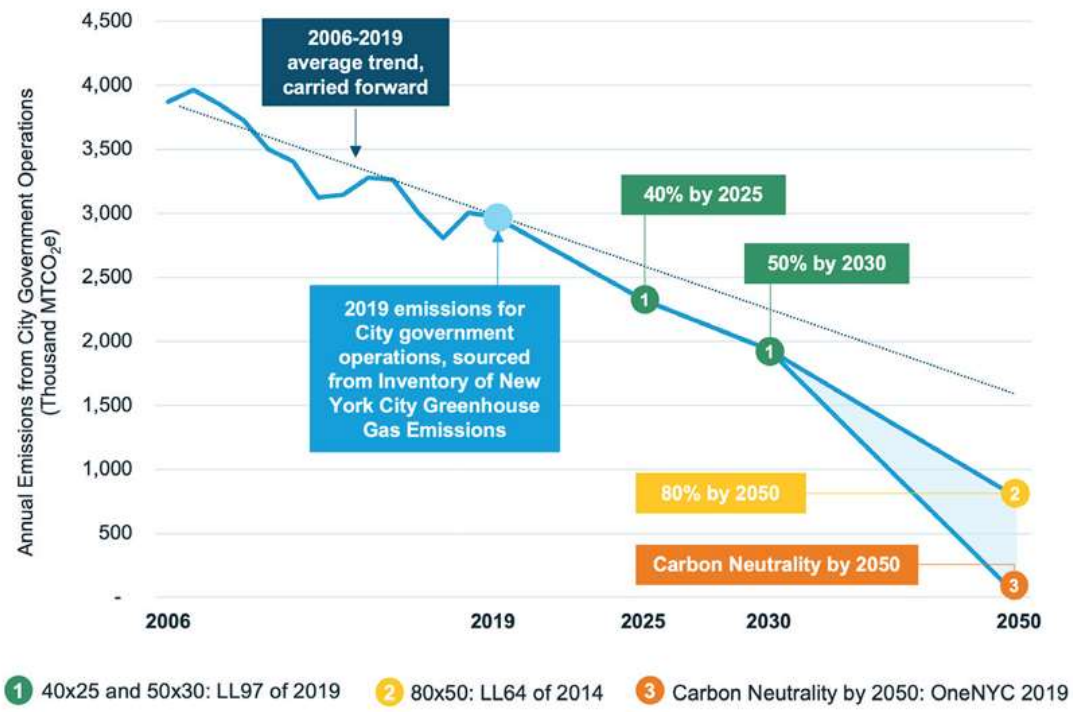
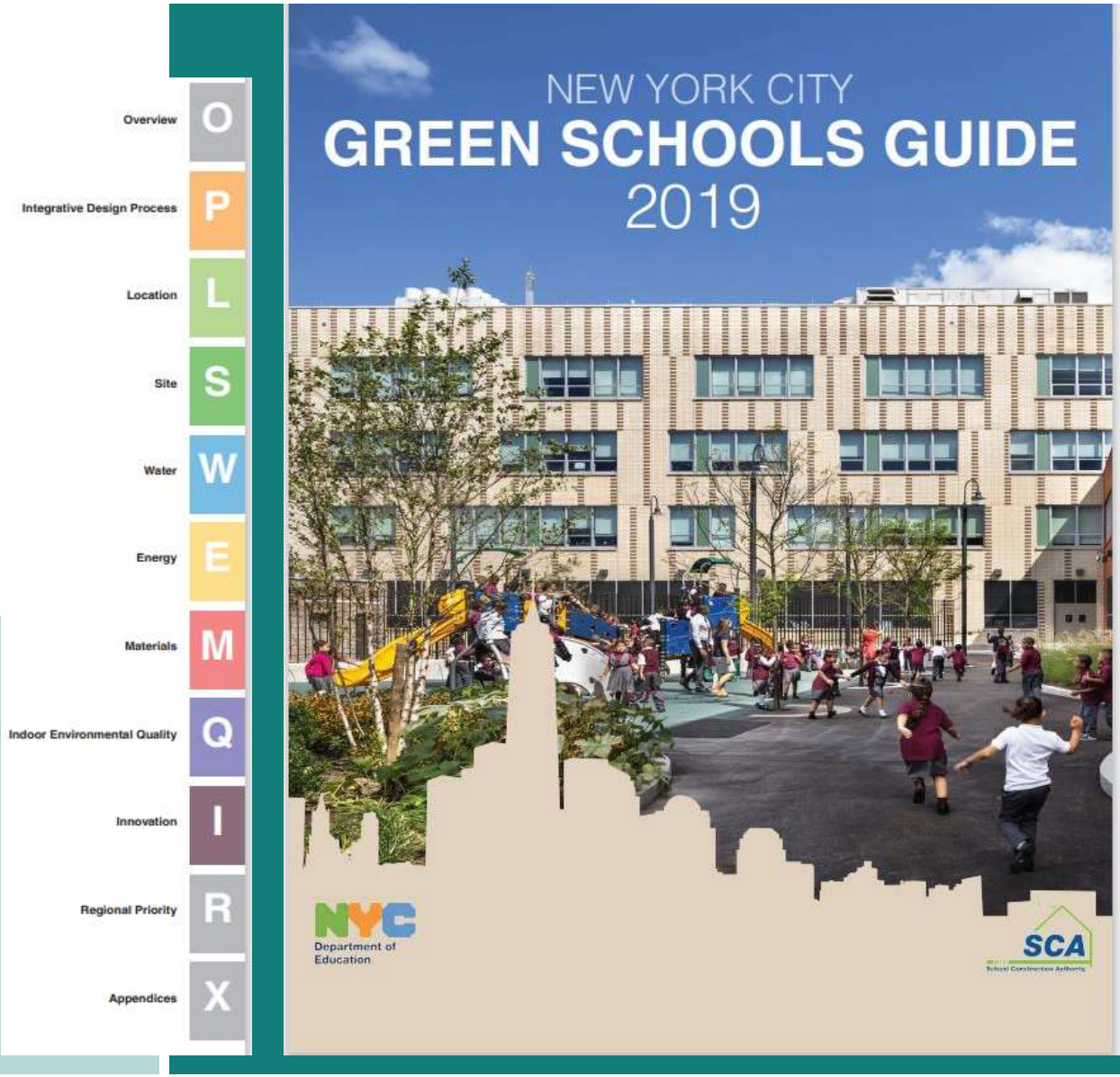


