

How Affordable Is Flood Insurance in New York City, and What Can Be Done to Address Affordability Issues?

Hurricane Sandy struck New York City on October 29, 2012, with devastating consequences—highlighting the importance of programs and policies that promote greater resilience. Flood insurance is an important part of this resilience strategy, but as in other parts of the country, coverage is inconsistent among one- to four-family properties in New York City and is difficult for some households to afford. Compounding this challenge is congressional direction to phase out certain long-standing subsidies in the National Flood Insurance Program (NFIP), the primary source of flood insurance for one- to four-family properties nationwide. Additionally, increasing risk from flooding and the resultant ongoing efforts to update the city’s flood maps will likely result in higher flood insurance premiums for many households.

Given this context, the New York City Mayor’s Office of Recovery and Resiliency asked the RAND Corporation to study the issue, and researchers sought to answer four questions, with a focus on one- to four-family homes in areas that are at high risk of flooding:

1. To what extent is purchasing flood insurance burdensome for households living in one- to four-family homes?
2. How might flood insurance premiums change?
3. What effect will flood insurance premium increases have on households and communities?
4. What are some promising options for a program that helps reduce the effect of higher flood insurance premiums, and how much would they cost?

The overall study area covers the areas at high risk of flooding shown in Figure 1. Purple areas on the map denote high-risk zones according to the 2007 Flood Insurance Rate Map (FIRM), and orange areas denote high-risk zones added by the Preliminary FIRM (PFIRM) released in June 2013. Properties in high-risk zones added by the PFIRM are referred to as *newly mapped properties*.

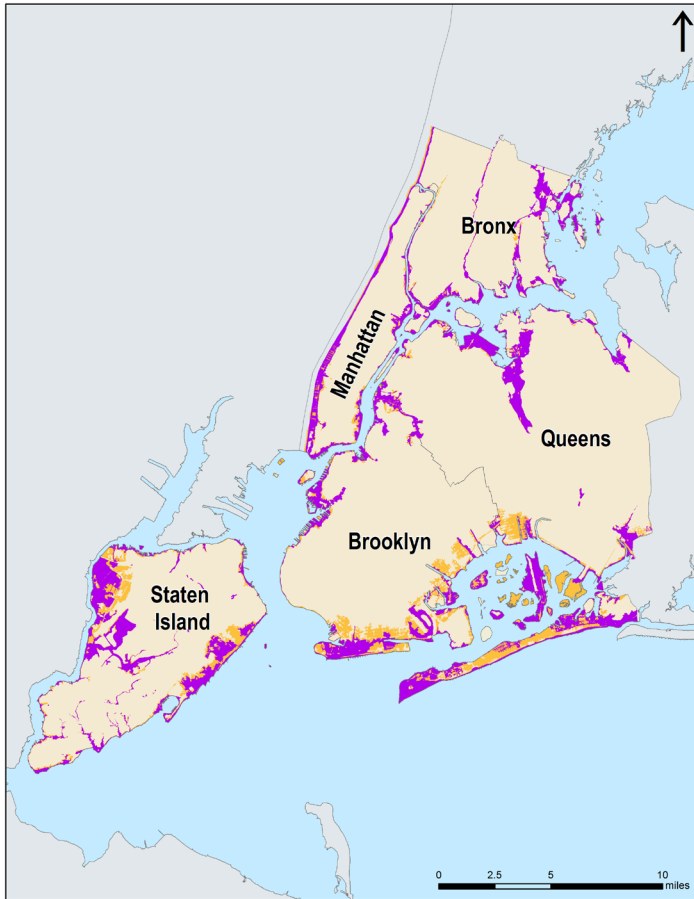
We break out results for five communities in the study area that the New York City Department of City Planning considers particularly vulnerable to flooding and other

Key findings:

- The cost of flood insurance is currently burdensome for about one-quarter of households in owner-occupied one- to four-family residences in the study area and is much more burdensome for lower-income residents.
- Removing grandfathering—the ability to base premiums on previous flood zones and elevations when flood maps are updated—dramatically increases premiums for all one- to four-family properties when maps are revised to reflect increasing risk.
- Such premium increases are projected to reduce property values and property tax revenue from what they would have been had premiums not increased; conversely, premium increases are projected to increase loan defaults and the percentage of households for which flood insurance is burdensome from what they would have been otherwise.
- There are promising financial-assistance options that use means-tested eligibility criteria rather than general subsidies.
- Grants and low-interest loans are not particularly attractive given the current rate structure and flood maps but become much more attractive when maps are revised to reflect increasing risk and when pre-FIRM rates and grandfathering are eliminated.
- Government costs can be significantly lower with an option that combines an income-based subsidy with mitigation, but only under certain conditions.
- Moving forward on any option requires answering a number of questions.

shocks (Figures 2 and 3): (1) Canarsie in Brooklyn; (2) Gerritsen Beach and Sheepshead Bay in Brooklyn; (3) Broad Channel, Howard Beach, Old Howard Beach, and Hamilton Beach in Queens; (4) Rockaway Peninsula in

Figure 1. Study Area



SOURCE: Generated by study team.

