

## Memorandum

To: Mayor's Office of New York City  
From: Nia Starr, Pratt Institute M.S. Candidate Sustainable Environmental Systems  
Date: 12 February 2022  
Subject: Chinatown Resiliency: A Comprehensive Greening Infrastructure Plan for Open Spaces

### Executive Summary

Focusing on one of the oldest enclaves of Chinese in North America, this proposal aims to support the OneNYC strategy by bolstering Manhattan's Chinatown with green infrastructure measures against climate change. This plan incorporates both mitigation and adaptation measures to produce efforts for reducing air pollution, the Urban Heat Island effect, and risks from future flooding. An integral part of this plan involves engaging public advocacy groups and nonprofits embedded in the cultural precedence of NYC's most famous Chinatown.

### Utilize NYC Open Streets for Neighborhood Resilience

**Current Issue:** Chinatown's current urban design contributes to detrimental environmental impact on its residents. Chinatown is the most heat-vulnerable neighborhood south of Harlem in Manhattan with a high risk rating of 4 (neighborhoods are ranked from *1-lowest risk* to *5-highest risk*) according to NYC's Heat Vulnerability Index.<sup>1</sup> Air quality in Chinatown remains highly polluted with levels of fine particulate matter (PM<sub>2.5</sub>) at 8.9 micrograms per cubic meter.<sup>2</sup> PM<sub>2.5</sub> is the most harmful urban pollutant and asthma rates among children ages 5-17 in Chinatown is higher than the citywide rate.<sup>3</sup> Stormwater flooding poses a risk to Chinatown streets as well, with vulnerabilities of deep and contiguous flooding (1ft and greater) in over 5 areas.<sup>4</sup>

**Solution:** Reintroducing a permanent, reimagined form of De Blasio's pilot program *NYC Open Streets* in a particularly historic part of Chinatown—the blocks east of Columbus Park, west of the Bowery, south of Bayard, and north of Worth Street (see map<sup>17</sup>)—will build neighborhood resilience against climate change and increase public safety for residents. Implementation strategies are as follows:

- Close streets to car traffic to mitigate carbon emissions, resulting in lower air temperatures and asthma rates
- Retrofit the streetscape with cool pavements to mitigate rising temperatures and adapt the neighborhood to flood risks.
- During the repavement process, introduce trees to these blocks where there currently is zero tree canopy.<sup>5</sup>
- Install rain gardens and bioswales as a water retention method for slowing water runoff and filtering pollutants during heavy rain events.

**Key stakeholders are NYC's Department of Transportation, NYC's Department of Environmental Protection: One Water NY, all of the businesses along Pell St., Doyers St., Mott St., and Mulberry St., community nonprofits, neighborhood councils, and the NYC Department of Health.** Reaching out to Nom Wah Tea Parlor, the oldest continuously running restaurant in Chinatown, yielded a conversation in favor of expanding the NYC Open Streets program to bring more foot traffic into Chinatown and provide open space for the neighborhood. This is a good indicator of neighborhood reception as they are considered a Chinatown institution. The DOT will be responsible for overseeing

provision of barriers, traffic signs or movable furniture to Open Streets partners. The DOT will fully manage any inquiries or actions needed to successfully implement Open Streets in the area including enforcement. The DEP's One Water NY is included in this list because of their Cloudburst neighborhood program<sup>12</sup> and the network they've built to achieve landscape redesign for stormwater management in NYC. They should advise and oversee development of these Open Streets. This partnership between the DOT and DEP would allow the city to combine resources from two agencies that have experienced successful case studies with their respective programs in the past to reduce time loss in the planning and implementation phase of revitalizing Chinatown streets. Community nonprofits and neighborhood councils are important to bring into the conversation early to educate and advocate for street development among neighborhood dissenters who might be affected by noise pollution or loss of walkways in the repavement process. Funding of neighborhood aid during the development can also be provided by community nonprofits through digital campaigns and marketing to the Asian American community of NYC who comprise over 14% of the city's total population.<sup>16</sup>