NYC Green Schools Guide

- The most recent update of the GSG went into effect 2/15/23 and is based on LEED v4 and v4.1.



Green Schools Guide

- The general process is as follows:
  - The A/E of Record follows the GSG during design, and compliance is verified at the end of the **design stage**.
  - During **construction**, compliance reviews are conducted by SCA which includes contractor submittal reviews and verification of credits.
  - **Commissioning** is conducted by a joint group made up of SCA staff, Consultant and Contractor personnel, as well as representatives from the NYC Department of Education.
  - Upon successful completion, **Certification** is awarded and a Certification Plaque is installed on the building.

Green Schools Guide – Key Credit Areas

- P1.1R – Integrative Design Process
- L1.4 – High Priority Site
- S3.1R – Joint Use of Facilities
- W2.1P – Indoor Water Use Reduction
- E1.1P – Fundamental Commissioning & Verification; E1.2A – Enhanced Cx & Monitoring Based Cx; E1.3A – Envelope Commissioning
- E3.2R – Optimize Energy Performance
- M2.1 – M2.6 – Material Reporting & Optimization
- Q1.1P – Minimum IAQ Performance; Q1.3R – Enhanced IAQ Ventilation & Monitoring

GSG - P1.1R – Integrative Design Process

- Collaborative approach that encourages early and active participation from all disciplines involved in the design process.
- To improve decision making, achieve high levels of building performance, improved learning and teaching environments, and lead to significant environmental benefits.

