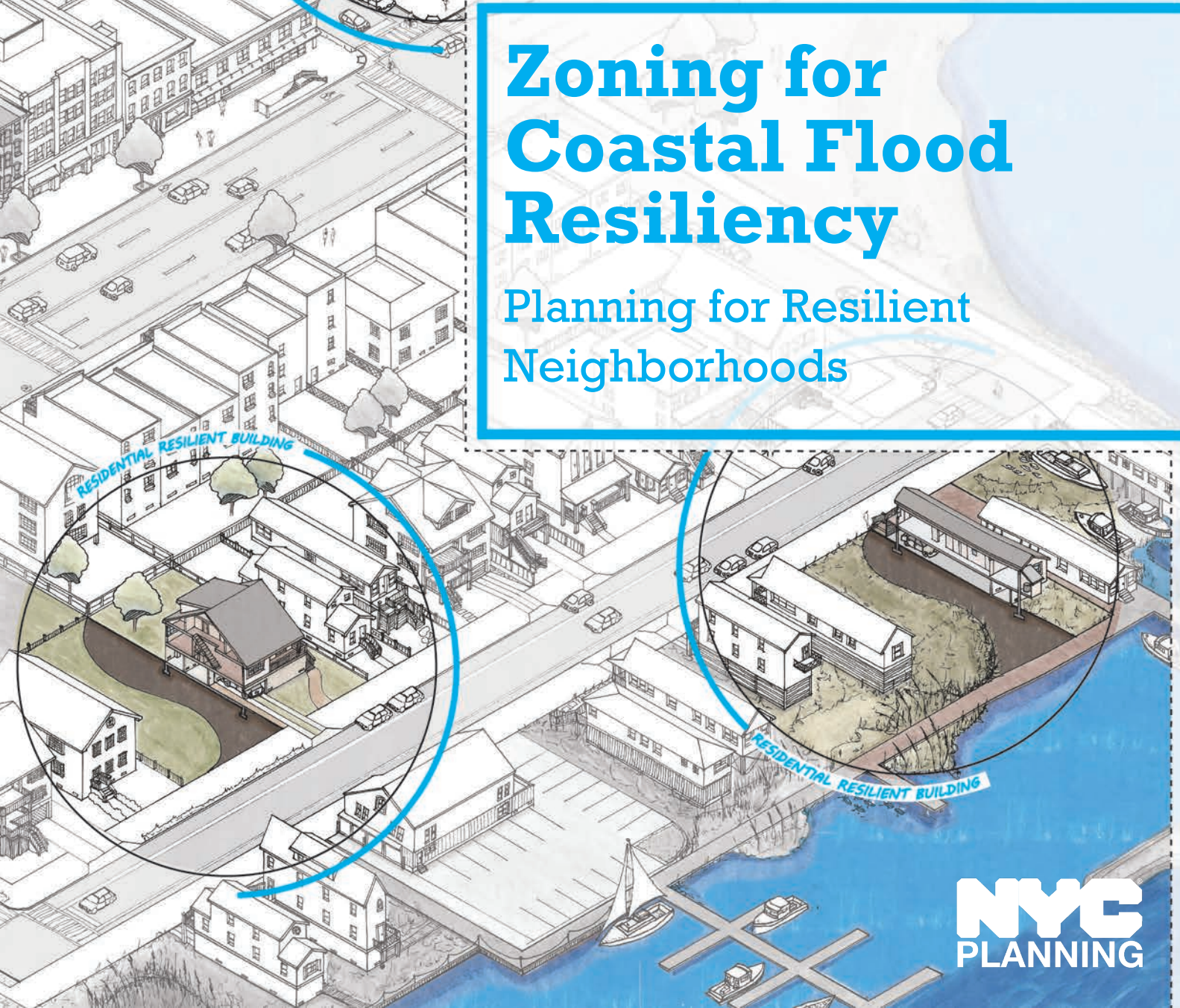


# Zoning for Coastal Flood Resiliency

Planning for Resilient Neighborhoods









# **Zoning for Coastal Flood Resiliency**

Planning for Resilient  
Neighborhoods

**THE CITY OF NEW YORK**  
Mayor Bill de Blasio

**DEPARTMENT OF CITY PLANNING**  
Marisa Lago, Director

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[www.nyc.gov/zcfr](http://www.nyc.gov/zcfr)



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## Terms to Know

- **1% annual chance floodplain:** Also referred to as the “100-year floodplain”, is the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year, and is designated on the U.S. Federal Emergency Management Agency’s (FEMA) Flood Insurance Rate Maps (FIRMs) and the Preliminary Flood Insurance Rate Maps (PFIRMs).
- **0.2% annual chance floodplain:** Also referred to as the “500-year floodplain”, is the area that will be inundated by the flood event having a 0.2-percent chance of being equaled or exceeded in any given year, and is designated on FEMA’s FIRMs and PFIRMs.
- **Base Flood Elevation (BFE):** The elevation to which floodwater is anticipated to rise during a 1% annual chance storm as shown on FEMA’s FIRMs and PFIRMs, as measured from sea level.
- **Building Envelope:** A three-dimensional space, shaped by height, setback, lot coverage and yard controls that define the maximum volume within which a structure can be built on a zoning lot.
- **Design Flood Elevation (DFE):** The minimum elevation to which a structure must be elevated or floodproofed, determined by adding freeboard (additional height for safety depending on the use occupancy type) to the BFE as determined by flood-resistant construction standards.
- **Dry-floodproofing:** One of two basic flood-resistant construction methods, designed to seal a building’s exterior walls to flood waters while ensuring that the building can resist water loads below the expected level of flooding.
- **Flood Insurance Rate Maps (FIRMs):** FEMA’s FIRMs, first adopted by New York City in 1983 and last updated in 2007, continue to be used in the city to guide the requirements of the National Flood Insurance Program. These maps include the 1% annual chance floodplain and the 0.2% annual chance floodplain. In areas where the FIRMs show flooding greater in extent or elevation than the PFIRMs, they are also used for flood-resistant construction standards and zoning regulations.
- **Floodplain:** Area designated on FEMA’s FIRMs and PFIRMs as the 1% annual chance floodplain and 0.2% annual chance floodplain.
- **Flood-resistant construction standards:** Regulations for buildings located in the floodplain, as set forth in Appendix G of NYC’s Building Code.
- **Non-complying or Non-compliance:** A lawfully existing building that does not comply with one or more of the bulk regulations of the applicable zoning district. This frequently occurs because a building was constructed prior to the adoption of the zoning that is currently in effect.
- **Non-conforming or Non-conformity:** A lawfully existing use that would not be permitted under the use regulations of the applicable zoning district. This frequently occurs because a use was established prior to the zoning currently in effect.
- **Preliminary Flood Insurance Rate Maps (PFIRMs):** FEMA’s PFIRMs, released as part of a citywide flood map update in 2013 with minor amendments in 2015, are the best available flood hazard data for planning purposes, and are currently used to regulate flood-resistant construction standards and zoning regulations. These maps include the 1% annual chance floodplain and the 0.2% annual chance floodplain.
- **Reference Plane:** An imaginary plane used to determine from which level a building envelope starts.
- **Retrofit:** An alteration of an existing building to make it more resilient. Retrofit work includes, but is not limited to the physical elevation of an existing structure or a vertical enlargement to relocate uses above the DFE.
- **Substantial Damage:** Damage to a building for which the total cost of repair is 50 percent or more of the building’s market value before the disaster occurred, regardless of the cause of damage. Substantially damaged buildings are required to comply with flood-resistant construction standards.
- **Substantial Improvement:** Any repair, reconstruction, rehabilitation, addition, or improvement with a cost of 50 percent or more of the market value of the building. Substantially improved buildings are required to comply with flood-resistant construction standards.
- **Wet-floodproofing:** One of two basic flood-resistant construction methods designed to allow the passage of water within parts of the structure that are located below the DFE, while ensuring that the structure resists water loads. Wet-floodproofed spaces can only be used as crawl space, or for parking, storage and building access.

# EXECUTIVE SUMMARY

Since Hurricane Sandy in 2012, the NYC Department of City Planning (DCP) has been working with stakeholders across New York City (NYC)'s floodplain to develop zoning strategies that help promote resilient buildings and neighborhoods, and therefore reduce flood risk in the city's most vulnerable areas. This set of recommendations would improve upon and make permanent existing temporary zoning rules that were adopted on an emergency-basis after Sandy. The purpose of this document is to share preliminary recommendations for proposed zoning text—Zoning for Coastal Flood Resiliency—with the public prior to the launching of the formal public review process later in 2019.

Zoning for Coastal Flood Resiliency would provide homeowners, business owners and practitioners living and working in the city's floodplain, the option to design or otherwise retrofit buildings to (a) reduce damage from future flood events, (b) be resilient in the long-term, and (c) potentially save on long-term flood insurance costs. Overall, implementation of Zoning for Coastal Flood Resiliency would improve the ability of the city's many flood-prone neighborhoods to withstand and recover quickly from future storms.

These recommendations have been drawn from lessons learned and initiatives implemented through the City's recovery efforts after Hurricane Sandy. They were developed based on analysis of resilient construction in the floodplain, through coordination with partner City agencies, and community feedback received during an extensive public engagement process as described in the [Community Outreach Summary](#) document released in 2018.

Features of the preliminary recommendations include:

- 1. An expanded geography:**  
Buildings in both the city's 1% annual chance floodplain and 0.2% annual chance floodplain would have access to rules that allow building owners to invest in resiliency improvements to fully meet or exceed flood-resistant construction standards, even when these standards are not required by the Federal Emergency Management Agency (FEMA) and Appendix G of the NYC Building Code.
- 2. An enhanced building envelope:**  
Zoning allowances coupled with enhanced design requirements would allow building owners to better accommodate sea level rise projections when designing new buildings or retrofitting existing ones, without creating negative impacts on the streetscape. This would increase the building's and its content's safety and allow flood insurance costs to be reduced, while ensuring an accessible design that makes the streetscape more inviting.
- 3. Alternatives for the relocation of important equipment:**  
Building owners would have additional zoning flexibility to relocate mechanical, electrical and plumbing equipment or install back-up systems such as generators above areas at risk of being flooded, including on roofs or in new separate structures.
- 4. A zoning framework that facilitates recovery from future disasters:**  
Rules that make it easier for damaged buildings to be reconstructed would be enabled in the event of a future disaster. This would allow residents and neighborhoods to recover faster and allow the City to more quickly offer disaster assistance to those who are impacted.

In the long-term, Zoning for Coastal Flood Resiliency, in conjunction with coastal protection strategies and infrastructure improvements that are being pursued by the City and other state and federal agencies, will help to fully realize the vision of a more resilient NYC.

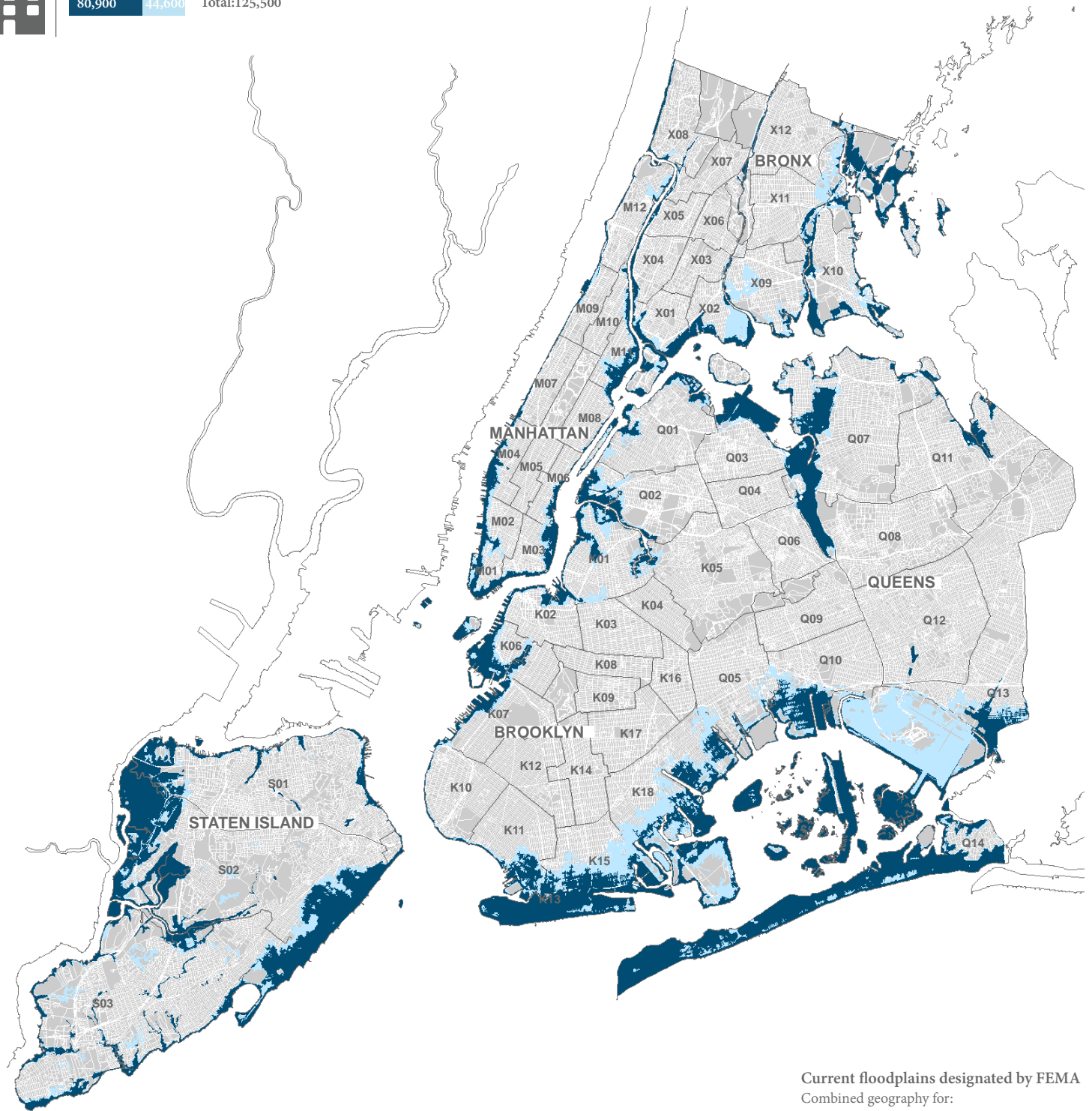
# 1% and 0.2% annual chance floodplain



434,500 348,300 Total: 782,800



80,900 44,600 Total: 125,500



Current floodplains designated by FEMA  
 Combined geography for:  
 2007 FIRM and 2015 PFIRM

- 1% annual chance floodplain
- 0.2% annual chance floodplain
- Community District

Source: The floodplains are based on a combined geography for the 1% annual chance floodplain and 0.2% annual chance floodplain established by the FEMA 2007 Flood Insurance Rate Maps (FIRMs) and the FEMA 2015 Preliminary Flood Insurance Rate Maps (PFIRMs).



# INTRODUCTION

This first section provides a brief context for resiliency planning in NYC by outlining general flood-risk information and a description of the existing regulatory framework applicable to the city's *floodplain*. This information will help the reader understand why there is a need to update the current zoning framework, and how Zoning for Coastal Flood Resiliency fits within the City's overall resiliency strategy.

## The City's Flood Risk

With 520 miles of shoreline, there is no denying that NYC is a coastal city. Its large natural harbor, where the Hudson River meets the Atlantic Ocean, is one of the reasons that NYC became the center of commerce and culture that it is today. However, due to this extensive shoreline, NYC's waterfront neighborhoods face significant risk of flooding.

While there are many sources of flooding that pose issues in NYC, including flooding from severe rain storms or due to impaired infrastructure, coastal storms present the most significant flood risk in terms of compromising human safety, property damage, and business disruption.

Therefore, in 1983, the City joined the National Flood Insurance Program (NFIP) allowing homeowners to purchase flood insurance and receive assistance following flood events. This program, which is administered by the U.S. Federal Emergency Management Agency (FEMA), is a voluntary program based on an agreement between the federal government and local communities. FEMA identifies areas at risk of flooding through the development of flood-risk maps. Local authorities adopt these maps to implement and enforce *floodplain* management regulations. In exchange, local communities get access to federally-backed flood insurance, which is made available to property owners and renters throughout the *floodplain*.

Areas at risk of a *1%* or *0.2%* *annual chance of flood* are commonly known as the *floodplain*, and are currently designated on FEMA's Flood Insurance Rate Maps (*FIRMs*) and Preliminary Flood Insurance Rate Maps (*PFIRMs*).