Queens; and (5) South Beach, Midland Beach, New Dorp Beach, and Oakwood in Staten Island.

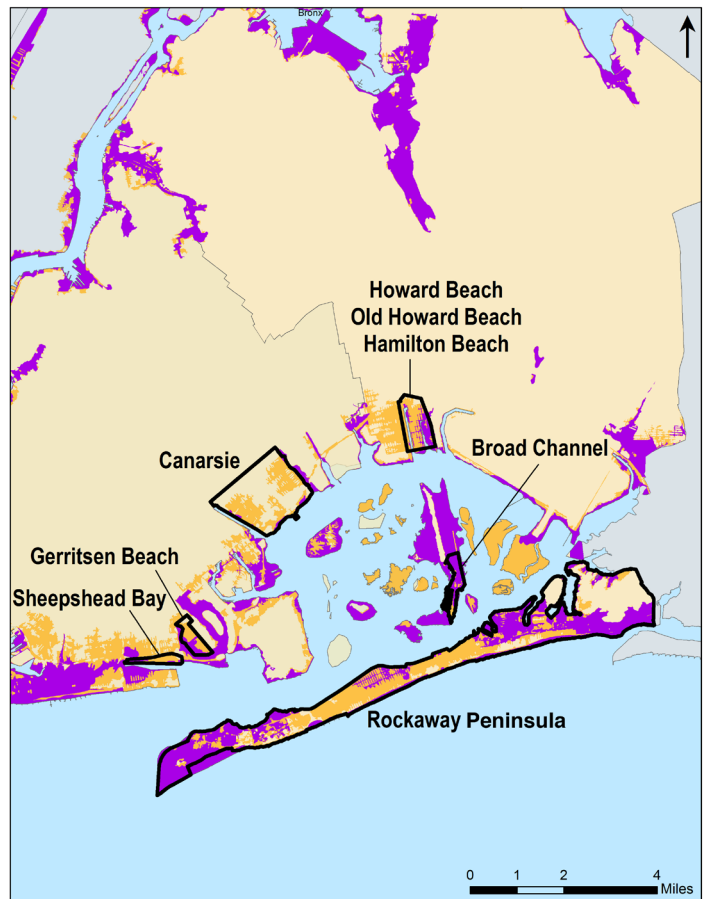
Our Approach

Our analysis is based on data from a stratified random sample of 2,800 of the 48,100 one- to four-family properties spread throughout the study area. The owners of the 2,800 selected properties were invited to complete a survey that asked for information on household income, mortgage payments, utility costs, insurance payments, and mortgage balance. The property owners also had to agree to allow a land surveyor to collect detailed elevation data on the structure, producing an elevation certificate. All told, we received 615 returned surveys and 485 elevation certificates. Sampling weights were developed to correct for differences in response rates among different groups and to extrapolate findings from the sample to the 48,100 one- to four-family properties in the study area.

Findings

Our findings are presented as answers to the four study questions, all relative to the study area.