DISCOVERY AREAS

- Energy & daylight related systems
- Water related systems/ green infrastructure
- Preliminary life-cycle impact assessments
- Active design
- Acoustics
- Climate resiliency

GSG – L1.4 – High Priority Site

- To encourage project location in areas with development constraints and promote the health of the surrounding areas.
- Historic district (infill location); priority designation (i.e. HUD Qualified Census Tract, Federal Renewal Community, etc.); Brownfield Remediation.
- Extensive environmental investigation is conducted during site selection (S1.1P – Environmental Site Assessment) to determine if a site can be made suitable for school use. This helps inform whether a site would be eligible for a program, such as the NYS Brownfield Cleanup Program, and whether engineering controls would need to be incorporated (i.e. SSDS).

GSG - S3.1R – Joint Use of Facilities

- Encourage parent and community involvement through design so that neighborhood meetings, recreation activities, and other community functions can take place at the school in a safe and secure fashion.
- Usage considered for after-school programs, voting, community meetings, as well as a provision of emergency services.
- Strategies that contribute to shared use of the school building include configuring entryways, lobbies and spaces for public use.
- Placement of mechanical systems and emergency generators help ensure building resiliency.

GSG - W2.1P, W2.2R – Indoor Water Use Reduction

- 20% reduction from the baseline is required; additional points are awarded up to 45% reduction.
- Typically able to achieve 35% reduction with use of low-flow faucets, low-flow toilets, low-flow showers and low-flow urinals.
- If replacing an entire plumbing system, the volume of the system should be considered against the usage to allow daily refresh of water in the system.

Table 2. Baseline Flow Rates	
Fixture Type	**Baseline Flow Rate**
Toilet (water closet)	1.6 gpf
Urinal	1.0 gpf
Public Lavatory faucet	0.5 gpm at 60 psi
Private Lavatory faucet	2.2 gpm at 60 psi
Kitchen faucets	2.2 gpm
Showerhead	2.5 gpm at 80 psi

GSG - E1.1P, E1.2A, E1.3A –Commissioning & Verification

- To support the design, construction, and eventual operation of a project that meets the Owner's Project Requirements for energy, water, indoor environmental quality, and durability.
- A Commissioning Authority (CxA) will verify installation and performance of systems.
- Verify temperature set points on hot water system; assure CO2 sensors are calibrated; assure HVAC systems are balanced; seasonal and 10-month testing; review O&M manuals; occupant training, etc.

GSG – E3.2R – Optimize Energy Performance

- Achieve energy reduction levels above the required minimum standard to reduce environmental and economic impacts associated with excessive energy use.
- Conduct a whole building energy simulation per ANSI/ASHRAE/IESNA standard 90.1-2010
- Analyze efficiency measures focusing on passive measures, load reduction, and HVAC related strategies appropriate for the facility.

Table 1. Points for % improvement in energy performance		
New Construction	Major Renovation	Points
6%	4%	1
8%	6%	2
10%	8%	3
12%	10%	4
14%	12%	5
16%	14%	6
18%	16%	7
20%	18%	8
22%	20%	9
24%	22%	10
26%	24%	11
29%	27%	12
32%	30%	13
35%	33%	14
38%	36%	15
42%	40%	16
46%	44%	17
50%	48%	18

GSG - M2.1 – M2.6 – Material Reporting & Optimization

- To utilize products that report on life-cycle impacts and those that optimize environmental transparency.
- Reporting – raw material extraction, energy use, chemical makeup, waste generation, and emissions to air, soil, and water.

- Environmental Product Declaration (EPD) – quantifies environmental information about the life cycle of a product.
- Health Product Declaration (HPD) – full disclosure of known hazards, included product contents and associated health information.