NYC's *1% annual chance floodplain* covers approximately 15 percent of the city's land area, touching 50 out of 59 Community Boards and 45 out of 51 Council Districts. This vast geography contains over 80,900 buildings that are currently at a high-risk of being flooded by coastal storms. It houses 434,500 residents. In commercial areas, it contains roughly 14,500 private businesses that employ approximately 270,000 people.<sup>1</sup> In industrial areas, it contains roughly 3,600 private businesses that employ approximately 87,000 people.<sup>2</sup> NYC's *0.2% annual chance floodplain* encompasses an additional four percent of the city's land area compared to the *1% annual chance floodplain*, which includes approximately 44,600 buildings that are at moderate risk of being flooded today, totaling 125,500 buildings in the city's *floodplain*. This area houses an additional 348,300 residents, totaling 782,800 residents in the *floodplain*.

No single flood event has made NYC's vulnerability clearer than Hurricane Sandy in 2012. This event created a historic storm surge that flooded neighborhoods well beyond the *1% annual chance floodplain*, inundating approximately half of the lots in the *0.2% annual chance floodplain*. This illustrates how this area is at risk today, and will continue to be at risk in the future.

<sup>1</sup> NYC Department of City Planning, (2016). Resilient Retail. New York City, NY. Source: [www.nyc.gov/resilientretail](http://www.nyc.gov/resilientretail)

<sup>2</sup> NYC Department of City Planning, (2018). Resilient Industry. New York City, NY. Source: [www.nyc.gov/resilientindustry](http://www.nyc.gov/resilientindustry)

## The City's Regulatory Framework

The need to quickly recover from Hurricane Sandy uncovered several regulatory conflicts between *flood-resistant construction standards*, which are overseen by the NYC Department of Buildings (DOB) as a requirement of the NFIP, and zoning regulations located within the NYC Zoning Resolution, which is administered by DCP.

*Flood-resistant construction standards* require all habitable spaces of new construction or existing buildings located within the *1% annual chance floodplain* that were *substantially damaged*, or are undertaking *substantial improvements*, to be raised above the *Design Flood Elevation (DFE)*. All spaces below the *DFE* must be *wet-floodproofed*, if the building is used solely for residential use, or *dry-floodproofed*, if the building contains non-residential uses. Spaces that are *wet-floodproofed* can only be used as crawl space, or for parking, storage and building access, and spaces that are *dry-floodproofed*, can be used for non-residential uses. Additionally, residential buildings are not allowed to provide spaces below grade, such as basements and cellars, and mechanical equipment must be located above the *DFE*.

These requirements have, at times, posed conflicts with certain zoning regulations, as they change the way that most buildings in NYC are structurally designed and internally configured. In NYC, aside from land use, zoning also establishes limits on the size and shape of buildings, with numerous zoning districts mapped in the city's diverse neighborhoods to reflect their varying density and character. These limits include height

and floor area restrictions, which help give shape to neighborhoods and predictability to their future. However, historically, the NYC Zoning Resolution generally did not take *flood-resistant construction standards* into consideration. Consequently, in the Sandy aftermath, DCP had to adopt two zoning text amendments, on an emergency basis, to remove zoning barriers that were hindering the reconstruction and *retrofitting* of damaged buildings.

The [Flood Resilience Zoning Text Amendment](#) (the “2013 Flood Text”),

removed obstacles from the NYC Zoning Resolution by, as an example, allowing height to be measured from the *DFE* (rather than from grade) to allow buildings to meet *flood-resistant construction standards*. The [Special Regulations for Neighborhood Recovery](#) (the “2015 Recovery Text”) simplified the process for old buildings to document *non-compliances*, and established new rules that allow damaged homes located within small lots to be reconstructed. Both zoning changes were adopted on a temporary, emergency basis and are set to expire in

the next few years. The 2013 Flood Text expires within one year of the adoption of new *FIRMs*, which are expected to be revised by FEMA in the next few years.<sup>3</sup> The 2015 Recovery Text is set to expire in 2020. Therefore, these zoning rules need to be adopted on a permanent basis to continue to allow buildings to incorporate resiliency improvements and recover from potential future storms.

The 2013 Flood Text and the 2015 Recovery Text were focused on facilitating buildings to meet minimum requirements set forth in the *flood-resistant construction standards*. However, the city’s flood risk will continue to increase with climate change, since sea level rise will increase the potential height of storm surges. For that reason, current building code standards that are tied to today’s storm surge projections may not be sufficient to protect buildings from being damaged by future storms.

In addition to increasing the potential height of storm surges, sea level rise will also cause the *floodplain* to expand over time across its geography. Based on data provided by the NYC Mayor’s Office of Resiliency (MOR) on behalf of The City University of New York (CUNY) Institute for Sustainable Cities (CISC) and the New York Panel on Climate Change (NPCC), by the 2050s,<sup>4</sup> the *1% annual chance floodplain* is projected to cover one quarter of the city’s total landmass. This area, which closely overlaps with today’s *0.2% annual chance floodplain*, currently contains double the number of residents compared to today’s *1% annual chance floodplain*: approximately 794,500 residents and 122,100 buildings. As a result, current zoning rules need to be modified to also take into consideration future flood risk, so that long term adaptation can be achieved across the city’s current and future flood-risk areas.



**Building rebuilt under 2013 Flood Text**  
Location: Queens



**Buildings rebuilt under the 2015 Recovery Text**  
Location: Brooklyn

<sup>3</sup> NYC Flood Maps. Accessed April 25, 2019.  
[www.nyc.gov/floodmaps](http://www.nyc.gov/floodmaps)

<sup>4</sup> NYC Flood Hazard Mapper. Accessed March 31, 2019.  
[www.nyc.gov/floodhazardmapper](http://www.nyc.gov/floodhazardmapper)



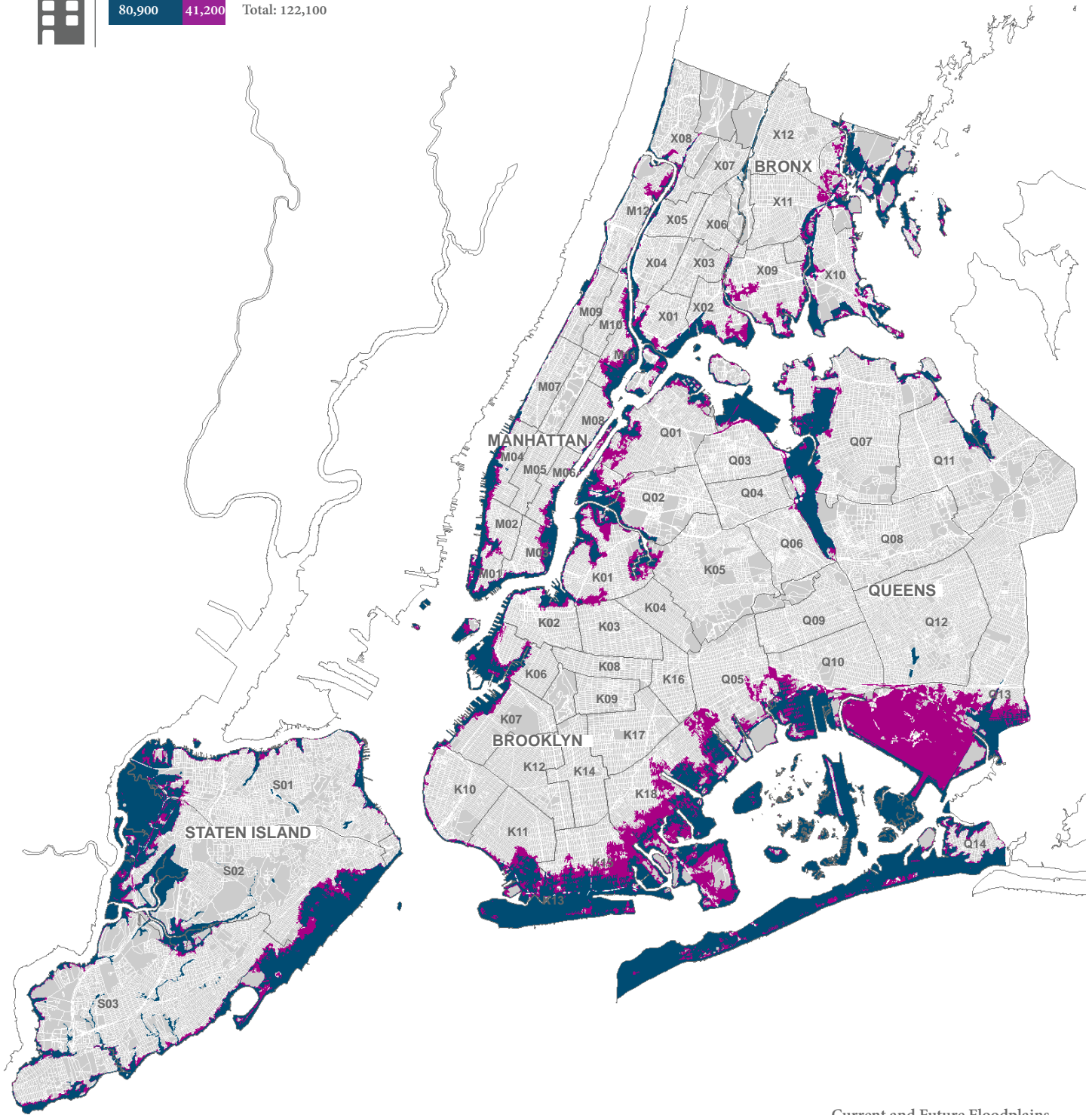
# Current and Future 1% annual chance floodplain



434,500 360,000 Total: 794,500



80,900 41,200 Total: 122,100



**Current and Future Floodplains**

- Current 1% annual chance floodplain
- 2050s 1% annual chance floodplain

Source: The current floodplain is based on the combined geography for the 1% annual chance floodplain established by the FEMA 2007 Flood Insurance Rate Maps (FIRMs) and the FEMA 2015 Preliminary Flood Insurance Rate Maps (PFIRMs). The 2050s floodplain is based on FEMA's Preliminary Flood Insurance Rate Map data and the New York City Panel on Climate Change's 90th Percentile Projections for sea level rise in the 2050s.

## Planning a Resilient New York City

In response to the effects of climate change, the City is pursuing actions on many fronts to promote resiliency. The City's goal is to increase the capacity of communities located in the *floodplain* to adapt to climate change while boosting their vibrancy, livability, and affordability in the long term.

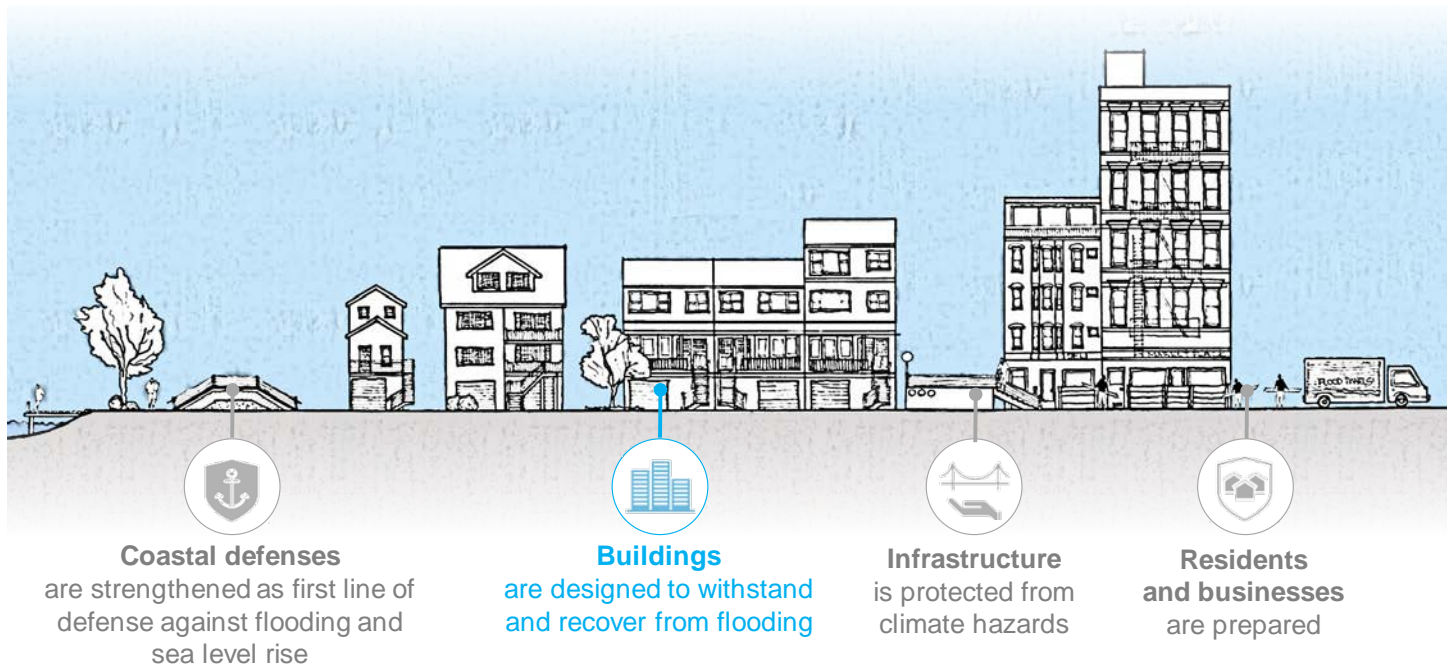
As laid out in “[OneNYC: The Plan for a Strong and Just City](#),” first issued in 2015, the City's resiliency strategy calls for planning for multiple lines of defense from coastal flooding. This entails pursuing coastal defense strategies to protect from storm surge and sea level rise, as well as retrofitting and upgrading infrastructure systems to withstand climate hazards. Furthermore, the strategy also includes preparing residents and business for future events, and promoting the flood-resilient design of buildings, so they can better

withstand flooding and therefore be reoccupied faster after a disaster. This vision for a resilient NYC is led and coordinated by MOR, in addition to the involvement of many city, state, and federal agencies.

An example of the City's work at the building scale is illustrated through the post-Sandy reconstruction process. DCP worked closely with other agencies, such as the Mayor's Office Housing Recovery Operations (HRO), to assist the Build It Back Program—a program funded by the US Department of Housing and Urban Development (HUD) Community Development Block Grant disaster recovery funds (CDBG-DR) dedicated to help New Yorkers living in communities affected by Sandy. The Build It Back Program frequently used the flexibility that was provided by the 2013 Flood

Text and 2015 Recovery Text, to aid approximately 1,323 homes that were elevated or rebuilt to meet *flood-resistant construction standards*. In total, approximately 8,300 property owners of one-to four-unit buildings were assisted through either a reimbursement check, construction work, or acquisition. Finally, the Build It Back's Multi-Family Program supported more than 19,600 households in 143 developments through repairs, resiliency upgrades, and reimbursement services.<sup>5</sup>

<sup>5</sup> NYC Housing Recovery. Accessed March 31, 2019. [www1.nyc.gov/site/housingrecovery/index.page](http://www1.nyc.gov/site/housingrecovery/index.page)





## The City's Land Use Strategy for the Floodplain

With such a vast and populous area subject to varied risk of flooding, it is evident that the city cannot simply retreat from the entire shoreline. Therefore, the City's land use policies across the *floodplain* vary based on the degree of flood risk that exists in different parts of the city.

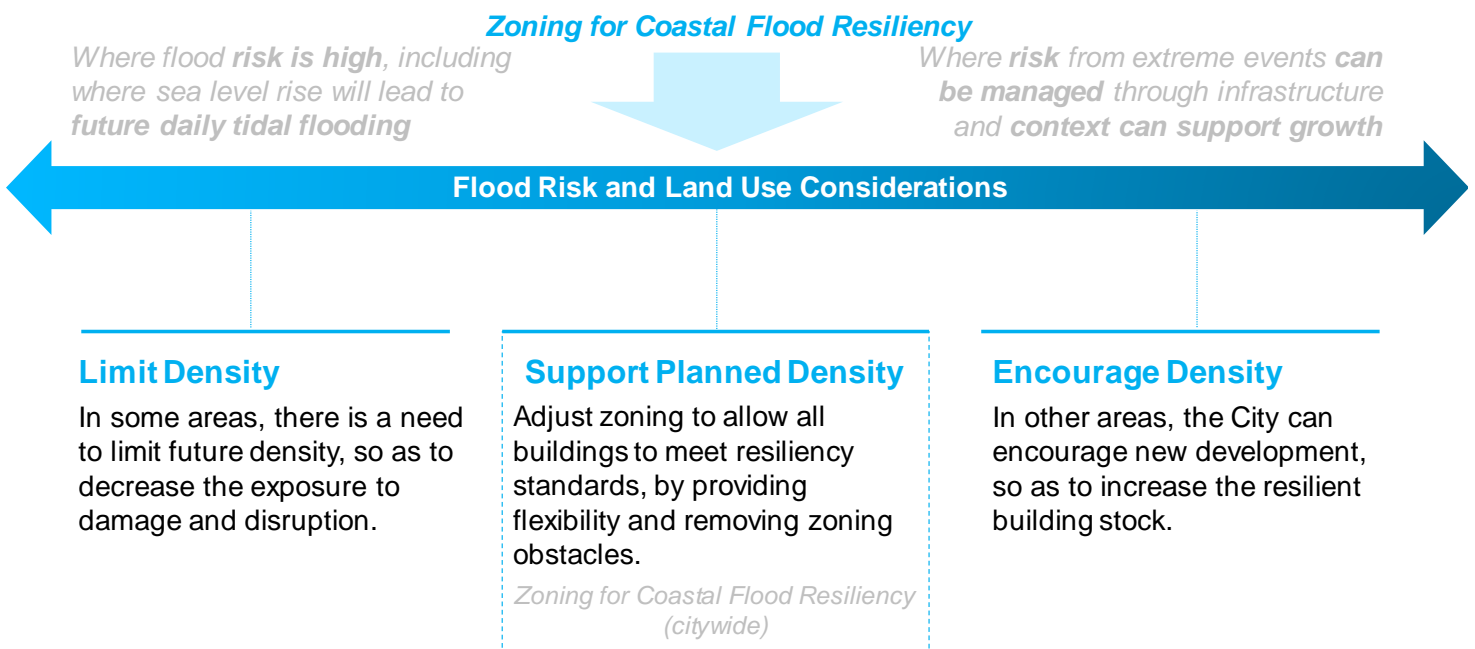
In certain neighborhoods, zoning regulations may be amended to either limit density in areas where coastal risk is high, or encourage density in areas otherwise equipped for it, where risk can be managed through coastal protection and infrastructure improvements. For example, the City believes that it is wise to limit future growth in neighborhoods that already experience flooding from high tides, or are projected to experience daily tidal flooding due to sea level rise in the near-term future. In some of these areas, depending on the shoreline

conditions, it may be infeasible to construct coastal protection, making it harder to assist with a community's viability and safety on a regular basis. Conversely, in areas where flood risk can be properly managed, zoning can allow for more density to encourage the construction of a more resilient building stock. The decision as to whether it is appropriate to increase or decrease density requires local input, as it depends on specific shoreline conditions, development patterns, and risk profile of each community.