### **Impacts:**

- Increased permeable surfaces are key stormwater management components and will be important in increasing street adaptability—particularly the section of Mulberry and Mosco Street just east of Columbus Park, designated as a high risk area to extreme stormwater flood.<sup>4</sup> The flood risk zone is highlighted in the notes section.<sup>17</sup>
- The introduction of cool pavements will create permeable surfaces that increase the streets' albedo and reflect solar radiation better than the impervious, dark asphalt currently in place.<sup>6</sup> An available material called Stormcrete®, a modular porous concrete stormwater system, was successfully installed as a ponding solution in front of a bus stop at Linden Boulevard & 204th Street in Queens by the NYC's Department of Transportation.<sup>7</sup> Stormcrete®'s modular design and materiality makes it a prime choice for pavement material because it reduces the amount of embodied carbon through its efficient construction and durability in contrast to other pavement materials.
- Greening this subset of streets will introduce nature-based cooling effects to mitigate the Urban Heat Island effect through added shade and increased water vapor to the air.<sup>6</sup> In the event of flooding, this green infrastructure will hold water and relieve stress on sewers and storm drains.
- Co-benefits include an increase in public safety with the removal of traffic fatality risks and a rise in local economies with increased pedestrian foot traffic to local businesses.<sup>8</sup> Removing car traffic emissions from this neighborhood will contribute to equitable health outcomes, addressing a historic problem of overlooking Chinatown's poor air quality in the years following the September 11, 2001 terrorist attacks and the fast rise of asthma rates among its child population.<sup>9</sup>

Measuring success rates will be carried out by both the DEP and the DOH. Monitoring air temperatures in the neighborhood will be carried out by the DEP and measuring air quality will be conducted by the DOH. Asthma rates should continue to be monitored to see if significant reduction is made. Measuring the amount of diverted stormwater pre-retrofit and post-development should be documented. All information should be logged into NYC's Open Data sources for year-over-year comparisons.

### **Converting Chinatown's Schoolyards to Public Green Infrastructure**

**Current Issue:** Chinatown has some of the lowest amount of open space per capita in NYC.<sup>10</sup> During this COVID-19 era, open space has become more important than ever before to ensure both physical and mental safety for NYC's inhabitants. Current schoolyards in Chinatown are comprised of blacktop that is

impervious and low in albedo. As stated in the previous strategy, Chinatown is subject to deep and contiguous flooding during extreme weather events<sup>4</sup> and a few of these schools are located in proximity to high risk flood zones.

**Solution:** The city should expand the successful pilot project of Chinatown's P.S. 2: The Meyer London School green infrastructure redesign by the Trust for Public Land to be iterated across all Chinatown schoolyards. This will contribute to Chinatown's adaptability to climate change.<sup>11</sup> Green infrastructure measures in this model include:

- Converting schoolyards for stormwater management through landscape design, bioswales, and porous surfaces to absorb rainwater.
- Addition of tree canopy to provide shade from solar rays.
- Open schoolyards to the public during non-school hours to increase available public green space.

**Key stakeholders are The New York City Department of Environmental Protection (DEP), The Trust for Public Land (TPL), NYC Department of Education's Public Schools in Chinatown, NYC Parks, and nonprofit community advocacy groups.** The Trust for Public Land will oversee the schoolyards' transformation by identifying designers within the Chinatown community, creating requests for proposals in regards to developers and construction, and sourcing funding from the federal government. This process has allowed the TPL to transform 300 vibrant schoolyards thus far.<sup>14</sup> These developments should also lean on the DEP's robust capital program of \$20.1 billion dollars. The DEP should also identify opportunities for additional stormwater management buffers on top of or combined with the storm sewer network. The list of NYC Public Schools in Chinatown with potential for schoolyard transformation are as follows: P.S. 1 Alfred E. Smith, P.S. 42 Benjamin Altman, P.S. 110 Florence Nightingale, P.S. 124 Yung Wing, P.S. 126 Jacob August Riis, P.S. 134 Henrietta Szold, P.S. 137 John L. Bernstein, P.S. 184M Shuang Wen, and the Orchard Collegiate Academy. The communities of each school should work together with the TPL and the designated designer to determine a design that best serves their school's cultural community and the neighborhood surrounding. Nonprofit organizations in Chinatown should be notified about the schoolyard projects so that they can advocate and announce to the neighborhoods about the new resource for public space to be utilized.