**This information is used by the project team when selecting materials but cannot be mandated as per NYS procurement.*

GSG - Q1.1P, Q1.2R, Q1.3R – Indoor Air Quality

- To contribute to the comfort and well-being of building occupants
- ASHRAE Outdoor Air Assessment done in design to identify any local source contaminates be addressed. This can lead to modeling and ultimately influence the final design (i.e. higher MERV filters for particulates, carbon filters for VOCs, airflow monitoring)
- Source Control – control pollutant entry into the building (entryway systems for dirt/particulates) and design cleaning/maintenance areas with dedicated exhaust.
- CO2 Monitoring – coordinate CO2 sensor setpoints with outdoor air demand.

Energy Conservation Measures (ECMs)

ECMs in New Buildings

- Electric cooking
- Demand defrost in freezers
- Addt'l insulation in coolers
- Shorter turn-down duration
- Copiers/laptops on shut-off timers
- Gearless elevators with regenerative drives
- Addt'l insulation for roof, slab, pipes
- High-performance windows
- Improved airtightness
- Wall thermal upgrades – brick cavity
- Oversized ductwork
- Zoning for partial summer occupancy
- Low-flow faucet aerators
- Lower faucet supply temp

Q085 Annex ECMs

External Solar Shades

High-Performance Windows

All-Electric Kitchen

Solar PV

Q085 Annex ECMs Cont.

LED Lighting

Vacancy Sensor (L) / Daylight Harvesting Sensor (R)

Q085 Annex ECMs Cont.

Heat Pump Water Heaters

Pipe Insulation

School Electrification

- As of summer 2022, all new schools designed to be all-electric
- In fall 2022, mayor announced an initiative to retrofit existing schools to be all-electric
- Remove fossil fuel-based mechanical systems and replace them with all-electric heat pumps that provide heating, cooling, and ventilation
    - Also electrify kitchens, science labs, and domestic hot water heaters

Pilot at K005

Electrification Projects Selection Process

- Selected in collaboration with Architecture & Engineering, Construction Management, Design Construction Innovation Management, and External Affairs
- Main selection criteria includes analysis of the following:
  - Boiler age and condition
  - Architectural considerations such as building material and fuel tank location
  - Synergistic opportunities with ongoing or planned projects
  - School utilization rate
  - Building ownership
  - Location in a disadvantaged community (DAC)

Deep Energy Retrofits

- Two schools selected for deep energy retrofit pilot
- Additional insulation for exterior walls and roof
- High-performance windows
- Electrified heating and cooling, remove fossil fuel boilers

Challenges: Design

- Existing room sizes
- Ceiling and slab heights
- Structural system and slab loading capacity (cinder concrete)
- Condition of building envelope
- Sidewalk vault locations & incoming service
- Locate or enlarge switchgear room
- Public assembly spaces
- SHPO approval
- Flood zone schools
- Current building utilization
- Coordination / competing interests
- Acoustics