On a citywide level, the City's land use policy is to support planned density, by enabling new and existing buildings to incorporate resiliency improvements. The 2013 Flood Text is an example of a citywide zoning framework that helped buildings and neighborhoods to become resilient. Moving forward,

the citywide zoning proposal would maintain prevailing land uses and the planned density across neighborhoods while encouraging buildings and neighborhoods of all types to be resilient in the long-term.

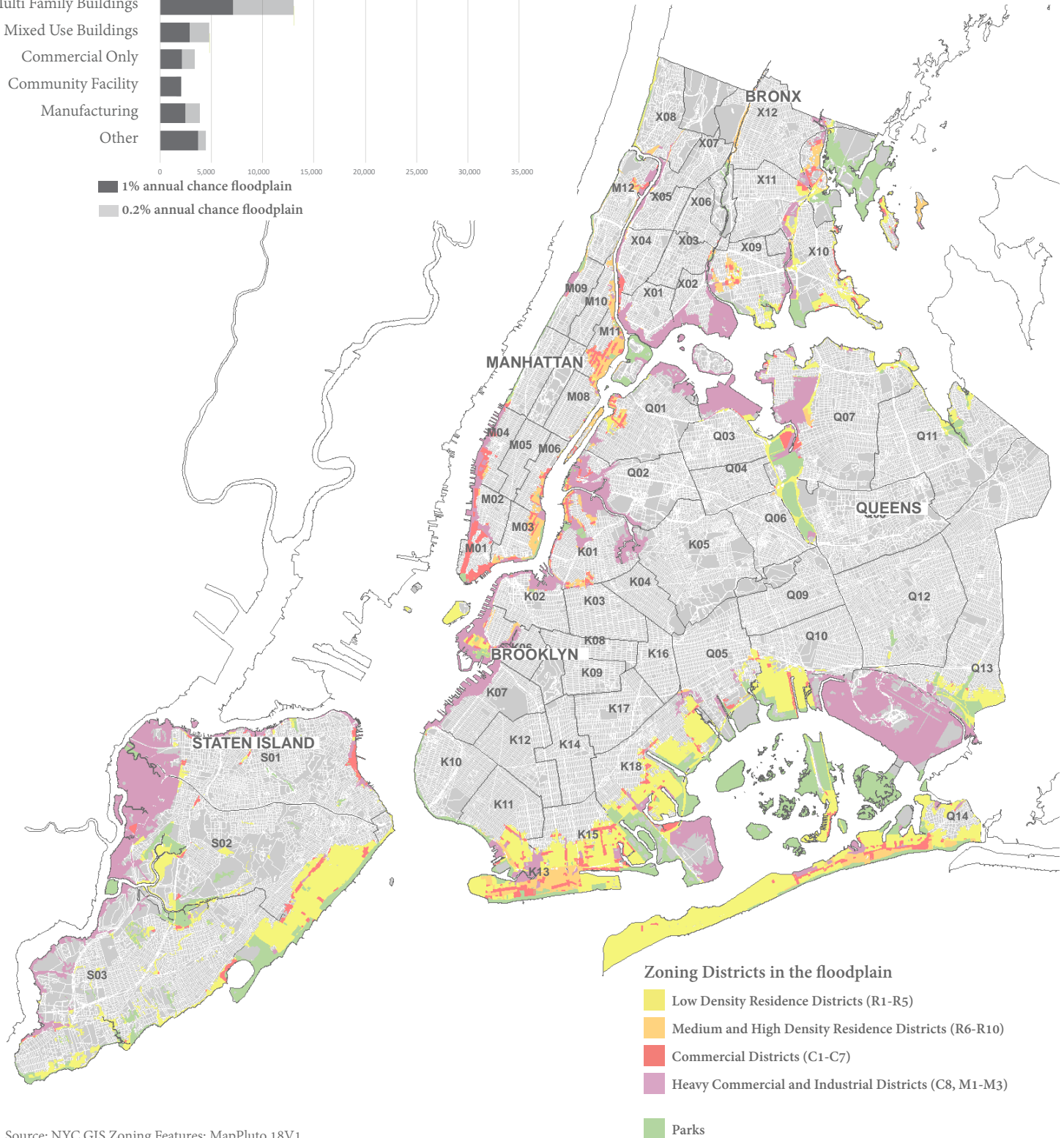
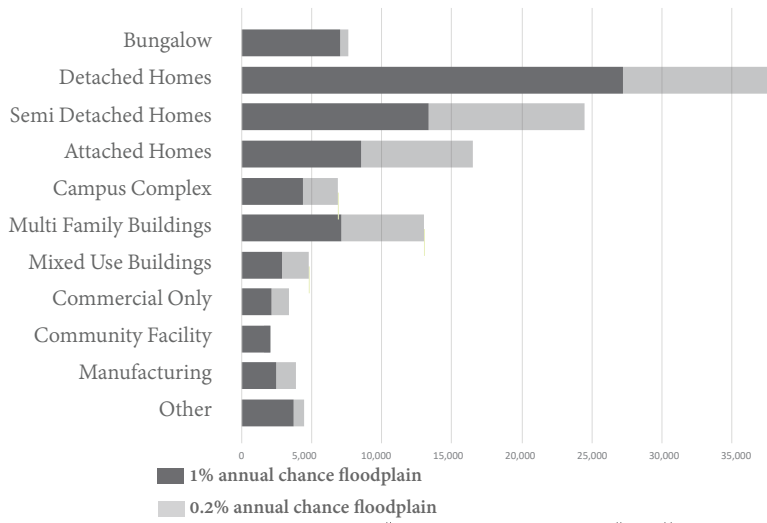
The next section will delineate the existing zoning challenges that building owners face when trying to undertake resiliency improvements.



# NYC'S NEIGHBORHOODS IN THE FLOODPLAIN

By Building Typologies (chart) and Zoning Districts (map)

Building Typologies in the Floodplain



Source: NYC GIS Zoning Features; MapPluto 18V1

# CURRENT CHALLENGES OF NYC'S COASTAL NEIGHBORHOODS

In both the 1% and 0.2% *annual chance floodplains*, residents and business owners are confronted with a range of issues when seeking to make resiliency improvements. There are generally four types of communities within the city's 1% and 0.2% *annual chance floodplains*: low-density residential neighborhoods, medium/high-density residential neighborhoods, commercial corridors, and industrial areas. In these areas, the density and range of building types vary considerably. However, existing zoning, including the 2013 Flood Text, is not responsive enough to these different conditions, often hindering investment in resiliency. DCP identified and examined these impediments through an analysis of the City's resiliency-related work, including DCP's citywide and neighborhood-specific reports and feedback received from other agencies and communities across the *floodplain*.

This section provides an overview of the zoning issues that communities still face when trying to incorporate resiliency investments. It begins with the issues that cut across the city's *floodplain* and follows with the issues that are specific to the four neighborhood types. Additionally, for each neighborhood, this section will provide a general profile of building types, their vulnerability to flood risk, and anticipated construction patterns.

## Citywide

Overall, DCP's analysis found that existing zoning provisions, including those adopted in 2013 on an emergency basis, can affect building-scale resiliency in two primary ways. First, zoning still discourages residents and business owners from making resiliency investments by not providing enough flexibility in the *building envelope*. This, in addition to financial challenges, makes it less likely that neighborhoods will become resilient in the foreseeable future. Second, when investments in building-scale resiliency are made, blank walls can be created at the sidewalk level due to the elevation of active uses above the *DFE*. This results in an undesirable effect on the streetscape.

*Building envelope* limitations on height and floor area are the most common zoning issues faced by building owners in the *floodplain*. For example, existing zoning can produce buildings with inconsistent heights because height limits are currently based on the *DFE* level, which greatly varies across the city's *floodplain*, even on the same street. The 2013 Flood Text allows some building owners more height and floor area flexibility to build a *wet-floodproofed* ground floor and use it for parking, minor storage, and building access, while others may only be able to provide a crawl space under the first occupiable floor.

Another issue related to the *building*

*envelope* is that most buildings in the 1% *annual chance floodplain* can only meet minimum resiliency standards, which require the first occupiable floor to be placed at the *DFE*. This hinders a building owner's ability to achieve the maximum flood insurance premium reduction, which is generally achieved when the first occupiable floor is placed four feet above the *BFE*. It also does not allow building owners to incorporate sea level rise projections when determining the level of their building's first occupiable floor. Additionally, for buildings in the 0.2% *annual chance floodplain*, there is no flexibility in the *building envelope* for buildings to have an elevated first floor. While most uses in these areas are not required to comply with *flood-resistant construction standards*, with sea-level rise projections showing flood risk increasing over time, the current 0.2% *annual chance floodplain* will become more vulnerable to flooding in the future. Therefore, building owners should have the option to design or *retrofit* their buildings to meet resiliency standards on a proactive basis. However, current height and floor area limits, from underlying provisions, create a barrier for building owners to proactively invest in the resiliency of their buildings. To address this issue, zoning should be updated to allow more flexibility in both the 1% and the 0.2% *annual chance floodplains* to allow

building owners to make resiliency improvements that maximize flood insurance savings and better address current and future flood risks.

The second way that zoning has been affecting building-scale resiliency is with blank walls at the sidewalk level. Currently, buildings are often being designed with external access such as extensive stairs and ramps, which creates a disconnect between the use of the building and the sidewalk. A more flexible zoning framework that goes beyond the 2013 Flood Text provisions could encourage buildings to provide internal access, which would offer a better relationship with the streetscape. Additionally, while existing zoning includes design requirements that help soften the negative effect of blank walls, these requirements are mostly focused on low-density residential communities, or other areas with high *DFEs* (where the *DFE* is 10 feet or more above grade). An expansion of these regulations to higher density building types and to areas with lower *DFEs* would help address the issue of blank walls more broadly in the *floodplain*.



## Low-Density Residential Neighborhoods

Low-density communities occupy the largest portion of the city's *floodplain*, with about three quarters of all lots zoned for low-density Residence Districts (R1-R5). These areas include bungalow communities and areas with larger detached homes, but also several neighborhoods with a prevalence of semi-detached, attached structures, and small multi-family buildings. These approximately 78,100 buildings, are the most vulnerable building stock, since they are generally smaller and lighter, and therefore more susceptible to flood damage. Also, many low-density neighborhoods in the *floodplain* are located within low-lying areas, with *BFEs* sometimes exceeding 10 feet above grade level. Therefore, they are more likely to be substantially damaged by a future storm, and be required to comply with *flood-resistant construction standards* when rebuilt. Homes in these areas are also more likely to trigger the *substantial improvement* threshold when conducting an enlargement or alteration work, due to lower home market values when compared to large multi-family buildings, therefore requiring homeowners to comply with *flood-resistant construction standards*. While compliance with these standards

is difficult and expensive, fortunately these structures, especially detached homes, are easier to *retrofit* when compared to large buildings since they can be physically elevated.

Through the Build It Back Program some low-density communities have seen new buildings and some existing structures incorporating resiliency strategies within the *1% annual chance floodplain*. However, with the federally funded program concluding, and without changes to the existing zoning framework, it will be less likely for these types of neighborhoods to see additional resiliency investments. This is not only because of financial challenges in undertaking this work, but also due to the disincentives that current zoning rules create. For example, at the building scale, given height restrictions, homeowners located in areas with *BFEs* that are lower than four feet above grade may not be able to raise all living spaces above the *DFE*. This is especially an issue for semi-detached and attached homes, because these buildings share party walls and would therefore need to be elevated at the same time as neighboring properties. In many instances, the biggest challenge is to obtain agreement from all neighbors to

elevate the full structure simultaneously. Therefore, instead of pursuing a physical elevation, a single attached building may only have the option of evacuating spaces located below the *DFE*, making them *wet-floodproofed*, and relocating these uses to the top of the structure. This strategy requires a full additional floor to be added on top of the existing structure, as opposed to elevating the first occupiable floor to the *DFE* level. Consequently, the *retrofit* would not be permitted because the building would likely not be able to comply with the height limits imposed by current zoning rules. Residents may also not be able to replace the lost spaces below grade when filling in basements and cellars to meet *flood-resistant construction standards*, potentially losing an important part of the house and often the area used for parking. Finally, homeowners may face constraints in elevating mechanical, electrical, and plumbing equipment above the *DFE*, and may lose a portion of their homes to store the equipment internally. It is also important to note that many existing buildings do not comply with current zoning rules and have limited paths to *retrofit* and achieve resiliency. If these issues are not addressed, it would be unlikely to see many resiliency improvements undertaken in low-density neighborhoods, and therefore, they would be less prepared to withstand future flood damage.

Lastly, homes that get built or *retrofitted* to meet *flood-resistant construction standards* may generate anomalies in the neighborhood context, due to some of the current zoning rules. For instance, in areas with a concentration of bungalow homes on narrow or shallow lots, high flood risks paired with existing yard requirements found in the NYC Zoning Resolution may result in taller and narrower homes that are considered out of context with their neighbors.



**Tall and narrow home in residential neighborhood**  
Location: Staten Island



## Medium / High-Density Residential Neighborhoods

Medium- and high-density communities occupy a small percentage of the city's *floodplain*, with less than one-tenth of all lots zoned for medium- and high-density Residence Districts (R6-R10). These areas include a high concentration of multi-family structures, such as mid-rise apartment buildings served by elevators, as well as walk-up structures, and areas with large residential campuses. Despite the fact that there are fewer buildings (7,300 buildings) located within medium- and high-density neighborhoods compared to low-density communities, almost half of all residential units in the *floodplain* are located within these areas. Flood risk varies across these areas, with *BFEs* ranging from low (up to three feet above grade) to moderate (between three and six feet above grade). These buildings are not as vulnerable as single- and two-family homes, as they are larger and generally better able to structurally withstand flood waters, and so are less likely to be *substantially damaged*. Because of their higher market value as compared to small homes, they are also less likely to trigger the *substantial improvement* threshold and be required to comply with *flood-resistant construction standards*. However, residential units

and mechanical equipment, which are often located below the *DFE* in these buildings, are highly vulnerable to flooding.

While many multi-family buildings that were damaged by Sandy were assisted by the Build It Back Multi-Family Program, few structures in these areas have been proactively *retrofitted* to meet resiliency standards in the private market. The reason is often that multi-family structures currently face structural, regulatory, and financial challenges, in addition to zoning restrictions. For example, existing barriers include height limitations imposed by zoning. These limits prevent building owners from relocating below-grade residential units and other common spaces above the *DFE*. Also, medium and high-density residential communities face zoning conflicts when undertaking the partial resiliency upgrades that make up most resiliency work in these areas. As an example, most multi-family buildings store important equipment below grade, within cellars, which are not counted as floor area under existing zoning. When building owners decide to elevate mechanical, electrical and plumbing equipment above the *BFE*, they may encounter floor area

constraints, possibly having to displace existing residential units or common areas to relocate the necessary building equipment. While roof bulkheads are an option, many existing roof structures cannot sustain the additional weight. Additionally, existing residential campuses have faced zoning constraints when looking to build new structures to locate essential building systems, including back-up power systems. Consequently, these communities will continue to be limited regarding the types of resiliency improvements that they can undertake. If zoning issues are not addressed, these communities may not be able to prepare to withstand future climate risks.