**Impacts:** Greening multiple schoolyards in Chinatown will ensure community resilience; if one schoolyard does not succeed, there is a higher chance of stormwater capture if a second or third exists to serve the same purpose.<sup>13</sup> If the city successfully implements the model of Chinatown's P.S. 2: The Meyer London School across all 9 schools within the Chinatown neighborhood, these are the calculated mitigation effects:

- Prevention of stormwater runoff and combined sewer overflows through rain gardens and bioswales that use native-species and engineered soils<sup>14</sup>
- ~9,900,000 million gallons of stormwater runoff diverted from the East River each year and reduction of the flood risk for residents and businesses in the area.<sup>11</sup>
- Cooler temperatures with introduction of permeable surfaces and tree canopy shade to decrease neighborhood warming and stave off the Urban Heat Island Effect
- Co-benefits of this climate resilient development include environmental impacts like pollutant removal and carbon sequestration. Social benefits for the neighborhood include closing the park equity gap<sup>14</sup>, recreational value, aesthetic value, and health benefits.

Measuring the success rate of this project would involve the DEP identifying exactly how much water is absorbed through retention gardens and pavements. Air temperatures should be monitored

pre-development and post-installation of trees. NYC Parks should monitor park use and submit park-goer numbers to NYC's Open Data platform.

### Notes

1. "Heat Vulnerability Index." *NYC Environmental & Health Data Portal*, 2021, <https://a816-dohbesp.nyc.gov/IndicatorPublic/HeatHub/hvi.html>. Accessed 9 February 2022.
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11. Kavanagh, Brian. "Forwarding: New Community Schoolyard Opens at PS 2M in Chinatown." *The New York State Senate*, 14 October 2021, <https://www.nysenate.gov/newsroom/press-releases/brian-kavanagh/forwarding-new-community-schoolyard-opens-ps-2m-chinatown>. Press release.
12. New York City Department of Environmental Protection. January 2017. "Cloudburst Resiliency Planning Study". <https://www1.nyc.gov/assets/dep/downloads/pdf/climate-resiliency/nyc-cloudburst-study.pdf>.
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14. The Trust for Public Land. 2022. "Community Schoolyards™ Projects". <https://www.tpl.org/community-schoolyards>.

15. NYC Department of Transportation. 2022. “DOT Now Accepting Applications for 2022 Open Streets”.

<https://www1.nyc.gov/html/dot/html/pr2021/dot-now-accepting-applications-for-2022-open-streets.shtml>

16. U.S. Census Bureau QuickFacts. (2021). Race Survey. U.S. Census Bureau. Retrieved from <https://www.census.gov/quickfacts/fact/table/newyorkcitynewyork>



# Chinatown Resiliency

A Comprehensive Greening Infrastructure Plan  
for Open Spaces

# The Goal

This proposal will focus on one of the oldest enclaves of Chinese in North America and aims to support the OneNYC strategy by bolstering Manhattan's Chinatown with open spaces and green infrastructure to guard against climate change.

This plan incorporates both mitigation and adaptation measures to address **reducing air pollution**, the **Urban Heat Island effect**, and **risks from future flooding**.





# The Need For Open Space

With an estimated population of 100,000 residents, Chinatown is a highly dense neighborhood with a very urban environment. Chinatown has some of the lowest amount of open space per capita in NYC.

This proposal seeks to create more open space for the residents of Chinatown and find opportunities to design this open space with climate events in mind. The more green infrastructure there is, the faster Chinatown will be able to bounce back after an extreme weather event when the disaster burden is dispersed.



# Two Strategies

1

## NYC Open Streets for Neighborhood Resilience

This strategy aims to reintroduce a permanent, reimagined form of De Blasio's pilot program, *NYC Open Streets*, in a particularly historic part of Chinatown—the blocks east of Columbus Park, west of the Bowery, south of Bayard, and north of Worth Street

2

## Chinatown's Schoolyards as Green Infrastructure

Chinatown has the potential of adding 9 new climate resilient parks to its neighborhood if public schools within the area redesigned their asphalt playgrounds into green spaces with both engineered and nature-based solutions.

# Strategy One

NYC Open Streets for Neighborhood Resilience

# The design of Chinatown's urban plan contributes to harmful environmental impacts on its residents.

## Heat Vulnerability

Chinatown is the most heat-vulnerable neighborhood south of Harlem in Manhattan with a high risk rating of 4 according to **NYC's Heat Vulnerability Index** (*neighborhoods are ranked from 1-lowest risk to 5-highest risk*).