Figure 2. Communities Studied in Brooklyn and Queens



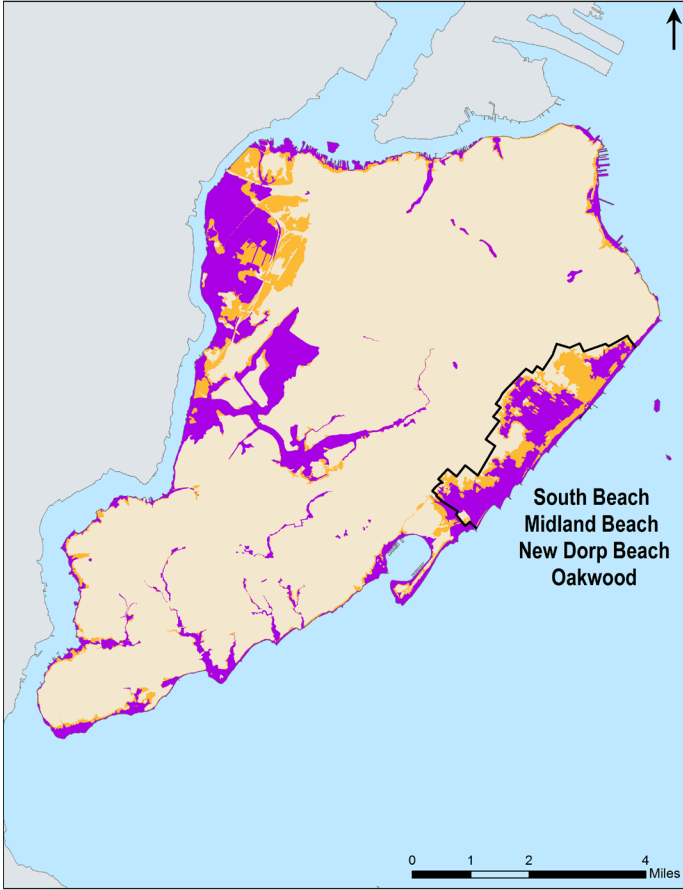
SOURCE: Generated by study team.

The cost of flood insurance is currently burdensome for about one-quarter of households in owner-occupied one- to four-family residences in the study area and is much more burdensome for lower-income residents.

What does the study area look like? Just fewer than 40 percent of the households in the study area who live in owner-occupied primary residences are low income, and the percentage of low-income households is substantially higher in some of the five communities examined. (Per federal guidelines, a three-person household in New York City with income less than \$62,200 is considered low income.) The flood-insurance take-up rate in 2016 was estimated at 43 percent, substantially higher than the 23 percent in 2012, but even those in the study area with insurance are not fully covered for flood-related losses. Specifically, structure replacement cost is greater than building coverage for about 45 percent of the structures with flood insurance.

Given this characterization of the study area, how affordable is flood insurance? We consider flood insurance affordability in terms of how “housing burdened” owners are. Specifically, if the ratio of mortgage premium and interest, property taxes, and property insurance (PITI) payments

Figure 3. Community Studied on Staten Island



SOURCE: Generated by study team.

to household income is more than 40 percent of household income, flood insurance premiums are considered burdensome and may be difficult to afford. The 40-percent cutoff was chosen to reflect the top end of the range used by the Federal Housing Administration to determine loan eligibility. Given this definition, flood insurance is burdensome for about 11,000 households. As expected, flood insurance is most difficult to afford for lower-income households: Flood insurance is burdensome for 64 percent of extremely and very low-income households and 41 percent of other low-income households. The percentage of households for which flood

insurance is burdensome varies across the five communities, with the highest (54 percent) in Canarsie. Also, take-up rates are lower when housing costs are burdensome.

Removing grandfathering dramatically affects premiums for all one- and four-family properties when maps are revised to reflect increasing risk.

We projected premiums in the study area if the PFIRM were to be adopted and analyzed the effect of grandfathering in the current NFIP rate schedule; grandfathering allows premiums to be based on an earlier flood map rather than the most recent map under certain circumstances. We also examined the effect of eliminating pre-FIRM rates; such rates are available to structures built before the first FIRM for New York City was issued in 1983 and subsidize some of the properties that qualify for these rates. Premiums without grandfathering and pre-FIRM rates are closer to risk-based rates than those with these options.

Table 1 shows that the median flood insurance premium is \$3,000 within the high-risk zones of the 2007 FIRM under current conditions (2007 FIRM, April 2015 NFIP rate schedule, and pre-FIRM rates available) and \$500 for properties that will be newly mapped under the PFIRM (first row). It also shows that eliminating the pre-FIRM rates has little effect on either group (second row).

If grandfathering is allowed, moving to the PFIRM has little effect on those properties already in high-risk zones: The median premium remains unchanged at \$3,100 (third row). But there are various eligibility requirements for grandfathered rates, and property owners may fail to qualify for them. If grandfathering is removed, the median premium would increase from \$3,100 to \$5,600 (fourth row), and at least 25 percent of property owners would pay premiums in excess of \$12,300 (not shown).