**Elevated access with extensive ramps in residential neighborhood**  
Location: Brooklyn

## Commercial Corridors

While most lots located within the City's *floodplain* are occupied by residential uses, approximately one-tenth are zoned for commercial uses (C1-C7). There are approximately 12,410 buildings located in commercial districts and most of them play an important role in providing retail and services to local residents. They include a wide range of building types, from single-story retail stores, to mixed-use developments and office buildings. The flood risk varies across these areas with *BFEs* ranging from low (up to three feet above grade) to high (above six feet above grade). However, in general, owners of small buildings are more vulnerable to flooding and more likely to be *substantially damaged*, when compared to those with larger structures. Depending on the building's market value, and the nature of the alteration work filed with the DOB, these smaller structures are more likely to trigger the *substantial improvement* threshold, which means that the buildings must be either elevated or *dry-floodproofed*. In contrast, building owners of larger mixed-use or office buildings are generally less likely to trigger the *substantial improvement* threshold, when filling for DOB building permits. Therefore, alteration work is less likely

to include resiliency investments that lead to buildings that fully meet *flood-resistant construction standards*. Instead, they may opt to undertake only partial resiliency improvements, such as the relocation of important equipment or the installation of flood panel systems in advance of a future storm.

In commercial areas, the city has seen few examples of buildings that have been *retrofitted* to comply with *flood-resistant construction standards*. In the absence of any zoning changes, this trend is unlikely to change in these areas since current regulations exacerbate the physical and financial challenges that these businesses face when incorporating resiliency improvements. For example, many businesses depend on spaces below grade for storage and other accessory uses, especially those located within mixed-use buildings. To make their buildings resilient, property owners may have to opt to vacate and fill up subgrade spaces due to the high cost and potential unfeasibility of *dry-floodproofing* areas below grade. However, because the current zoning rules do not offer enough flexibility to facilitate the relocation of these spaces above the flood elevation, these supportive uses may be lost. Aside

from challenges in *retrofitting* existing buildings, commercial corridors have also been facing challenges when constructing new resilient buildings. For instance, the pedestrian experience, which is critical to the success of most of the city's commercial streets, has been negatively affected when new buildings opt to elevate active uses above the *DFE*. Alternatively, a walkable commercial street in the *floodplain* could be maintained by *dry-floodproofing* the ground floor and keeping it at grade. However, this strategy has been found to be costly, especially since current zoning rules often require storefronts to comply with transparency requirements. Without zoning or financial incentives, this strategy is unlikely to be considered by business owners. Over time, these burdens could potentially result in overall disinvestment in *floodplain* retail corridors, with an increasing concentration of vacated businesses, especially if they are damaged in a future flood event. Consequently, it could result in a loss of retail vitality along commercial corridors. Therefore, not only will these neighborhoods be unprepared to withstand future flood events, they might not be able to maintain needed services.



**Elevated active use in commercial corridor**  
**Location: Manhattan**



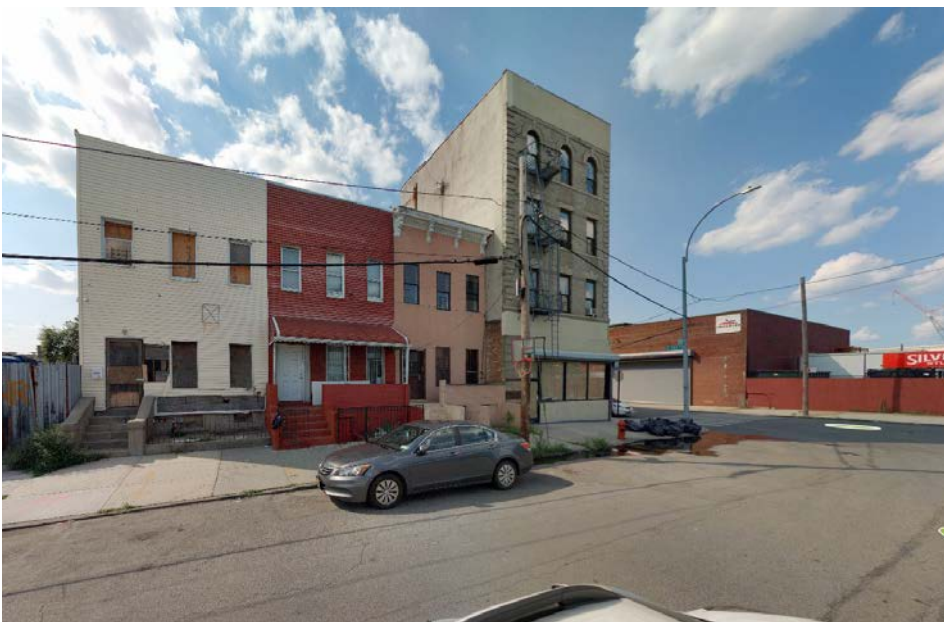
## Industrial Areas

A large portion of NYC's industrial neighborhoods were historically built on the shorefront because of shipping needs. As a result, roughly half of the city's industrially zoned land, falls within the city's *floodplain*. The flood risk in these areas varies, with *BFEs* ranging from low (up to three feet above grade) to high (above six feet above grade). Approximately one-tenth of the lots in the *floodplain* are in districts zoned for Manufacturing and Heavy Commercial uses (C8, M1-M3). These areas contain about 7,960 buildings, most of which are single-story structures. They include warehouses and factory buildings, as well as open uses such as construction material distributors, automobile dismantlers, or maritime facilities. Since most industrial businesses have large footprints and are in single-story buildings, their entire operations are located on the ground floor, and are therefore highly vulnerable to flooding. The industrial parts of the city have seen even fewer resiliency improvements at the building scale when compared to other neighborhood types, because the buildings found here are large and owners rarely undertake major renovations or improvements. Like commercial corridors, the resiliency

work is currently limited to small improvements, such as the relocation of important equipment or the installation of flood panels and emergency egress for future storm events. In the future, while it is unlikely that buildings in industrial areas would be able to conduct major alterations to comply with *flood-resistant construction standards*, building owners may wish to invest in small improvements. However, some of this work is currently limited by current zoning rules. For example, existing businesses located in light manufacturing districts, which have a low maximum floor area allowance, may not have enough zoning floor area available to relocate essential equipment and office spaces to upper stories and mezzanines situated above the flood elevation. Consequently, these areas will continue to be exposed to future flood risks.

Aside from industrial businesses, these areas zoned for manufacturing and heavy commercial uses also contain approximately 800 homes and small apartment buildings that are not conforming with the district's use regulations, since residential uses are not permitted here. As a result, under the current zoning rules, these

homes, which are generally clustered together, may not be able to proactively *retrofit* to resiliency standards or be able to be reconstructed if damaged by a future storm. Without any path to resiliency improvements, these pockets of residential communities will be exceptionally vulnerable to forthcoming storms.



**Residential buildings in industrial area**  
**Location: Bronx**

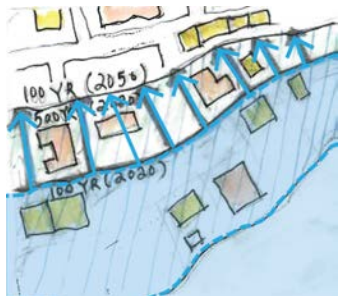




# CITYWIDE ZONING RECOMMENDATIONS

With a comprehensive understanding of the issues that NYC's coastal neighborhoods currently face under the existing zoning framework, DCP has developed a preliminary set of citywide zoning recommendations applicable in the *floodplain* to assist the city and its residents to be resilient over the long term. Additionally, an overview of other DCP zoning recommendations that are intended to be pursued in parallel to the citywide zoning proposal are described later in this document.

These recommendations would assist the City achieve the following overarching goals:



## **Goal 1. Encourage resiliency throughout the city's current and future floodplains**

All buildings located within areas at risk of coastal flooding should have the option to proactively incorporate resiliency standards, even when they are not required by FEMA and Appendix G of the NYC Building Code.



## **Goal 2. Support long-term resilient design of all building types by offering flexibility in the zoning framework**

All buildings should have access to rules that facilitate protection from storm surge in the near and long-term future, independently of the building's typology or specific location within the city's *floodplain*.



## **Goal 3. Allow for adaptation over time through partial resiliency strategies**

All buildings should be able to incorporate some level of resiliency improvements, including existing structures that are not able to fully meet *flood-resistant construction standards*.



## **Goal 4. Facilitate future storm recovery by removing regulatory obstacles**

Rules that assist with the reconstruction of damaged buildings after a future storm or other type of emergency should be readily accessible to expedite the City's response and recovery.

In summary, Zoning for Coastal Flood Resiliency would provide clear and simple rules that treat all buildings as similarly as possible, to guide long-term resilient design across NYC's current and future *floodplains*, helping prepare NYC's neighborhoods to withstand future storms.

## Goal 1 - Encourage resiliency throughout the city's current and future floodplains

Zoning for Coastal Flood Resiliency should be applicable to all properties located within the current and future *floodplains* to facilitate buildings owners' proactive investments in resiliency improvements. Because the 2050s projected *1% annual chance floodplain* closely overlaps with the *0.2% annual chance floodplain*, as shown in the flood risk maps on pages 4 and 7, DCP intends to increase the applicability of this zoning framework to lots that are wholly or partially within the *1%* and *0.2% annual chance floodplains*, as described below.

### 1% annual chance floodplain

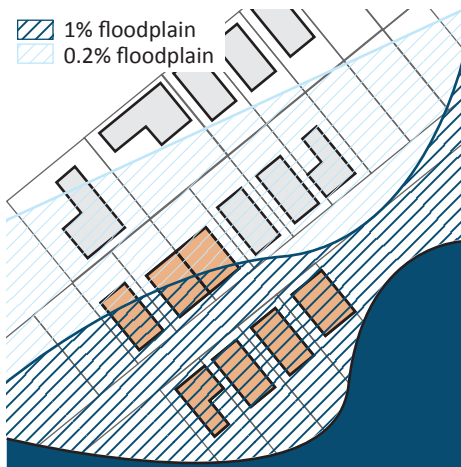
The *1% annual chance floodplain* covers approximately 65,500 lots. The existing temporary zoning rules (2013 Flood Text and the 2015 Recovery Text) are currently available to buildings located wholly or partially within this geography. However, Zoning for Coastal Flood Resiliency would modify the way special zoning rules apply in the *floodplain* by extending the flexibility to any lot where at least a portion of that lot is located within this high-risk flood zone. This modification would allow rules to be better aligned with how

underlying zoning regulations apply in the city, which are based on zoning lots. Also, by allowing all buildings located within a lot in this area to use Zoning for Coastal Flood Resiliency rules, property owners would be able to more easily proactively comply with resiliency standards in the Building Code or otherwise undertake partial resiliency improvements. For example, a residential campus with multiple buildings would be able to apply the same zoning rules and flood protection standards to all buildings located on the property, even those structures that are not located within the *1% annual chance floodplain*. This strategy would not only simplify the design process, it would encourage more buildings to proactively meet *flood-resistant construction standards*.

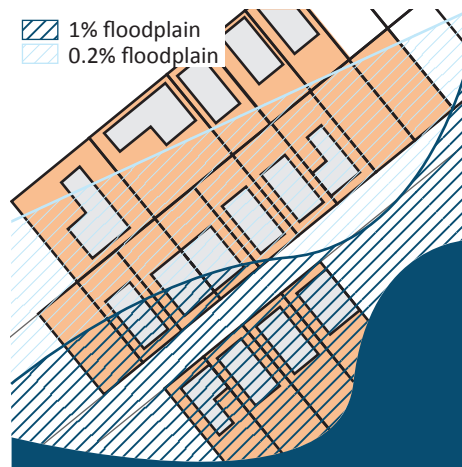
### 0.2% annual chance floodplain

The *0.2% annual chance floodplain* cover approximately 36,700 lots, in addition to the other 65,500 lots that are located within the *1% annual chance floodplain*. DCP intends to use the *0.2% annual chance floodplain* geography as a proxy to the future *1% annual chance floodplain*, given that this area is already

included within accepted regulatory maps. The existing temporary zoning rules (2013 Flood Text and the 2015 Recovery Text) are currently not available to buildings located within the *0.2% annual chance floodplain*. As a result, building owners in these areas may be hindered by zoning when trying to proactively invest in resiliency measures. Zoning for Coastal Flood Resiliency would therefore apply to any lot where at least a portion of that lot is located within this moderate-risk flood zone. This would encourage property owners to proactively comply with resiliency standards in the Building Code or otherwise undertake partial resiliency improvements. For example, a homeowner who owns a house located within the *0.2% annual chance floodplain*, right across the street from another building that is located within the *1% annual chance floodplain*, would also be able to proactively *retrofit* the home to be flood resilient. This expansion in applicability is a sensible precautionary approach, it would ultimately allow the city to proactively adapt to increased future flood risk.



**2013 Flood Text**  
Buildings located within the 1% annual chance floodplain



**Zoning for Coastal Flood Resiliency**  
Lots located within the 1% and 0.2% annual chance floodplains

## Goal 2 - Support long-term resilient design of all building types by offering flexibility in the zoning framework

Zoning for Coastal Flood Resiliency should include zoning allowances that address the wide variety of building conditions and degrees of risk from coastal flooding found in the city’s *floodplain*. These regulations would allow new and existing buildings to meet *flood-resistant construction standards*, but also to exceed them if a property owner decides to also include future sea level rise projections, when designing a new or *retrofitting* an existing building. This means that building owners would be able to proactively locate all living spaces and important equipment to higher elevations. This precautionary approach helps make the building safer in the long-term while decreasing the chance of property damage in the event of a future storm. These allowances would be coupled with streetscape regulations to ensure that resilient structures better match adjacent context while reducing impacts of potential blank walls. These zoning recommendations are described below.

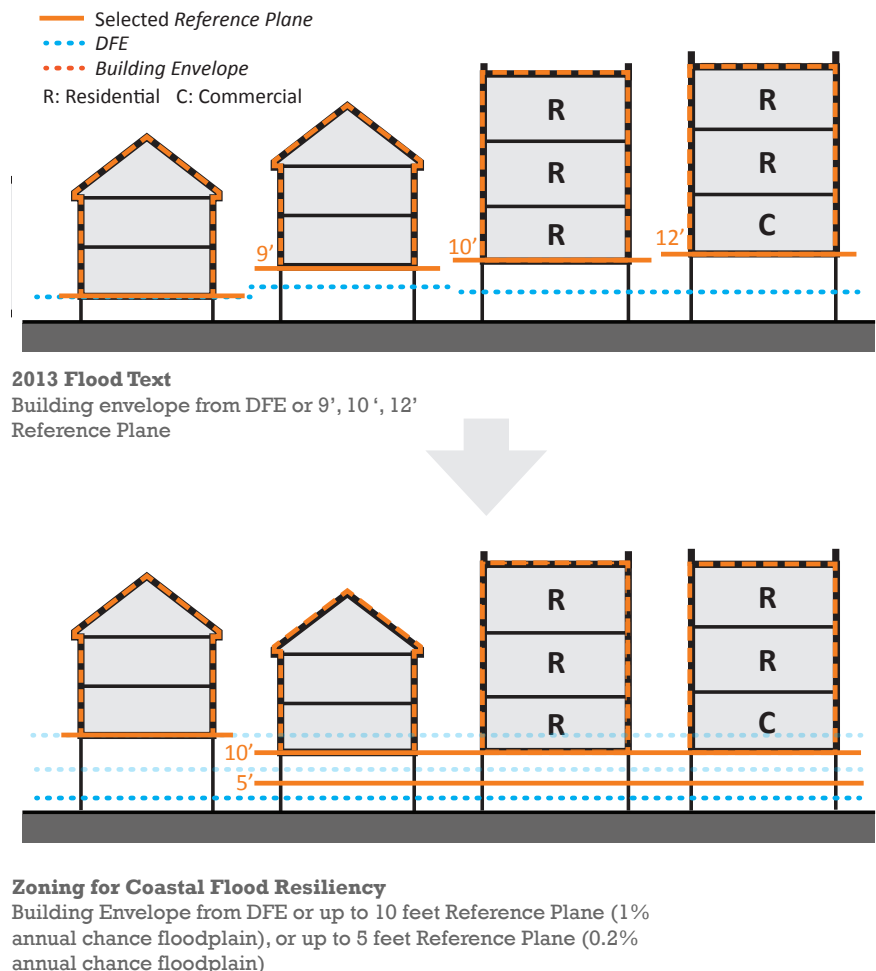
### Building Envelope

Zoning for Coastal Flood Resiliency would include modifications to existing rules that designate the allowed size of buildings, known as the *building envelope*. These proposed rules would assist new and existing buildings within the *floodplain* to make resiliency improvements that protect the structure from flooding by modifying how height is measured, and by allowing extra flexibility with yards and setbacks.