## Stormwater Flood Risk

Stormwater flooding poses a risk to Chinatown streets, with vulnerabilities of deep and contiguous flooding (1ft and greater) in over 5 areas.

## Poor Air Quality

Air quality in Chinatown is highly polluted with levels of fine particulate matter at 8.9 micrograms per cubic meter.  $PM_{2.5}$  is the most harmful urban pollutant and asthma rates among children ages 5-17 is higher than the citywide rate (9 mg per cm).

# Proposed Solution

## Introduce a permanent form of NYC Open Streets

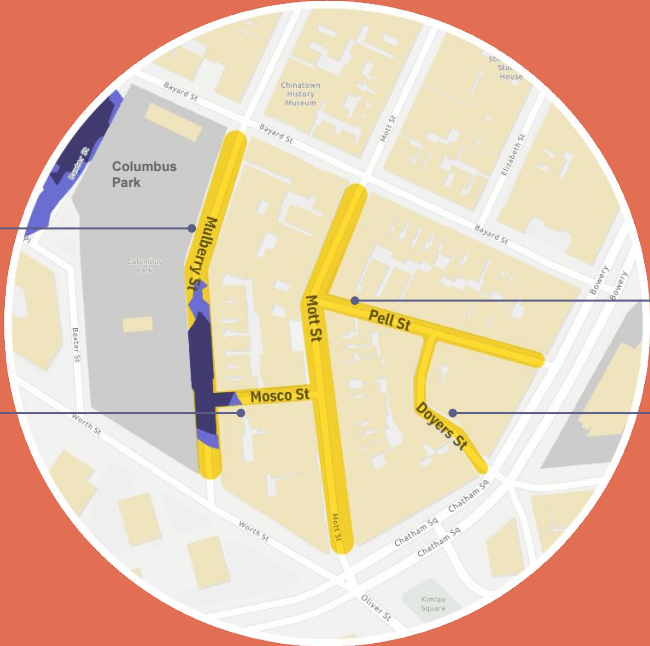
- Close streets to car traffic to mitigate carbon emissions, resulting in lower air temperatures and asthma rates
- Retrofit the streetscape with “cool pavements” to mitigate rising temperatures and adapt the neighborhood to flood risks.
- During the repavement process, introduce trees to these blocks where there currently is zero tree canopy to provide shade and reduce temperature
- Install rain gardens and bioswales as a water retention method for slowing water runoff and filtering pollutants during heavy rain events.



# The Focus Area

Mulberry Street, Mosco Street, Mott Street, Pell Street, and Doyers Street

*West of the Bowery, South of Bayard Street, North of Worth Street*





# Impacts

- Greening this subset of streets will introduce nature-based cooling effects to mitigate the Urban Heat Island effect through added shade and increased water vapor to the air through transpiration. In the event of flooding, this green infrastructure will hold water and relieve stress on sewers and storm drains.
- Increased permeable surfaces are key stormwater management components and will be important in increasing street adaptability—particularly the intersection of Mulberry and Mosco Street just east of Columbus Park, designated as a high risk area to extreme stormwater flood.
- Retrofitting streets with cool pavement materials will create permeable surfaces that increase the streets' albedo and reflect solar radiation better than the impervious, dark asphalt currently in place.

- An available material called Stormcrete®, a modular porous concrete stormwater system, was successfully installed as a ponding solution in front of a bus stop in Queens at Linden Boulevard & 204th Street by NYC's Department of Transportation.
- Stormcrete®'s modular design and materiality makes it a prime choice for pavement material because it reduces the amount of embodied carbon used through its efficient construction and durability in contrast to other pavement materials.