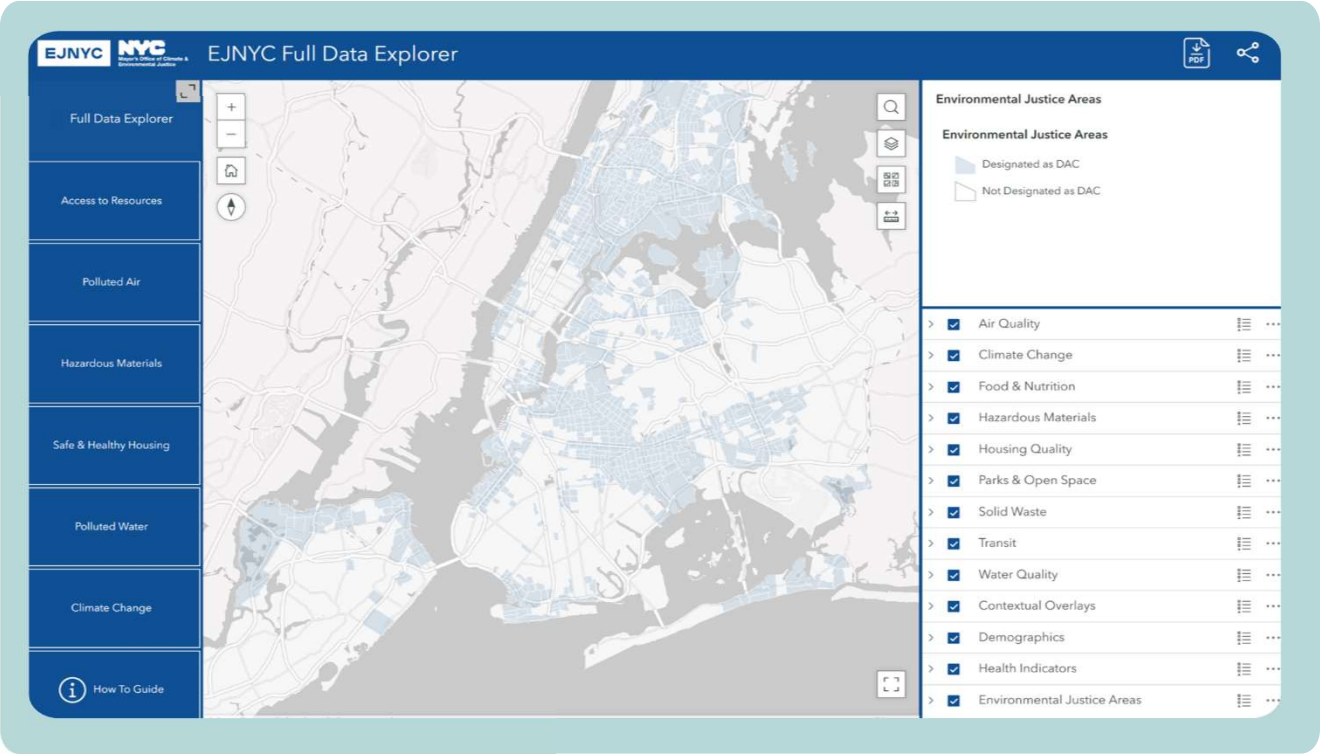
Challenges: Construction

- Timing / phasing
  - Boiler phase out & removal
  - Kitchen equipment
  - Seasonal phasing / school breaks
  - Building use / room turnover
  - Vertical vs horizontal
  - Long lead time for equipment
- Maintaining ventilation / cooling during construction
- Maintenance training
- Low-flow faucets