Underlying zoning regulations currently allow lots located within the *1% annual chance floodplain* in zoning districts with height limits to measure the *building envelope* from the *BFE*. This regulation allows buildings to achieve their fully permitted height above the flood elevation. However, due to the incorporation of additional freeboard requirements after Hurricane Sandy into NYC’s Building Code, the NYC

Zoning Resolution was amended to allow *building envelopes* across all zoning districts to be measured from the *DFE*. This allowance, which is part of the 2013 Flood Text, currently ensures that buildings can meet *flood-resistant construction standards*. Additionally, in areas in which the *BFE* above grade equals or exceeds four feet, existing temporary rules allow height restrictions to be measured from a *reference plane* located higher than the *DFE* – nine, 10 or 12 feet above grade depending on the building’s use. This extra height allowance was developed to improve the utility of spaces subject to flooding for parking, storage and building access if *wet-floodproofed*, or active uses such as retail space if *dry-floodproofed*. Without this flexibility, buildings would have little room in the *building envelope* to elevate living spaces beyond the *DFE*,

potentially leading to tall crawl spaces that are unused and therefore generate blank walls at the sidewalk level. These additional height allowances currently apply to buildings based on the flood elevation, the building type, and the zoning district in which the building is located. This approach creates a complex framework that unnecessarily benefits some buildings more than others leading to inconsistent outcomes, sometimes even along the same street. Zoning for Coastal Flood Resiliency would continue to allow *building envelopes* across all zoning districts to be measured from the *DFE* to continue to facilitate all buildings in meeting *flood-resistant construction standards*. Additionally, it would streamline the height allowance by also offering the option to all *building envelopes* to be measured from a *reference plane* that is





placed higher than the *DFE*: up to 10 feet above grade (if located within the *1% annual chance floodplain*), or up to five feet above grade (if located beyond the *1% annual chance floodplain* and within the *0.2% annual chance floodplain*). This allowance would assist buildings, including those that cannot be physically elevated, to have their living spaces raised beyond current flood projections and therefore be resilient in the long term. For instance, the average *BFE* in the city ranges from three to four feet above grade. This surge projection refers to today's 1% annual chance storm. However, by the 2050s, NPCC projects that the city will be subjected to approximately 28 inches (almost two and a half feet) of sea level rise.<sup>6</sup> Therefore, in the next couple of decades, the expected flood elevation of a 1% annual chance storm will become roughly six to seven feet within most of the city's current high-risk zone. To address this, the *reference plane* would allow buildings in these areas to incorporate these projections, and design living spaces and other important uses at the second story, while floodproofing the ground-floor. However, this extra height allowance would not preclude areas located within higher *BFEs* to also utilize the *reference plane* or the *DFE*, whichever is higher, since the first occupiable floor would still be able to be placed higher than 10 feet or *DFE* (within the *1% annual chance floodplain*) or higher than five feet (beyond the *1% annual chance floodplain* and within the *0.2% annual chance floodplain*), if there is enough space within the *building envelope*. Additionally, by elevating a building's first occupiable floor well above the *DFE*, homeowners and business owners would be able to maximize long-term flood insurance premium

reductions, which are achieved in the *1% annual chance floodplain*, when the first occupiable floor is located four feet above the *BFE*. Lastly, aside from assisting building owners to be more resilient in the long-term and potentially save on flood insurance, additional height flexibility would also facilitate existing basements and cellars to be relocated above flood risk levels. These height allowances would come with extra conditions to ensure that buildings that take advantage of these rules are designed to be protected from flooding in the long-term and provide an inviting streetscape, as explained in the next section.

In addition, Zoning for Coastal Flood Resiliency would make available an alternative *building envelope*, informally referred to as the "cottage envelope", for detached homes being built or *retrofitted* on narrow or shallow lots in low-density areas. This envelope was made available as part of the 2015 Recovery Text, although it was limited to specific Neighborhood Recovery Areas designated in zoning text. Zoning for Coastal Flood Resiliency would make the cottage envelope permanent and allow all new and existing single- and two-family detached homes in the *floodplain* to: (a) reduce side yard requirements if the lot is narrower than 30 feet (to a minimum of three

feet); (b) reduce rear yard requirements if the lot is shallower than 95 feet (to a minimum of 10 feet); and (c) meet front yards and setbacks of neighboring buildings, to best align to surrounding neighborhood context. All existing regulations related to fire-protection would still apply under the NYC Fire Code. In exchange for this flexibility, the building would be limited to a maximum height of 25 feet, as measured from the *reference plane*, instead of 35 feet (most common maximum height in low-density districts). This envelope results in a wider but lower building, which better reflects the existing neighborhood character of areas with a prevalence of small lots. It also provides a better design and interior layout for the homeowner, while allowing living spaces to be placed above the *DFE*.

In addition to providing flexibility to lots that are smaller than what is usually required by current zoning rules, Zoning for Coastal Flood Resiliency would also provide additional flexibility to existing buildings that do not meet current zoning regulations. For instance, a large portion of the existing building stock and the land uses within such buildings, do not meet current zoning rules, either because they were constructed before zoning existed, or because they were legally built under the provisions in effect at the time and the regulations



**2013 Flood Text**  
Underlying envelope



**Zoning for Coastal Flood Resiliency**  
Cottage envelope



<sup>6</sup> Climate Resiliency Design Guidelines – Version 3.0. NYC Mayor's Office of Recovery and Resiliency, New York, 2019. [www1.nyc.gov/assets/orr/pdf/NYC\\_Climate\\_Resiliency\\_Design\\_Guidelines\\_v3-0.pdf](http://www1.nyc.gov/assets/orr/pdf/NYC_Climate_Resiliency_Design_Guidelines_v3-0.pdf)



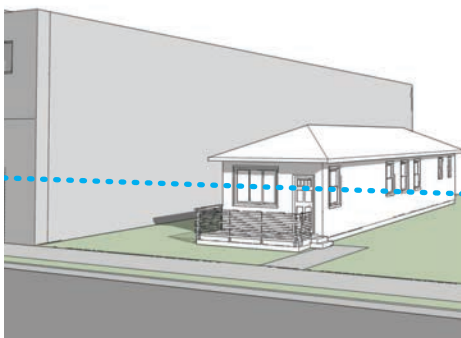
have since changed. These are known as *non-complying* buildings or buildings with *non-conforming* uses, depending on whether they do not comply with bulk or use regulations, respectively. In general, they can stay in place pursuant to underlying zoning. However, there are limitations on the reconstruction, enlargement or alteration of these structures. Generally, buildings located outside of the *floodplain* and that are *non-compliant*, cannot increase the degree of *non-compliance* that already exists when enlarging. Similarly, *non-conforming* uses cannot generally be expanded, or be reconstructed if demolished. The 2013 Flood Text already updated these rules to allow *non-complying* buildings to elevate or reconstruct to the *DFE*, and *non-conforming* single- and two-family homes, except homes in Manufacturing Districts (M1, M2, M3) or heavy Commercial District (C8), to rebuild. However, the work can only be achieved if the building is kept within the existing footprint and if the first occupiable floor is located at the *DFE* level. Consequently, this allowance does not provide enough flexibility for all buildings to place living spaces above the *DFE*, or for the entire building to be repositioned on the lot if needed. If these rules are not updated, they would inhibit most existing buildings in the *floodplain* from meeting resiliency standards.

To balance overall planning goals with communities’ resiliency needs, Zoning for Coastal Flood Resiliency would enhance existing allowances to ensure that these buildings meet *flood-resistant construction standards*—or exceed them— if they fit within the modified *building envelope*. This updated framework would allow all properties with *non-conforming* uses and *non-complying* buildings to measure the underlying *building envelope* from the *DFE* when located within the *1% annual chance floodplain*, while granting access to more flexible yard and setback rules for those that are located within either the *1%* or the *0.2% annual chance floodplains*. This framework would allow buildings to increase the degree of *non-compliance* due to the resiliency work. As an example, a *non-conforming* attached home with non-compliant yards located within a residence district that only allows detached structures, would be able to relocate floor space currently located below the *DFE* to the top of the structure, even if the enlargement work increases the degree of non-compliance with yard regulations. Another example would be a *non-conforming* residence in a manufacturing district, which would be able to be elevated or *retrofitted* to or above the *DFE*, or be reconstructed, if located within areas that are predominantly residential.

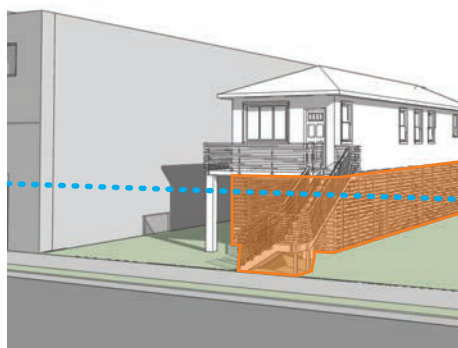
## Building Design

Zoning for Coastal Flood Resiliency would also make modifications to floor area, use, parking and streetscape regulations that affect the design of buildings in the *floodplain*. These changes would help promote good resilient design in the long-term for all building types. As an example, through floor area exemptions, the proposal would encourage new and existing buildings to floodproof the ground floor, provide building access at grade, and design storefronts that are located at grade and are visually accessible at the sidewalk level. If building owners opt to elevate the ground floor instead of utilizing these incentives, the proposal would require buildings to provide streetscape strategies that soften the impact of elevated uses on the public realm.

Underlying zoning regulations currently allow lots located within the *1% annual chance floodplain* to exempt the entire ground floor from floor area calculations, if more than half of the floor-to-ceiling height is placed below the *BFE*. This regulation allows buildings to achieve their fully permitted floor area above the flood elevation. However, this exemption is only available to lots located within zoning districts with height limits, since those can utilize the *BFE* as the underlying datum from which height restrictions are measured, and floor area is calculated. Therefore, as part of the 2013 Flood Text, this rule was expanded to allow the ground floor of all buildings within the *1% annual chance floodplain* to discount the ground floor from floor area calculations if more than half of the floor-to-ceiling height is placed below the *DFE*. This allowance helps ensure buildings with moderate and high *DFE* levels (especially those that equals or exceeds four and a half feet above grade), achieve the fully permitted floor area. However, this provision has



**2013 Flood Text**  
Non-conforming homes in manufacturing districts cannot be retrofitted



**Zoning for Coastal Flood Resiliency**  
Non-conforming homes in manufacturing districts can be retrofitted

generally resulted in low-quality spaces, as buildings are encouraged to lower the ground-floor ceiling height to get the floor area discount. Additionally, the outcome can be out of scale with the neighborhood context, since an entire floor can be discounted from floor area calculations, while being used for active uses such as a commercial space or a community facility space.

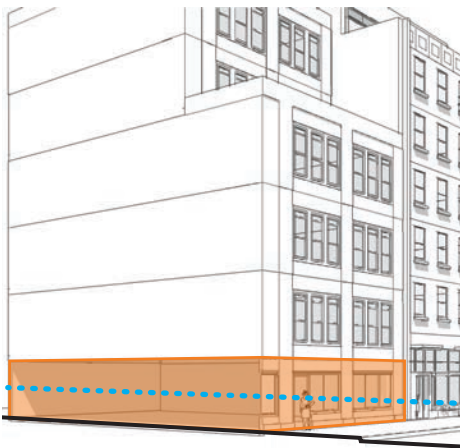
In addition to this floor area exemption, the 2013 Flood Text also included extra floor area incentives to encourage existing buildings to floodproof, independent of the *DFE* level. As an example, *flood-resistant construction standards* require the ground floor of residential buildings to be *wet-floodproofed*, which restricts their use to parking, storage and/or building access. While accessory parking is generally not counted towards zoning floor area throughout the city, spaces used for storage or building access are typically included. If these rules were not modified, they would penalize building owners and result in the reduction of available floor area. Therefore, the 2013 Flood Text amended the NYC Zoning Resolution to allow all existing residential structures to exempt the ground floor

from floor area calculations, if the space is *wet-floodproofed*. Additionally, the 2013 Flood Text allows existing non-residential uses that are *dry-floodproofed* to be exempted from floor area calculations (up to 10,000 square feet) to incentivize this costly measure. Indeed, one of the great benefits of *dry-floodproofing* ground floors is that it allows active uses to be kept at grade. However, this provision has not been utilized because of the high cost of *dry-floodproofing*, but also due to existing restrictions that limit the use of the relocated space, which could help offset the cost of the investment.

Zoning for Coastal Flood Resiliency would recalibrate these various floor area exemptions to: (a) continue to incentivize buildings to floodproof without giving away extensive amounts of extra floor area, (b) encourage uses to be kept at the street level, and (c) if uses are elevated, encourage buildings to provide internal access. To accomplish these three aims, spaces that are *wet-floodproofed*, in both new and existing buildings, would be exempted from floor area calculations, as these spaces would only be used for parking, storage and building access, as required by *flood-resistant construction standards*.

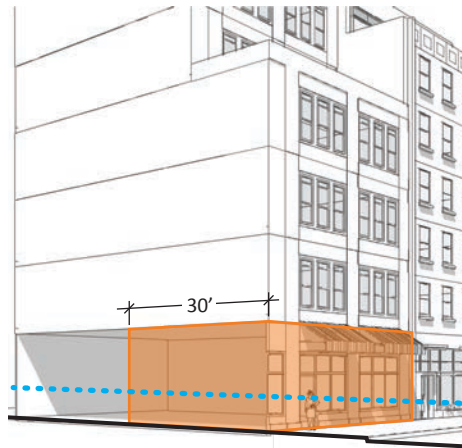
This floor area allowance would be offered in all zoning districts, to help incentivize internal access at grade, while encouraging new and existing buildings to elevate living spaces well above the *DFE*. Furthermore, the project would allow a small floor area incentive for active uses to be kept at grade and *dry-floodproofed*. This would be achieved by exempting the first 30 feet of the floor space as measured from the street wall of the building, when facing primary streets as defined by zoning, since these are the areas in which retail continuity is key for the success of the street. This allowance would continue to incentivize buildings to *dry-floodproof*, as opposed to elevating active uses. Also, to ensure quality ground floors, this flood-area exemption would come with design controls, such as transparency requirements that meet *dry-floodproofing* regulations, and the condition that the ground floor be at least 13-feet high. This incentive would encourage well-designed commercial and community facility uses to be kept at grade, helping enhance the streetscape experience and retail continuity. Spaces that are exempted from floor area would not count towards parking calculations, as many buildings would face difficulties in fitting the extra parking spots that would otherwise be required.

While Zoning for Coastal Flood Resiliency would provide floor area incentives for building owners to take future risk into account and to provide a more accessible design, others may still decide to simply elevate the first floor of the building to the *DFE*. To encourage access to be designed internally in those situations, Zoning for Coastal Flood Resiliency would continue to allow areas used for internal ramps and stairs to be exempted from floor area calculations. While this allowance would at least help incentivize the location of the main building access at the sidewalk level, unfortunately, buildings that elevate the



**2013 Flood Text**

Floor area exemption for ground floors that have more than 50% of the ground floor height below the *DFE*



**Zoning for Coastal Flood Resiliency**

Floor area exemption for the first 30 feet of the ground floor, if dry-floodproofed, located at grade, and with a floor-to-ceiling height of at least 13 feet



first occupiable floor to the *DFE* may still create blank walls at the sidewalk level due to the absence of design controls in the zoning framework. Blank walls can detract from pedestrian-oriented commercial streets or from the character of residential neighborhoods. To tackle this issue, the 2013 Flood Text and 2015 Recovery Text set forth design regulations, in addition to those already required by underlying zoning rules. As an example, buildings that are elevated or that otherwise increase the height of the building's street wall must meet requirements that depend on the building's use and the level of the first occupiable floor. For instance, single-

and two-family homes that elevate their first occupiable floor at or above five feet must either raise and plant the front yard, design a porch in front of the building, or design a stair turn and install planters to help alleviate blank walls. On the other hand, multi-family buildings with the lowest occupiable floor at or above five feet simply have to install planters. However, commercial uses that are elevated to the *DFE* currently do not have to comply with any extra design requirements (only if the *DFE* exceeds 10 feet above grade). The anomalous result is that existing design requirements are somewhat extensive to single- and two-family

homes, yet do not require the same level of design enhancements for multi-family buildings and commercial structures.

Zoning for Coastal Flood Resiliency would improve upon these existing streetscape regulations by extending design requirements in the *floodplain* to all residential, commercial, mixed-use buildings as well as buildings containing community facilities. These improvements would help attenuate potential blank walls at the street level, and also alleviate the additional height caused by resiliency needs. The proposed rules would provide a wider range of options to better accommodate different neighborhood contexts, lot conditions and ground-floor uses. For example, elevated commercial uses would be able to choose among several options that help mitigate blank walls, such as changes to the building's façade (fenestration and articulation), or elements that can be placed at the sidewalk level (planters or street furniture). As another example, row-houses would be able to provide elevated porches, balconies or bay windows to help soften taller facades. Single-family homes on shallow lots would be able to provide stairs at the side yard as opposed to the front yard, to help reduce the number of obstructions close to the sidewalk. These design options would help activate the streetscape of residential and commercial streets in the *floodplain*. Moreover, these regulations would encourage buildings to set back top stories or provide lower ridge lines to assist in mitigating the additional height created by resiliency needs.