Localized flooding prior to Stormcrete placement



Stormcrete after a 1.5" rainfall



Curb-to-Curb Eco-Lock Pavers, Westmoreland Permeable Pavement Project, Portland, Oregon

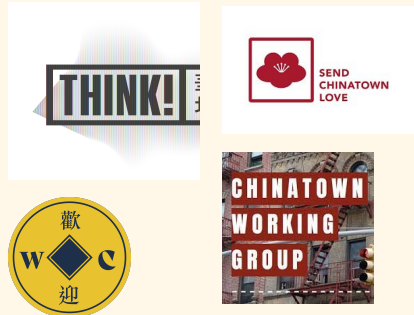
# Key Stakeholders



**NYC Department of Environmental Protection**  
[www1.nyc.gov/site/dep/index.page](http://www1.nyc.gov/site/dep/index.page)

**NYC Department of Transportation**  
[www1.nyc.gov/html/dot/html/home/home.shtml](http://www1.nyc.gov/html/dot/html/home/home.shtml)

**NYC Department of Health**  
[www.health.ny.gov](http://www.health.ny.gov)



**Nonprofits**

**Businesses**



# Co-Benefits & Measuring Success

## Co-Benefits

Co-benefits include an increase in public safety with the removal of traffic fatality risks and a rise in local economies with increased pedestrian foot traffic to local businesses.

Removing car traffic emissions from this neighborhood will contribute to equitable health outcomes, addressing a historic problem of overlooking Chinatown's poor air quality in the years following the September 11, 2001 terrorist attacks and the fast rise of asthma rates among its child population.

## Measuring Success

Measuring success rates will be carried out by both the DEP and the DOH. Monitoring air temperatures in the neighborhood will be carried out by the DEP and measuring air quality will be conducted by the DOH. Asthma rates should continue to be monitored to see if significant reduction is made.

Measuring the amount of diverted stormwater pre-retrofit and post-development should be documented. All information should be logged into NYC's Open Data sources for year-over-year comparisons.

# Strategy Two

Transforming Chinatown's Schoolyards into  
Green Infrastructure

# Unlocking 9 potential sites for public open space and green infrastructure for neighborhood resilience: schoolyards.

## Low Albedo

Current schoolyards in Chinatown are comprised of blacktop or asphalt that is impervious and retains heat from solar radiation

## Stormwater Flood Risk

All of these schoolyards are all located near stormwater flood zones and if redesigned, can help alleviate the neighborhood against nuisance flooding or deep / contiguous flooding.