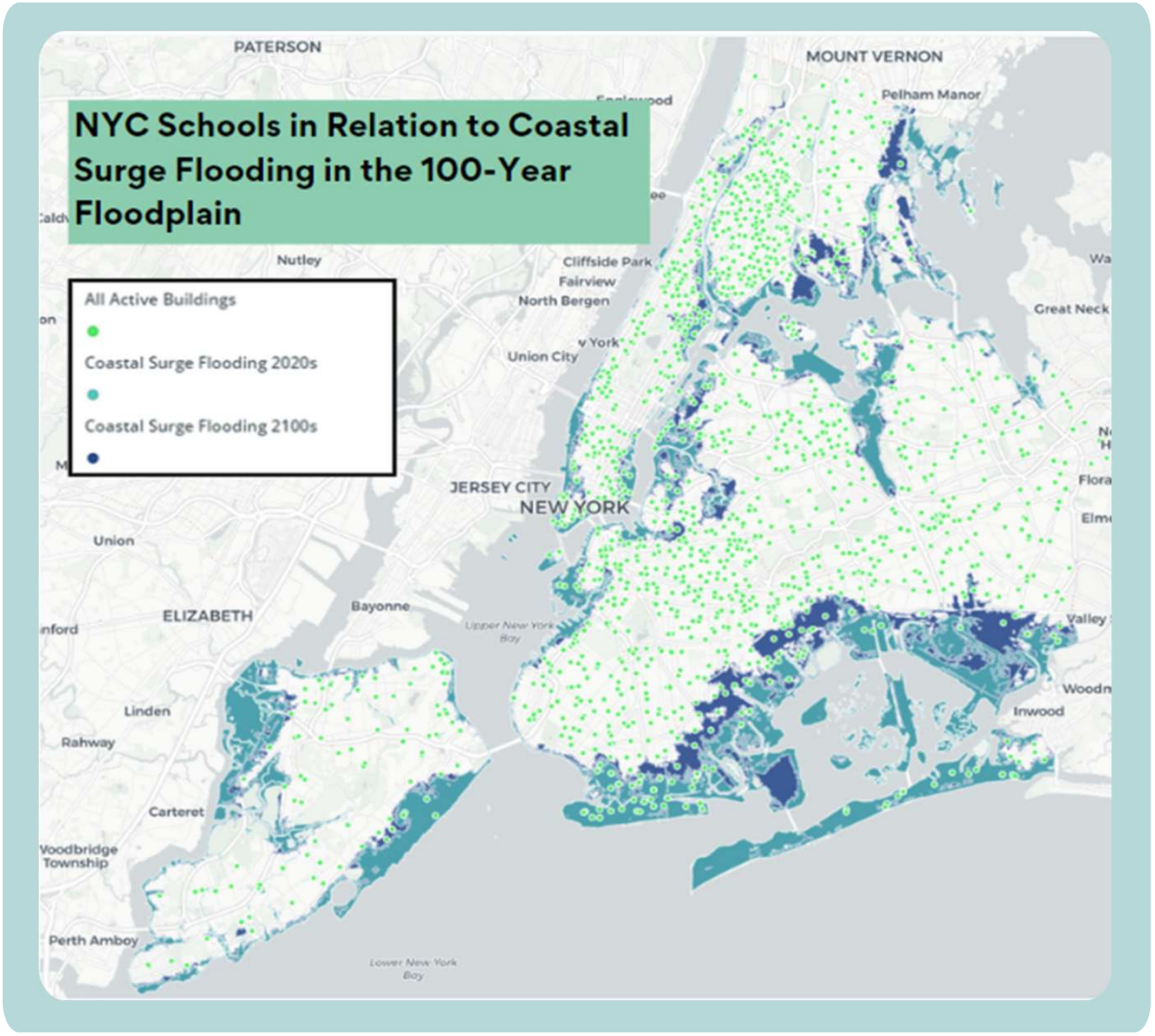
LL41 Pilots: Q388

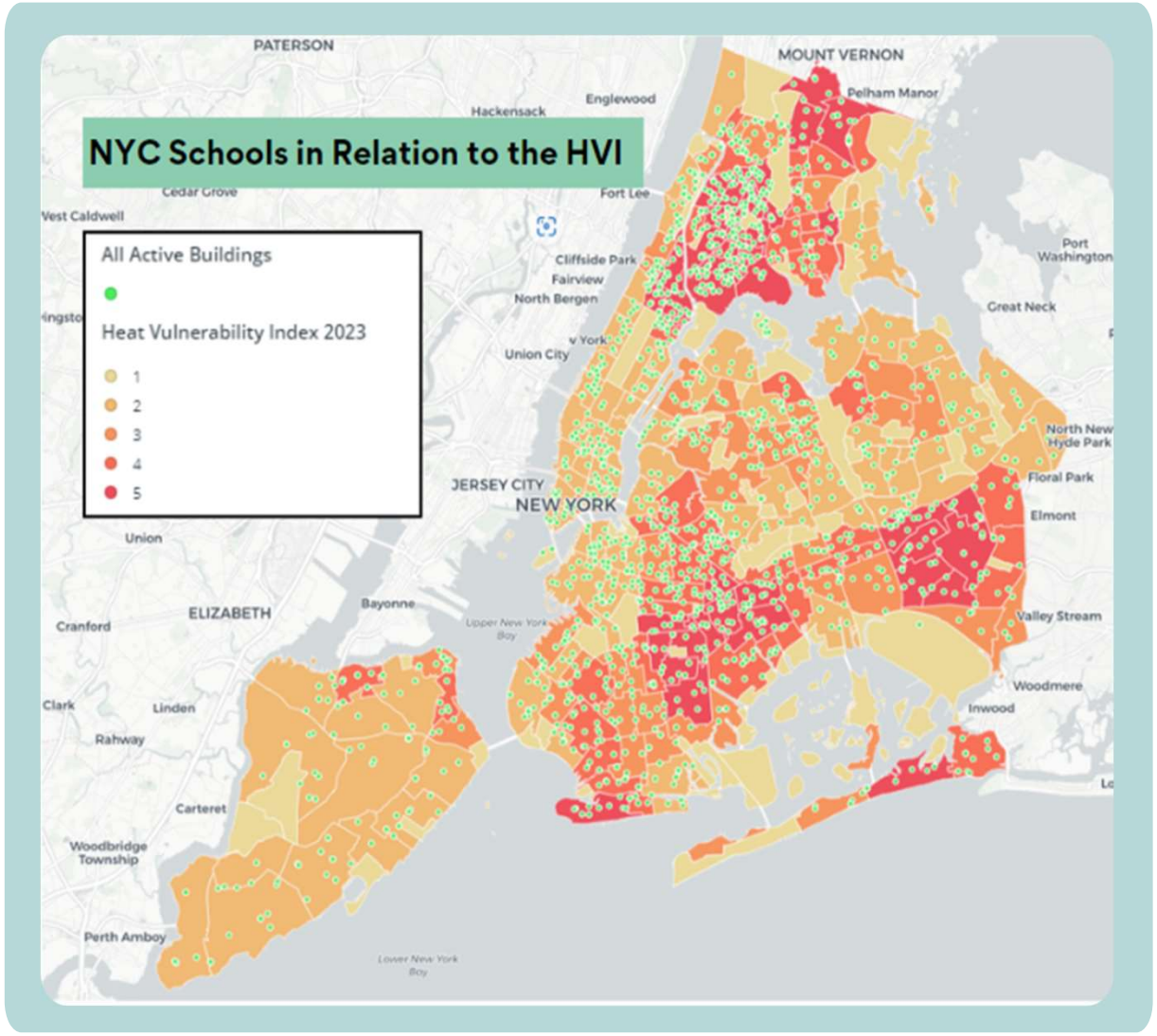
LL41 Pilots: K004

MOCEJ's Mapping Tool



EJNYC Mapping Tool (arcgis.com)


NYC Schools in Relation to Coastal Surge Flooding in the 100-Year Floodplain
All Active Buildings
Coastal Surge Flooding 2020s
Coastal Surge Flooding 2100s
PATERSON
MOUNT VERNON
Pelham Manor
Nutley
Cliffside Park
Fairview
North Bergen
Union City
Great Neck
JERSEY CITY
NEW YORK
Union
ELIZABETH
Bayonne
Upper New York Bay
Linden
Rahway
Carteret
Woodbridge Township
Perth Amboy
Lower New York Bay
Inwood


NYC Schools in Relation to the HVI
All Active Buildings
Heat Vulnerability Index 2023
1
2
3
4
5
PATERSON
MOUNT VERNON
Pelham Manor
Englewood
Hackensack
Cedar Grove
Fort Lee
Cliffside Park
Fairview
North Bergen
Union City
Port Washington
Great Neck
North New Hyde Park
Floral Park
Elmont
JERSEY CITY
NEW YORK
Union
ELIZABETH
Bayonne
Cranford
Upper New York Bay
Valley Stream
Woodmere
Inwood
Clark
Linden
Rahway
Carteret
Woodbridge Township
Perth Amboy
Lower New York Bay

Thank you!

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