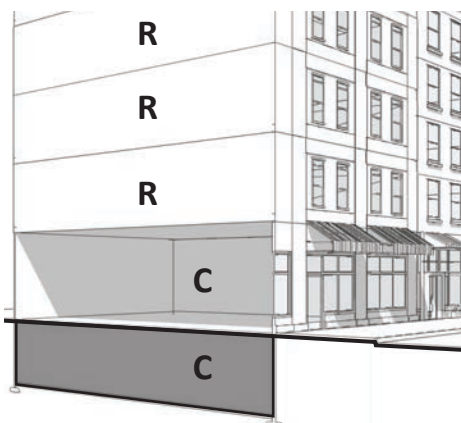
Lastly, Zoning for Coastal Flood Resiliency would modify use regulations for mixed-use buildings to provide more flexibility for the placement of commercial uses, such as storage space for businesses. Underlying rules for low and medium-density commercial districts currently



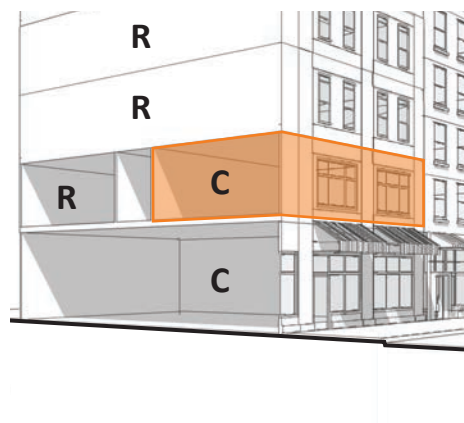
**2013 Flood Text**  
Few design options to help mitigate potential blank walls



**Zoning for Coastal Flood Resiliency**  
Wider range of design options to make the streetscape more inviting while mitigating additional height



**Underlying Zoning**  
Commercial uses are limited to the ground-floor in mixed-use buildings in certain commercial corridors



**Zoning for Coastal Flood Resiliency**  
Commercial uses can be located within the second story in mixed-use buildings above the BFE in all commercial corridors



## Goal 3 - Allow for adaptation over time through partial resiliency strategies

limit commercial uses to the first story in mixed-use structures. Therefore, many existing buildings rely on spaces below grade to locate parts of their operations. Considering the high cost and technical difficulties in providing *dry-floodproofed* below-grade cellars in the *floodplain*, this flexibility would allow existing and new buildings to provide commercial uses on the second story, as a design option for mixed-use structures. However, the space within the second floor would still be counted towards floor area calculations and generate parking requirements.

### Special Conditions

Zoning for Coastal Flood Resiliency recommends modifications to existing special permits that are granted by the Board of Standards and Appeals (BSA) to facilitate resiliency investments in unique conditions.

While Zoning for Coastal Flood Resiliency would increase flexibility to allow buildings to meet *flood-resistant construction standards* as-of-right without needing to pursue special permits, there will still be instances in which these rules would not be sufficient to address specific needs. Examples of this situation may include buildings built prior to zoning regulations that currently exceed height limits or maximum floor area allowances, or that do not currently comply with parking requirements. While the 2013 Flood Text allowed buildings to pursue the BSA Resiliency Special Permit to be able to meet *flood-resistant construction standards*, these rules were found to be insufficient. For example, the BSA cannot currently modify height allowances beyond 10% or 10 feet (whichever is less) above what is permitted by the underlying zoning district. In districts with a height limit of 35 feet (common in most low-density residence districts), this rule allows only 3.5 feet of additional

height for extenuating circumstances. Additionally, parking and floor area rules cannot be modified. These regulations hindered many buildings from meeting *flood-resistant construction standards*. Therefore, Zoning for Coastal Flood Resiliency would amend the BSA Resiliency Special Permit to allow the BSA to modify a wider range of zoning regulations to assist buildings in meeting *flood-resistant construction standards*, including limited height (10% or 10 feet whichever is more), floor area, and parking, in addition to yards and setbacks, permitted obstructions and design regulations. To use this special permit, the applicant would still need to demonstrate that there would be a practical difficulty in complying with the *flood-resistant construction standards* without such modifications.

Additionally, Zoning for Coastal Flood Resiliency would create a BSA special permit for buildings located within residence districts to be able to use the ground-floor level of the building for professional offices, if the space is *dry-floodproofed* according to *flood-resistant construction standards*, and if the BSA finds that the use is consistent with the surrounding neighborhood's character. This allowance would provide a greater range of floodproofing options to buildings that today are only used as residential structures, considering how some structures face difficulties to *wet-floodproof* the ground floor. This framework can also benefit the streetscape of residential streets, as it allows for use options that go beyond parking, storage and building access, since these are currently the only uses that are allowed within *wet-floodproofed* ground floors.

Zoning for Coastal Flood Resiliency should include new zoning allowances to assist building owners who wish to invest proactively in small changes that help improve their buildings' resiliency. These provisions would be optional and, when utilized, would not require the entire building to fully comply with *flood-resistant construction standards*. These partial resiliency strategies would particularly assist industrial, multi-family and commercial buildings to gradually incorporate resiliency measures, as those face significant cost and regulatory hurdles to fully meet *flood-resistant construction standards*. In the long-term, buildings will be able to make partial steps towards ultimately meeting or exceeding *flood-resistant construction standards*.

Zoning for Coastal Flood Resiliency would make changes to permitted obstruction rules and floor area regulations, to make it easier for building owners to relocate or otherwise floodproof their buildings' mechanical systems. The 2013 Flood Text already provided certain flexibility for buildings to incorporate partial resiliency measures. However, there are instances in which the existing temporary rules have been found to be insufficient. For example, current rules allow mechanical systems to be relocated as permitted obstructions from basements and cellars to either the bulkhead, required rear yards or open space, or other locations within the building. Underlying zoning rules generally allow the space used for mechanical equipment to be discounted from floor area calculations. However, this allowance is limited to the space that is physically occupied by the mechanical equipment itself, in addition to the space directly adjacent to the equipment as required by the manufacturer. If the room used to store this equipment requires extra space for access, that additional area would be counted towards floor area calculations.

This poses challenges for buildings that do not have extra zoning floor area available. Similarly, in many instances, existing residential campuses may need to construct an entirely new structure to house all the mechanical, electrical and plumbing (MEP) equipment. This option is often hindered by underlying zoning restrictions that require minimum distances between buildings, as well as floor area regulations in instances in which the property already meets its maximum floor area allowance. Additionally, this measure is currently complicated by extra regulations for properties located in waterfront blocks as defined in the NYC Zoning Resolution. Lastly, back-up systems such as emergency generators are generally not considered permitted obstructions in yards and open space, since the 2013 Flood Text amendment only provided this allowance to single- and two-family homes.

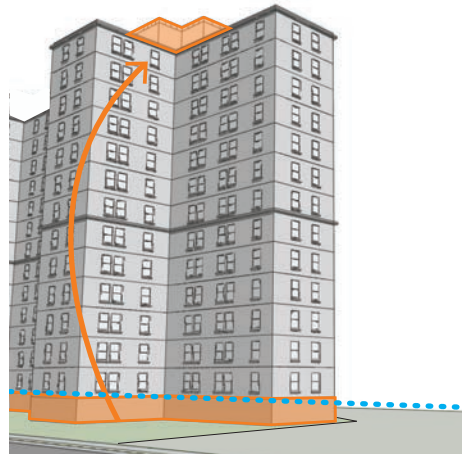
Zoning for Coastal Flood Resiliency would improve upon these existing provisions by allowing all MEP equipment to be in the building bulkhead, as a permitted obstruction on required rear yards and open space, or within the building. When placed outside of the building, design requirements would ensure that the equipment is screened from view. When placed within the building, floor area rules would also allow spaces used to access the MEP room and areas used for the storage of flood panels to be exempted from floor area calculations. In this way, Zoning for Coastal Flood Resiliency would not prevent existing buildings from relocating equipment that is often placed within cellars (and therefore not counted towards floor area) above the DFE. In addition, it would modify minimum distance between building requirements to allow more flexibility for the construction of MEP buildings, facilitating new utility structures on larger campus-style housing sites. Lastly,

it would introduce flexibility to power systems, such as emergency generators, allowing them to encroach on side and rear yards and open space on a citywide basis for all building types, considering that needs go beyond low-density homes, and can assist buildings beyond flood-related risk.

Zoning for Coastal Flood Resiliency would also allow up to 500 square feet of floor area to be added to existing heavy commercial and manufacturing buildings. This recommendation came from the [Resilient Industry](#) report, issued in 2018, which recognized the limitations of retrofitting existing industrial uses, especially those in districts with limited floor area allowances. Aside from facilitating the relocation of valuable

equipment to above the DFE, this minor floor area allowance would also provide businesses the option of elevating important spaces, such as offices or storage rooms, above the flood elevation, within either a second story or a mezzanine.

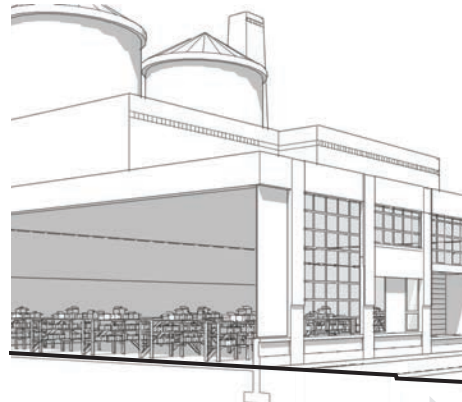
Lastly, the 2013 Flood Text allowed several flood protection measures as permitted obstructions, including flood barriers, retaining walls and raised yards. However, some flood control measures—such as structured berms and floodgates, which are common flood control measures on large campus sites—are currently not listed. Zoning for Coastal Flood Resiliency would update these 2013 provisions to include these measures.



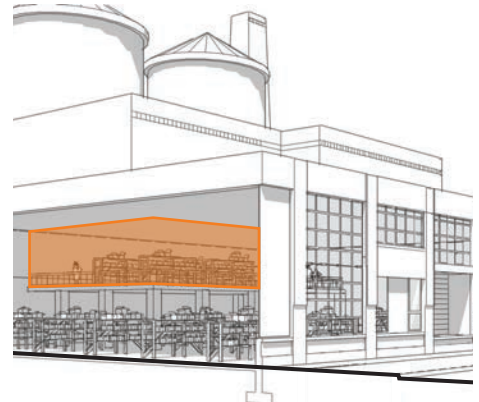
**2013 Flood Text**  
Additional flexibility with permitted obstructions facilitate mechanical equipment to be relocated to the roof of buildings



**Zoning for Coastal Flood Resiliency**  
Additional flexibility to facilitate mechanical, electrical and plumbing equipment to be placed on the roof or in a separate structure



**Underlying Zoning**  
Existing industrial buildings may not have enough floor area to elevate important equipment/spaces above the BFE



**Zoning for Coastal Flood Resiliency**  
Floor area can be exempted to facilitate the placement of important equipment/spaces above the BFE within small mezzanines

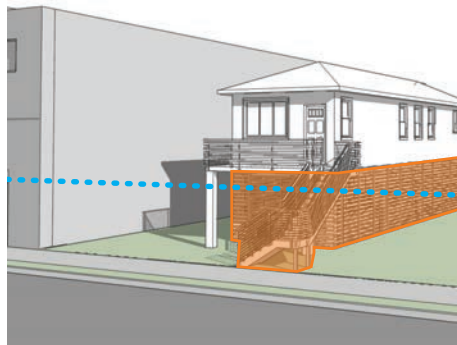
## Goal 4 - Facilitate future storm recovery by removing regulatory obstacles

Zoning for Coastal Flood Resiliency should incorporate lessons learned from the Hurricane Sandy recovery process by including a set of emergency provisions that could become available after a future storm or other catastrophe. The need to adopt temporary zoning rules (the 2013 Flood Text and the 2015 Recovery Text) on an emergency-basis after Sandy demonstrated that a lengthy process to update zoning regulations can present obstacles to the reconstruction of buildings damaged in a disaster.

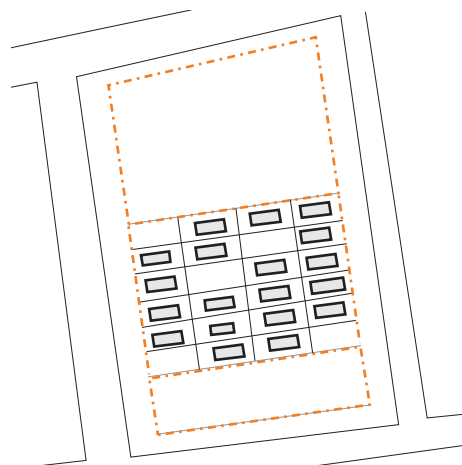
To expedite future recovery processes, Zoning for Coastal Flood Resiliency would establish provisions that would be adopted as part of the Zoning for Coastal Flood Resiliency text amendment, but would only be applicable when the State declares a state of emergency. Once declared, these rules could be triggered quickly through a City Planning Commission (CPC) authorization, which would follow a review process with compressed time frame. Zoning provisions would then become applicable within “Recovery Areas” as designated by the CPC, in consultation with the MOR, DOB and other relevant agencies. This framework would assist the City and building owners to rebuild or *retrofit* damaged structures in a more expeditious manner. These provisions would be optional for building owners undertaking reconstruction or *retrofit* work, but when used would require the building to fully comply with all related provisions pursuant to the Building Code, including *flood-resistant construction standards* when applicable.

These provisions would include certain special regulations that were included in the temporary text amendments. For example, the 2013 Flood Text provided reconstruction allowances for existing *non-conforming* uses and *non-complying* buildings, which were not permitted pursuant to the underlying zoning rules. These rules would become available as part of Zoning for

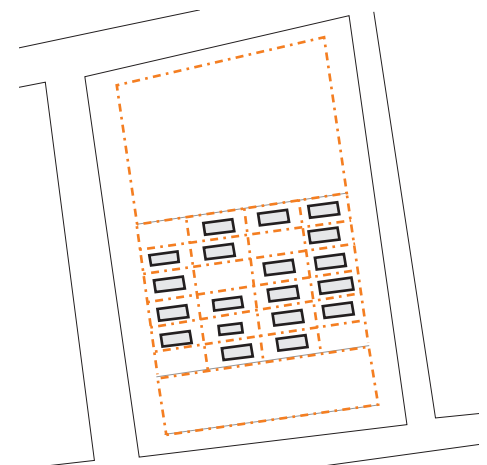
Coastal Flood Resiliency. In addition, Zoning for Coastal Flood Resiliency would include provisions from the 2015 Recovery Text that simplified the documentation process for obtaining DOB permits for the reconstruction or elevation of storm-damaged buildings. As an example, property owners would be able to provisionally consider their tax lot as their zoning lot to apply *building envelope* rules, so they could more quickly reconstruct damaged structures. These, and other emergency rules, would be available for a certain timeframe after the event so buildings could complete reconstruction.



**Zoning for Coastal Flood Resiliency**  
Reconstruction of a damaged non-conforming building after a future-disaster



**2013 Flood Text**  
Provisions apply to zoning lots



**Zoning for Coastal Flood Resiliency**  
Provisions can be applied to tax lots as if they are zoning lots



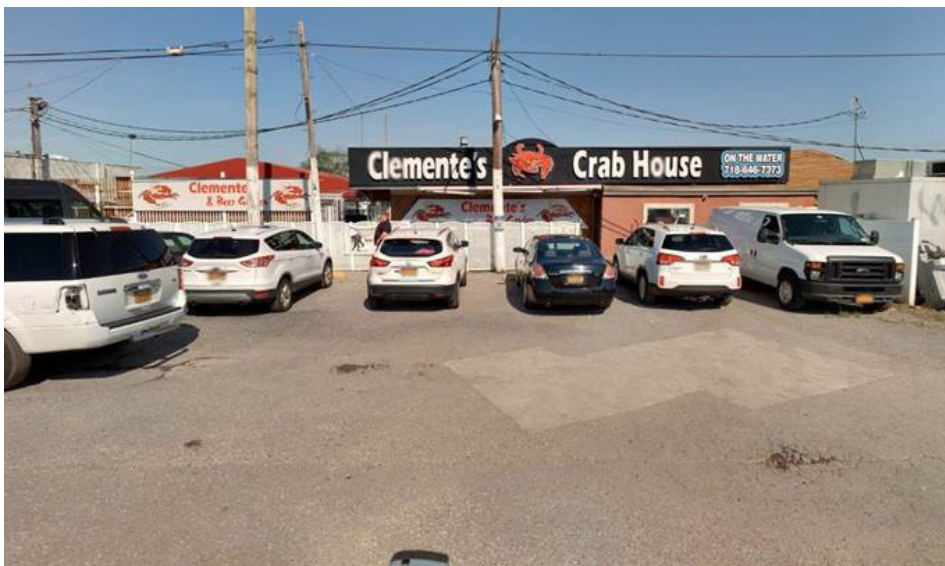
## Other Citywide Zoning Recommendations

### Special Permit for Restaurants in Waterfront Recreation Districts

DCP recommends that Zoning for Coastal Flood Resiliency includes modifications to the existing BSA special permit for eating or drinking establishments that are located within Waterfront Recreation Districts (C3, C3A). These areas are mapped along the city's waterfront in a limited number of places, generally allowing commercial uses related to boating and other waterfront recreational activities, in addition to the full range of residential and community facility uses. Restaurants are currently only allowed in these areas through a BSA special permit, which must be renewed every five years. To reduce the time and cost burden of getting repeated BSA approvals, Zoning for Coastal Flood Resiliency would extend the special permit term from five to 10 years for new applicants. Additionally, for existing establishments that are pursuing renewals, the term would be established by the BSA. These changes would allow building owners to focus their investment in resiliency improvements and other partial resiliency strategies, helping decrease existing vulnerabilities, as most buildings are located at the waterfront and are therefore at high risk of being flooded.