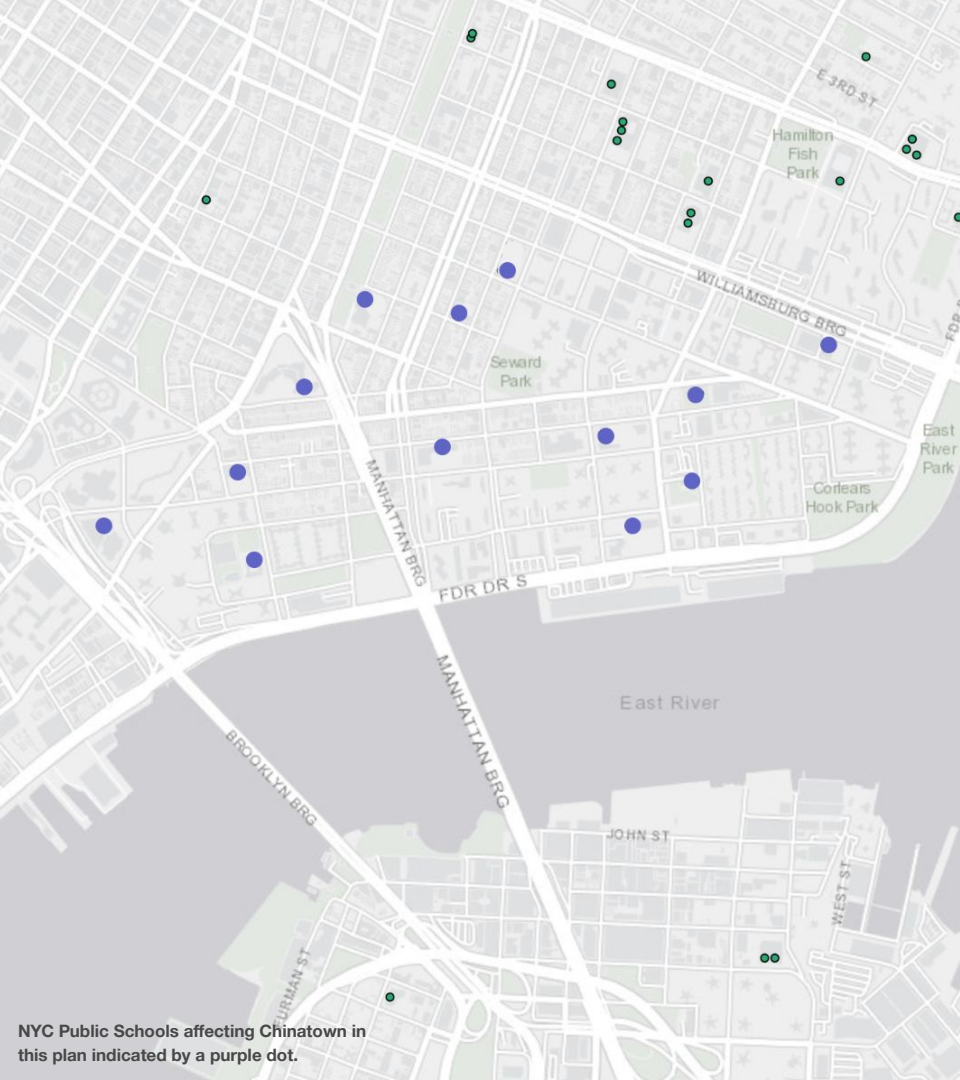
## Creating Redundancy

Greening multiple schoolyards in Chinatown will ensure community resilience; if one schoolyard does not succeed, there is a higher chance of stormwater capture if a second or third exists to serve the same purpose. This is resilience.

# Proposed Solution

The city should expand the successful 2021 pilot project of Chinatown's **P.S. 2: The Meyer London School** green infrastructure redesign by the Trust for Public Land to be iterated across all Chinatown schoolyards. This schoolyard will capture approximately 1,100,000 gallons of stormwater each year, helping to improve the health of the East River and reduce the risk of flooding for residents in businesses in the area.





# Impacts

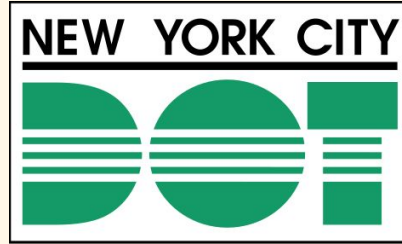
- Prevention of stormwater runoff and combined sewer overflows through rain gardens and bioswales that use native-species and engineered soils
- ~9,900,000 million gallons of stormwater runoff diverted from the East River each year and reduction of the flood risk for residents and businesses in the area.
- Cooler temperatures with introduction of permeable surfaces and tree canopy shade to decrease neighborhood warming and stave off the Urban Heat Island Effect.

NYC Public Schools affecting Chinatown in this plan indicated by a purple dot.

# Key Stakeholders



**NYC Department of Environmental Protection**  
[www1.nyc.gov/site/dep/index.page](http://www1.nyc.gov/site/dep/index.page)



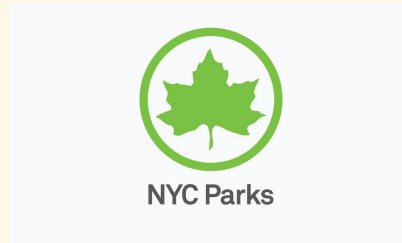
**NYC Department of Transportation**  
[www1.nyc.gov/html/dot/html/home/home.shtml](http://www1.nyc.gov/html/dot/html/home/home.shtml)



**The Trust for Public Land**  
[www.tpl.org](http://www.tpl.org)



**NYC Department of Education**  
[www.schools.nyc.gov](http://www.schools.nyc.gov)



**NYC Parks**  
[www.nycgovparks.org](http://www.nycgovparks.org)



**Nonprofits**

# Co-Benefits & Measuring Success

## Co-Benefits

Co-benefits of this climate resilient development include environmental impacts like pollutant removal and carbon sequestration.

Social benefits for the neighborhood include closing the park equity gap, recreational value, aesthetic value, and health benefits.

## Measuring Success

Measuring the success rate of this project would involve the DEP identifying exactly how much water is absorbed through retention gardens and pavements.

Air temperatures should be monitored pre-development and post-installation of trees. NYC Parks should monitor park use and submit park-goer numbers to NYC's Open Data platform.



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**Thank you.**