### Vulnerable Uses

Concerns have been raised about adding vulnerable populations, such as those living in nursing homes, to areas at high risk of flooding. Therefore, DCP is examining whether Zoning for Coastal Flood Resiliency should include measures that address these concerns. An option would be to limit the construction of new nursing homes in areas at high risk of flooding and in areas that face difficulties evacuating once there is a City mandate to do so. DCP is seeking feedback from communities, City agencies and other stakeholders on this issue, while continuing to update the city's *floodplain* communities on this issue.



Waterfront Restaurant in C3 District  
Location: Brooklyn

# Summary Comparison Chart

## Underlying Zoning



GOAL 1

### General Applicability

Permanent regulations control which uses could be conducted on a given piece of property, while establishing limits on the *building envelope*.

- Apply to zoning lots located citywide (ZR 11-111).



GOAL 2

### Building Envelope

### Height Allowance

Underlying height regulations allow certain buildings to more closely achieve their fully permitted height within the *1% annual chance floodplain*.

- *Building envelopes* can be measured from:
  - The *BE* in zoning districts with height limits (ZR 12-10, Definition of Base Plane), or
  - Grade in all other zoning districts (ZR 23-00, 24-00, 33-00, 34-00, 35-00, 43-00).



GOAL 3

### Cottage Envelope

Underlying optional yard regulations facilitate the construction of buildings located on pre-existing substandard lots.

- Required yards can be modified as follows:
  - Side yards can be reduced for single- and two-family detached homes on lots narrower than the minimum lot width as required by the zoning district (to a minimum of five feet) (ZR 23-48).
  - Rear yards can be reduced for buildings on lots shallower than 70 feet in selected low-density districts and 90 feet in medium-high density districts (to a minimum of 10 feet) (ZR 23-52).



GOAL 4

### Existing Buildings

Underlying regulations allow existing *non-conforming* uses and *non-complying* buildings to stay in place but limit their reconstruction, enlargement or alteration.

- Existing non-complying buildings generally cannot be elevated, retrofitted or reconstructed to meet *flood-resistant construction standards*, as they cannot create new non-compliances to height and setback (ZR 54-31, 54-41).
- Existing non-conforming uses generally cannot be reconstructed, if demolished (ZR 52-531).

## 2013 Flood Text / 2015 Recovery Text

Temporary regulations facilitate buildings to incorporate resiliency improvements to fully meet *flood-resistant construction standards* while maintaining the same allowable *building envelope*.

- Apply to **buildings** where at least a portion is located within the **1% annual chance floodplain** (ZR 64-12)

Optional height regulations facilitate buildings to incorporate *flood-resistant construction standards*, while improving the utility of spaces below the *DFE*.

- *Building envelopes* can be measured from:
  - The *DFE* in all zoning districts (ZR 64-131), or
  - A *reference plane* placed at nine, 10 or 12 feet, depending on the building type and zoning district, if the BFE equals or exceeds 4 feet above grade and blank walls are mitigated (ZR 64-334, 64-335, 64-336)

Optional *building envelope* facilitates the reconstruction of homes located on pre-existing substandard lots in selected areas (Neighborhood Recovery Areas), and better reflects the scale of traditional cottage buildings.

- Required yards can be modified as follows:
  - Side yards can be reduced for single- and two-family detached homes on lots narrower than the minimum lot width as required by the zoning district (to a minimum of three feet) (ZR 64-A352)
  - Rear yards can be reduced for **single- and two-family detached homes** on lots shallower than 95 feet (to a minimum of 10 feet) (ZR 64-A353)
- Yard flexibility comes with a lower height limit than required by the underlying zoning district (ZR 64-A30, 64-A36)

Regulations allow the reconstruction, enlargement or alteration of **certain** existing *non-conforming* uses and *non-complying* buildings to meet *flood-resistant construction standards*.

- Existing *non-complying* buildings can be elevated or reconstructed to the *DFE*, while creating new height and setback non-compliances (ZR 64-721, 64-722, 64-723, 64-724, 64-A20, 64-A21)
- Existing *non-conforming* single- and two-family homes, except homes in manufacturing or heavy commercial districts, can be rebuilt to *DFE* (ZR 64-711, 64-712)

## Zoning for Coastal Flood Resiliency

Permanent regulations would facilitate buildings to proactively incorporate resiliency improvements to fully meet or exceed *flood-resistant construction standards* while maintaining the same allowable *building envelope*.

- Apply to **zoning lots** where at least a portion is located within the **1% annual chance floodplain** or within the **0.2% annual chance floodplain**

Optional height regulations would facilitate buildings to incorporate **sea level rise projections** when meeting *flood-resistant construction standards*, while improving the utility of spaces below the *DFE*.

- *Building envelopes* would be measured from:
  - The *DFE* in all zoning districts, or
  - A *reference plane* placed anywhere between grade and 10 feet (within the **1% annual chance floodplain**), or five feet (within the **0.2% annual chance floodplain**), if the building is designed to be flood resistant in the long-term and provides an inviting streetscape

Optional *building envelope* would facilitate the construction, reconstruction, and *retrofit* of homes located on pre-existing substandard lots in **all areas**, and better reflect the scale of traditional cottage buildings.

- Required yards would be able to be modified as follows:
  - Side yards would be reduced for single- and two-family detached homes on lots narrower than **30 feet** or the minimum lot width as required by the zoning district (to a minimum of three feet)
  - Rear yards would be reduced for single- and two-family detached homes in lots shallower than 95 feet (to a minimum of 10 feet)
  - **Front yards would be reduced by allowing buildings to meet front yards and setbacks of neighboring buildings**
- Yard flexibility would come with a lower height limit than required by the underlying zoning district

Regulations would allow the reconstruction, enlargement or alteration of a **greater range** of existing *non-conforming* uses and *non-complying* buildings to meet or exceed *flood-resistant construction standards*.

- Existing *non-complying* buildings would be able to be elevated, *retrofitted* or reconstructed to or above the *DFE*, while creating new height and setback non-compliances and if the **height does not exceed underlying maximum height as measured from the *DFE* (1% annual chance floodplain), or grade (0.2% annual chance floodplain)**
- Existing *non-conforming* uses, including residential buildings in manufacturing or heavy commercial districts, would be able to be *retrofitted* or generally rebuilt to or **above the *DFE***



# Summary Comparison Chart

## Underlying Zoning



GOAL 1



GOAL 2



GOAL 3



GOAL 4

### Building Design

#### Floor Area Exemptions

Underlying floor area regulations exempt floor area for buildings located within the 1% annual chance floodplain under limited conditions.

Floor area can be exempted if:

- More than one-half of the floor-to-ceiling height is located
  - below the *BFE* in zoning districts with height limits (ZR 12-10, Definition of Cellar)

#### Streetscape Regulations

Underlying streetscape regulations promote walkability across the city's residential and commercial areas.

- Ground floor use, street wall, and planting rules apply for residential and commercial buildings, and community facilities (ZR 26-00, 37-00)

#### Use Regulations

Supplemental use regulations ensure that buildings contribute to the streetscape of the area.

- Commercial uses are limited to the ground-floor in mixed-use buildings located within low and medium-density commercial districts (ZR 32-421)

### Special Conditions

#### Existing Buildings

No applicable provisions.

#### Ground-floor Use Special Permit

No applicable provisions.

## 2013 Flood Text / 2015 Recovery Text

## Zoning for Coastal Flood Resiliency

Floor area regulations exempt floor area to **encourage new and existing buildings to meet flood-resistant construction standards.**

Floor area can be exempted if:

- More than one-half of the floor-to-ceiling height is located below the *DFE* in all zoning districts (ZR 64-11, Definition of Cellar)
  - The ground-floor of existing buildings is *wet-floodproofed* (ZR 64-411)

The ground-floor of existing buildings in selected commercial districts is *dry-floodproofed* (ZR 64-411)

Streetscape regulations promote walkability across the city's 1% *annual chance floodplain* by helping mitigate potential blank walls.

- Additional streetscape regulations are required for:
    - Residential buildings and community facilities if the level of the first occupiable floor equals or exceeds five feet or the *DFE* equals or exceeds 10 feet (ZR 64-61, 64-62, 64-63)
- Other non-residential buildings in areas where the *DFE* equals or exceeds 10 feet (ZR 64-64)

No applicable provisions.

Discretionary path allows existing buildings that need extra zoning flexibility to meet *flood-resistant construction standards* when *retrofitting* or reconstructing

- The BSA can modify design requirements, height (10% or 10 feet whichever is less), and other bulk regulations, except floor area rules (ZR 64-92)

No applicable provisions.

Floor area regulations would exempt floor area to encourage new and existing buildings to meet or exceed *flood-resistant construction standards*, while ensuring quality ground-floors that are kept at street level.

- Floor area would be exempted if:
  - The ground-floor of new and existing buildings is wet-floodproofed
  - The first 30 feet of ground-floors of new and existing buildings in all commercial districts along primary streets, is *dry-floodproofed*, located at grade, and with a floor-to-ceiling height of least 13 feet

Streetscape regulations would promote walkability across the city's *floodplain* by ensuring an accessible design that makes the streetscape more inviting while mitigating additional height.

- Additional streetscape regulations are required for:
  - All buildings (except manufacturing buildings) at all *DFE* levels would be required to comply with streetscape regulations, by having access to a wider range of design options to better accommodate different contexts and building typologies

Supplemental use regulations would offer alternatives beyond *dry-floodproofed* cellars for businesses to locate commercial uses, especially accessory spaces

- Commercial uses would be able to be placed at the second story in mixed-use buildings located within all commercial districts

Discretionary path would allow existing buildings that need **additional** zoning flexibility to meet *flood-resistant construction standards* when *retrofitting* or reconstructing

- The BSA can modify design requirements, **parking**, height (10% or 10 feet whichever is more), and other bulk regulations, including floor area rules

Discretionary path to allow buildings extra floodproofing options, beyond *wet-floodproofing*, while encouraging a more active streetscape

- The BSA would allow buildings located within residence districts to use the ground-floor level of the building for professional offices, if the space is *dry-floodproofed*

# Summary Comparison Chart

## Underlying Zoning



GOAL 1



GOAL 2



GOAL 3



GOAL 4

Partial Resiliency Strategies

Emergency Rules

Mechanical Equipment

Flood Protection Measures

Existing Buildings

Documentation

Permitted obstruction and floor area regulations facilitate the placement of mechanical equipment within or outside of buildings.

- Space used to store mechanical equipment is not counted toward floor area calculations, with some exceptions in low-density residence districts (ZR 12-10, Definition of Floor Area)
- Permitted obstruction allowances are offered for mechanical equipment to be placed on roofs (ZR 23-62, 33-42)

No applicable provisions

Regulations limit the reconstruction of existing *non-conforming* uses and *non-complying* buildings.

Existing *non-conforming* uses and *non-complying* buildings generally cannot be reconstructed if damaged (ZR 52-531, 54-41)

No applicable provisions



Permitted obstruction and floor area regulations facilitate the placement of mechanical equipment **above the DFE, including emergency generators**, within or outside of buildings.

- Space used to store mechanical equipment is not counted towards floor area calculations, **within all zoning districts** (ZR 64-313)
- Extra permitted obstruction allowances are offered to mechanical equipment to be placed on roofs **or within rear yards** (ZR 64-322, 64-331, 64-332, 64-421, 64-432)
- Emergency generators can be installed as permitted obstructions on yards and open space on lots with single- or two-family homes (ZR 64-421, 64-A24, 64-A34)

Permitted obstruction and floor area regulations would facilitate the placement of **MEP equipment** above the **DFE**, including emergency generators within or outside of buildings, **including within separate MEP buildings**.

- Space used to store **MEP equipment, including access to the equipment**, would not be counted towards floor area calculations, within all zoning districts
- Extra permitted obstruction allowances would be offered to **MEP equipment** to be placed on roofs or within rear yards
- Emergency generators would be installed as permitted obstructions on yards and open space for **all lots located citywide**
- Extra flexibility with minimum distance between buildings would allow **MEP** to be located within separate buildings on large lots

Permitted obstruction regulations facilitate the implementation of site-scale flood protection measures.

- More flexible permitted obstruction rules allow flood barriers, retaining walls and raised yards to be installed (ZR 64-323)

Permitted obstruction regulations would facilitate the implementation of site-scale flood protection measures, **including on large sites**.

- More flexible permitted obstruction rules would allow flood barriers, retaining walls, raised yards, **berms and floodgates** to be installed

Regulations **facilitate** the reconstruction of existing *non-conforming* uses and *non-complying* buildings that were damaged by Hurricane Sandy.

- Existing *non-conforming* uses and *non-complying* buildings can be reconstructed if damaged (ZR 64-711, 64-721)

Regulations would facilitate the reconstruction of existing *non-complying* and/or *non-conforming* buildings that were **damaged by a future disaster in future recovery area**.

- Existing *non-conforming* uses and *non-complying* buildings would be able to be reconstructed if damaged

Regulations expedite the Hurricane Sandy recovery process in Neighborhood Recovery Areas.

- Simplified documentation process is available to single- and two-family homes that need to obtain DOB permits for the reconstruction or elevation of storm-damaged buildings (ZR 64-A02, 64-A11, 64-A12)

Regulations would expedite **future recovery processes in heavily damaged areas**.

- Simplified documentation process would be available to **all buildings** that need to obtain DOB permits for the reconstruction, elevation **or retrofit** of storm-damaged buildings



# OTHER RESILIENCY EFFORTS

## Local Zoning Recommendations

In addition to the proposed citywide zoning recommendations, DCP would pursue neighborhood-specific zoning changes in four neighborhoods that were recommended as part of DCP's [Resilient Neighborhoods Initiative](#). While many of the zoning recommendations from the 10 resilient neighborhood reports are being folded into Zoning for Coastal Flood Resiliency, there are resiliency issues in these areas that cannot be addressed through a citywide zoning text amendment. Therefore, local zoning actions are recommended to address unique conditions in these areas. Each neighborhood is summarized in the following pages. It is expected that these neighborhood-specific recommendations will travel in parallel with the citywide zoning text amendment through the public review process in 2019.





## Staten Island: New Dorp Beach

The New Dorp Beach bungalow colony is located between New Dorp Lane and Ebbitts Street, and between Cedar Grove Avenue and Roma Avenue. The area contains a high concentration of single- and two-family homes located on narrow and shallow lots along one-way streets. The area has poor drainage with few viable options for storm sewer infrastructure within the neighborhood. To more closely reflect the area's built form and reduce stress on the area's already strained infrastructure, a Special Coastal Risk District (SCRD) would be mapped to limit future density, by only allowing large lots to provide two-family homes. The SCRD would also limit building heights to 25 feet, as opposed to 35 feet currently allowed by the underlying zoning district. This height restriction would be measured above the *reference plane* as recommended by Zoning for Coastal Flood Resiliency in alignment with the cottage envelope. The lower height would best match the area's neighborhood character while enabling existing buildings to *retrofit*. Lastly, there are also small retail establishments along Cedar Grove Avenue and New Dorp Lane that are important to the economic vitality of the neighborhood, but that currently face zoning challenges when *retrofitting* to resiliency standards. The proposal would facilitate existing commercial uses to invest in resiliency improvements by requiring less stringent parking requirements that best align with the current conditions.

## Brooklyn: Gerritsen Beach

Gerritsen Beach is a low-lying residential community located along Plumb Beach Channel in southern Brooklyn. Originally developed as a neighborhood of summer bungalows, Gerritsen Beach is now built up with year-round homes, a local commercial corridor, and marina facilities. During Hurricane Sandy, the neighborhood was almost entirely inundated as the

tidal surge rose up to seven feet above grade. Less severe but more frequent storms also cause flooding to Gerritsen Beach's constrained roadways, with some streets as narrow as 15 feet. This area is proposed to be designated as a Special Coastal Risk District (SCRD) to limit future density, by allowing only large lots to provide two-family homes. The SCRD would also limit building heights to 25 feet, as opposed to 35 feet currently allowed by the underlying zoning district. This height restriction would be measured above the *reference*

*plane* as recommended by Zoning for Coastal Flood Resiliency in alignment with the cottage envelope. This lower height would best match the area's neighborhood character while enabling existing buildings to *retrofit*. In addition, Gerritsen Beach's residential and waterfront areas would be remapped to more contextual districts, to prevent the construction of attached buildings, as those districts do not reflect the existing character of the area and are more difficult to *retrofit* in the future. Additionally, the proposal would



New Dorp Beach, Staten Island



Gerritsen Beach, Brooklyn



expand use options for commercial establishments at Gerritsen Avenue to allow for a wider range of local services, which are key in providing support year-round for the community.

### Brooklyn: Sheepshead Bay

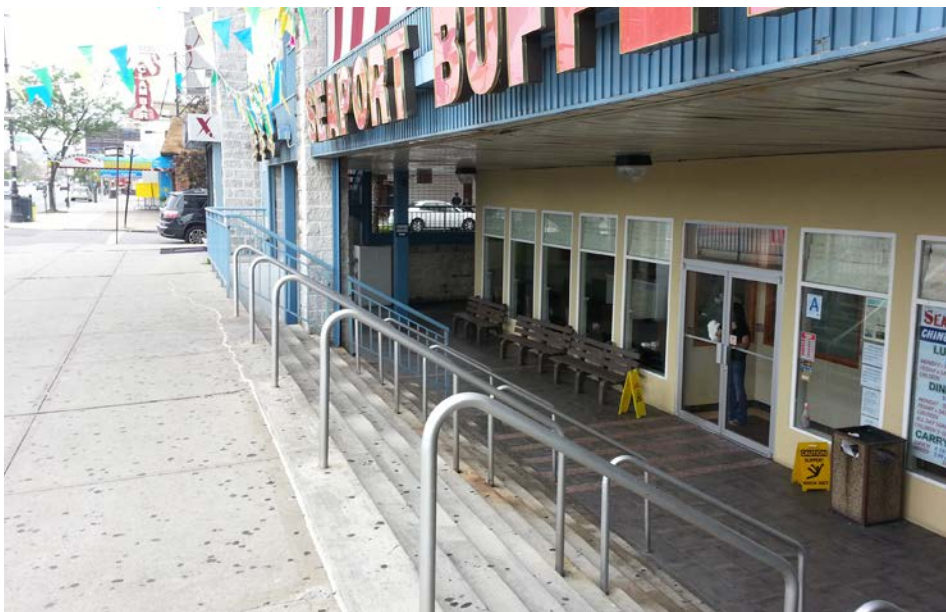
Sheepshead Bay is a mixed-use neighborhood with a working and recreational waterfront, commercial corridors, and residential areas that have a wide range of building types, from small bungalows to large apartment buildings. During Hurricane Sandy,

small businesses in the area experienced flood levels as high as six feet above grade, resulting in their temporary closure. Within the Special Sheepshead Bay District (SSBD), businesses located in cellar spaces below grade experienced severe flooding and, in some cases, have been unable to return following Sandy. In consultation with the community, DCP proposes to update the existing SSBD so that regulations align with Zoning for Coastal Flood Resiliency to ensure that buildings are encouraged to floodproof in the long term. Additionally, public

space regulations in the SSBD would also be updated to include requirements for resiliency, such as the prohibition of below-grade plazas, and to promote the creation of well-designed, inviting spaces that support the commercial vibrancy of Emmons Avenue.

### Queens: Old Howard Beach

Old Howard Beach is a waterfront neighborhood with predominantly detached houses, an active commercial corridor, and a community that enjoys easy access to the waterfront. During Sandy, flooding inundated basements in residential buildings and ground floor commercial uses. Old Howard Beach is characterized by being within a low-lying area, with *BFEs* ranging from four to six feet above grade, and analysis suggesting that projected sea level rise will affect the neighborhood primarily through tidal inundation in low-lying streets. As sea levels rise, Old Howard Beach is projected to see a gradual increase in vulnerability to flooding from daily and monthly spring high tides. Portions of Old Howard Beach are recommended to be rezoned to limit permitted residential uses to one- and two-family detached houses ensuring flexibility to *retrofit* existing buildings and, as may be necessary, elevate to the *DFE*. Building to these higher *flood-resistant construction standards* will reduce vulnerability to future floods.



Sheepshead Bay, Brooklyn



Old Howard Beach, Queens

## Other City Initiatives

Zoning for Coastal Flood Resiliency should greatly advance the city's resiliency by making it easier for properties to be *retrofitted* to resiliency standards, and enable new construction to be designed with long-term flood risk in mind. In addition to these zoning changes, additional programs and policies are necessary to make neighborhoods more resilient over time. DCP will continue to work with agency partners and others to advance these priorities.

### **Develop additional tools to address the need for ongoing financial assistance for retrofits**

The City is exploring a variety of potential tools to lower the costs of *retrofitting*, such as waiving fees and providing tax relief, as well as potential loan or grant programs. DCP will continue to coordinate with MOR, HRO, Housing Preservation and Development (HPD), and other agencies to advance this work. In addition, HPD is exploring how to incorporate resiliency into affordable housing preservation programs, such as accounting for the costs of flood insurance in its underwriting and seeking to implement resiliency improvements where feasible.

### **Provide on-going education and counseling services on flood risk and flood insurance**

The City has partnered with the Governor's Office of Storm Recovery, the Center for New York City Neighborhoods, and Enterprise Community Partners to provide counseling services to increase awareness of flood risk, flood insurance, and mitigation actions. Through the website [Flood Help NY](#), funded through the New York Governor's Office of Storm Recovery and the State's New York Rising Community Reconstruction program, New Yorkers can learn about their flood risk by seeing if they are in the *floodplain* and getting a free

flood insurance estimate. In addition, property owners in select areas can receive a free resiliency audit, which includes a flood elevation certificate. For many homeowners, an accurate and updated flood elevation certificate can result in reduced flood insurance premiums. DCP is working with MOR, HRO, and HPD to provide technical assistance through these programs, and to expand their reach. In addition, DCP has developed a [Resiliency FAQ newsletter](#) to increase awareness of flood risk and resiliency strategies. The newsletter is shared online and is also sent in hard copy form to every Community Board.

### **Continue to advocate for National Flood Insurance Program reform**

The City has aggressively advocated for federal flood insurance reforms to make flood insurance affordable to New Yorkers and to address the ways in which the program does not support densely built environment like New York City. Flood insurance annual premiums average \$2,400 within the high-risk flood areas of the effective 2007 FIRMs, and \$1,780 within the high-risk areas of the *PFIRMs*.<sup>7</sup> Given prior Congressional reforms, and the expected expansion of the *floodplain* through FEMA's map update process, these premiums are expected to continue increasing over time. The rising costs of flood insurance will affect homeowners in the *floodplain*, over a third of whom are already housing-cost burdened.<sup>8</sup> A study commissioned by the City determined that as flood insurance becomes even more difficult to afford with NFIP continuing to phase out subsidies, it could reduce the resilience of communities to flood events.

While *retrofitting* homes to federal standards can greatly reduce flood insurance premiums and preserve home values, many buildings in the

city are hard to *retrofit*. For instance, although elevation is the primary strategy for making a home flood resistant per FEMA guidance, over half of the residential buildings in the city's *floodplain* are attached or semi-detached and therefore have shared structural walls significantly complicating the ability to elevate them. The City is advocating for a variety of changes to the NFIP, including permitting partial resiliency strategies, such as elevation of mechanical systems, to count towards premium reductions. Such partial mitigations would create new pathways for reducing insurance premiums and flood risk for homes that cannot be easily elevated. In addition, the City has called for the federal government to institute a means-tested voucher program for low-income homeowners to assist them in affording coverage. While these changes will require action by Congress, the City will continue to advocate for these measures.

### **Work with FEMA to develop forward-looking flood maps**

FEMA and the City are working to develop forward-looking flood maps that consider sea level rise projections to be used for planning and building purposes. FEMA's *FIRMs* have not been significantly updated since 1983. FEMA began the process to update the maps prior to Sandy, and released *PFIRMs* as part of the update process in 2013. The City filed a technical appeal of the *PFIRMs* that, upon analysis, showed that FEMA's mapping process contained significant errors in the modeling of the *floodplain*. FEMA accepted the appeal in 2016, and began working with the City to develop new *FIRMs*. These new maps will be used for insurance purposes, as they will more accurately reflect current risk of 100-year storms. However, FEMA and the City agreed that there was a need to develop a separate map that considers sea level rise, which would be better suited for planning purposes. This ground-breaking step will be based on the best-available science, as guided

<sup>7</sup> FEMA NFIP Active Policy File, January 2019

<sup>8</sup> American Community Survey (ACS) 2013-2017 5-year estimates.



by the NPCC, and will result in a new set of flood maps for building purposes that better account for the future risk of sea level rise and coastal storm surge.

### **Construction Codes and Revision Cycle**

The NYC Construction Codes protect public health, safety, general welfare, and the environment by establishing minimum standards for the design, construction, and occupancy of buildings. To ensure the City's construction regulations are up-to-date, every three years the City's Construction Codes must be updated based on the latest version of the International Code Council Codes (I-Codes). The Construction Code Revision Cycle is primarily intended to: introduce measures to update the 2015 I-Codes with City modifications; adopt innovative new technologies by incorporating the latest national standards; improve construction safety; clarify the existing text; and to correct errors, typos and inconsistencies. To aid the process, DOB has organized a series of Committees to review the technical and administrative provisions of the Codes.

Included in this work is a review of Appendix G of the NYC Building Code, which specifically addresses *flood-resistant construction standards*. The Flood-Resistant Construction Advisory Committee for this revision cycle is tasked with reviewing the latest codes and standards related to management of flood hazard areas. The committee will consider a wide range of provisions to improve the design, construction, enforcement and administration of flood regulations for buildings and other structures located in the city's *floodplain*.

### **Continue to implement additional resiliency investments**

OneNYC, which includes the City's plan for resiliency, calls for multiple lines of defense from flooding and other

climate hazards. In addition to Zoning for Coastal Flood Resiliency, many investments in coastal protection, drainage improvements, and property acquisitions are ongoing and necessary to advance a more resilient city. For instance, since 2015, the City has invested or leveraged over \$3.7 billion for coastal protection projects and over \$11.6 billion for the strengthening and adaptation of the region's infrastructure.<sup>9</sup> Furthermore, the Department of Environmental Protection (DEP) has been working on drainage improvement projects, creating resources on [storm water management](#) and administering an ongoing [Green Infrastructure Grant Program](#). Lastly, some homeowners in the Build It Back program opted to have their properties acquired. Therefore, the City is working to transfer those sites to agencies to be maintained as open space and drainage improvements, or be reconstructed as resilient housing.

### **Reduce risk through climate change mitigation**

As the projections for sea level rise demonstrate, the City's vulnerability to coastal flooding is likely to increase. While the City is acting now to adapt to these changes, it is also important to work towards reducing greenhouse gas emissions to reduce the potential long-term effects of sea level rise. Greenhouse gas emissions in the city are down 15 percent since 2005, and the City has committed to an overall 80 percent reduction by 2050. To meet this target, the City, led by the NYC Mayor's Office of Sustainability, has developed local laws to require energy efficiency standards in large buildings and public buildings, as well as programs to support solar power, increase the use of electrical vehicles, and reduce the amount of waste generated in the city. These efforts are also part of the OneNYC, the City's strategic plan that was recently released.

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<sup>9</sup> OneNYC: [onenyc.cityofnewyork.us/](https://onenyc.cityofnewyork.us/)



## **NYC Department of City Planning**

Marisa Lago, Director

Anita Laremont, Executive Director

Howard Slatkin, Deputy Director, Strategic Planning

Michael Marrella, Director, Waterfront and Open Space Division

Brendan Pillar, Deputy Director, Waterfront and Open Space Division

Beth Lebowitz, Director, Zoning Division

Frank Ruchala Jr, Deputy Director, Zoning Division

### **Document Team**

Manuela Powidayko, Project Manager

Jean You, Jesse Hirakawa, Lucrecia Montemayor, Mary Kimball

### **Advisory Team**

Allan Zaretsky, Annabelle Meunier, Christopher Wassif, Janine Gaylard, Jennifer Gravel,  
John Mangin, Laura Kenny

### **Reviewers**

Aleena Farishta, Catherine Ferrara, Christopher Hayner, Eri Furusawa, Hallah Saleh,  
Lara Merida, Melissa Grace, Paul Power, Rafael Berges, Sera Tolgay

## **NYC Agencies**

NYC Board of Standards and Appeals (BSA): Margery Perlmutter, Shampa Chanda,  
Gjela Prenga

NYC Department of Buildings (DOB): Joseph Ackroyd, Chintan Desai, David Hendershot,  
Hao Sun, Peggy W. Liu, Tina Mathew, Wendy Wan

NYC Emergency Management (NYCEM): Heather Roiter

NYC Housing Authority (NYCHA): Joy Sinderbrand, Jessica Mauricio

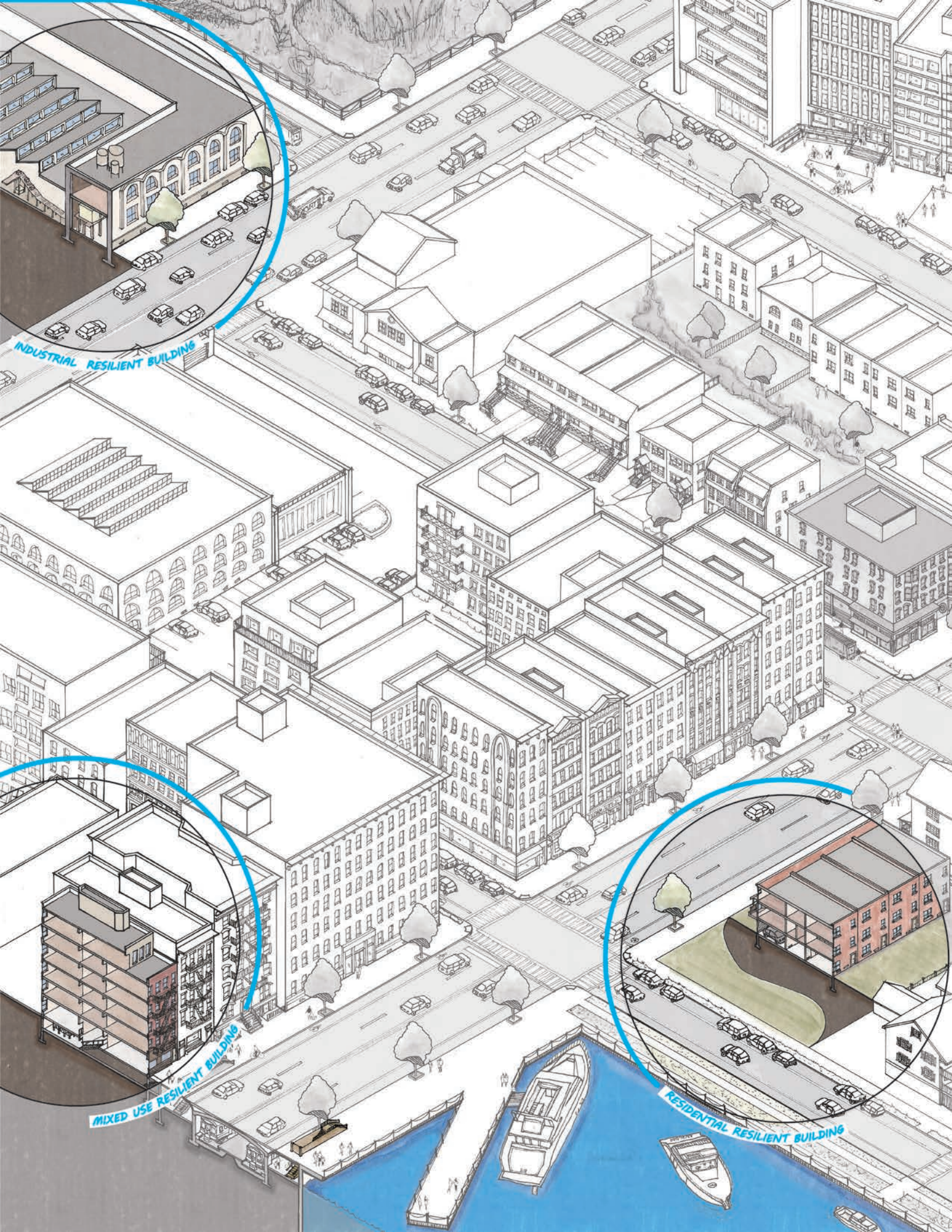
NYC Housing Preservation and Development (HPD): Deborah Morris, Katherine Gloede

NYC Mayor's Office Housing Recovery Operations (HRO): Matt Viggiano, HaeSun Nam

NYC Mayor's Office of Resiliency (MOR): Eric Wilson, Carrie Grassi, Dana Kochnowar,

Daphne Lundi, Lauren Wang, Peter Adams, Rebecca Fischman, Tallant Burley, Tom Eisele,  
Tomi Vest





INDUSTRIAL RESILIENT BUILDING

MIXED USE RESILIENT BUILDING

RESIDENTIAL RESILIENT BUILDING