Premiums for newly mapped properties will increase even with grandfathering, given the rating provisions prescribed by Congress for such properties. The increases will be phased in gradually over time, and median premiums eventually increase from \$500 to \$2,700 even with grandfa-

Table 1. Median Premium in Flood Insurance Scenarios Examined

FIRM in Effect and Premium Scenario	Median Premium for 22,200 Properties in High-Risk Zones of 2007 FIRM (in \$ 2016)	Median Premium for 25,900 Newly Mapped Properties (in \$ 2016)
2007 FIRM in Effect		
1. With pre-FIRM subsidies (baseline scenario)	\$3,000	\$500
2. Without pre-FIRM subsidies	\$3,100	\$500
PFIRM in Effect		
3. With grandfathering and without pre-FIRM subsidies	\$3,100	\$2,700
4. Without grandfathering or pre-FIRM subsidies	\$5,600	\$4,200

NOTE: Assumes policies cover the lesser of structure replacement cost and \$250,000 and that contents coverage is 40 percent of building coverage.

thering. If grandfathering is removed, the median premium increases by another \$1,500 to \$4,200. Premium increases are particularly large for both newly mapped and other one- to four-family properties on the Rockaway Peninsula.

Premium increases are projected to reduce property values and property tax revenue from what they would have been had premiums not increased; conversely, premium increases are projected to increase loan defaults and the percentage of households for which flood insurance is burdensome from what they would have been otherwise.

What is the cumulative effect of such premium increases on the study area neighborhoods? Existing research indicates that flood insurance premiums are capitalized into property values, which implies that increases in flood insurance premiums will result in decreases in property values. Our research shows that, if premiums increase from the first row to fourth row in Table 1, the values of newly mapped properties will decrease by roughly \$10,000 to \$100,000 from what they would have been absent the increases. Inside the high-risk zones of the 2007 FIRM, the effect is more variable and can be far more severe if premiums undergo the same shift. The effect ranges from declines of \$20,000 or less to many hundreds of thousands of dollars. In the most extreme cases, the increase in the net present value of the cost of flood insurance exceeds the current value of the property, and the property value falls to zero. Tight housing markets in New York City may prevent housing prices from falling in absolute terms, and the declines projected here should be interpreted as declines from what prices would have been otherwise.

This drop in property value has a wide variety of implications. Lower property values reduce the value of the property

tax base. As such, property tax revenue in the study area is projected to be \$22 million less than what it would have been otherwise given an increase in premiums from the first row to the fourth row in Table 1. (Total property tax revenue in New York City was \$24.1 billion in fiscal year 2016.) Also, we estimate that the default rate will increase from just more than 300 per year to roughly 450 per year, or from 1.0 percent to 1.5 percent of homes with mortgages per year. Some communities in the study area, such as the Rockaway Peninsula, could be particularly hard hit by increased default rates.

These potential premium increases would both increase the number of households for which flood insurance is burdensome *and* increase the burden on those for which it is already burdensome. With the PFIRM in place and grandfathering and pre-FIRM rates eliminated, the percentage of housing-burdened households would increase from the 26 percent (about one-quarter) previously discussed to 33 percent.

Take up of insurance is likely to increase for homeowners outside the high-risk zones of the 2007 FIRM with mortgages because the mandatory purchase requirement now applies to the newly mapped properties. But the large increase in premiums may decrease take-up rates for homes not subject to the mandatory purchase requirement, both inside and outside the current high-risk zones.

There are promising financial assistance options for a flood insurance affordability program that use means-tested eligibility criteria rather than general subsidies.

Given these findings, we considered five different designs for a flood insurance affordability program that are means tested, as opposed to premium-reduction strategies that rely on general subsidies (Table 2). The first three designs

Table 2. Summary of Outcomes for Flood Insurance Affordability Program Designs

Design	Beneficiaries		Benefit Cost with Full Participation (in 2016 \$)	Average Flood Insurance Premiums for Beneficiaries for Whom Flood Insurance Is Burdensome Without Program	
	Flood Insurance Burdensome Without Program	Flood Insurance Not Burdensome Without Program		Without Program	With Program
1. Income-based subsidy	9,700	22,000	\$33M/year	\$2,100	\$650
2. Housing burdened-based subsidy	9,700	0	\$19M/year	\$2,100	\$150
3. Deductible subsidy	9,700	22,000	\$12M/year	\$2,100	\$1,600
4. Mitigation grants and low-interest loans					
Flood vents	30	190	\$2M	\$2,900	\$1,400
Raise machinery and equipment	930	4,300	\$28M	\$4,000	\$3,300
Basement infill	750	2,400	\$100M	\$4,400	\$820
Structure elevation	190	0	\$31M	\$10,500	\$600
5. Mitigation grants and loans and income-based subsidy	Potentially substantial government savings under certain conditions				

NOTE: Does not include administrative cost. M = millions.

(unshaded) subsidize flood insurance premiums in different ways. The fourth (light gray shading) makes flood insurance premiums more affordable by funding or subsidizing structure-specific mitigation measures, and the fifth (dark gray shading) combines mitigation assistance with a premium subsidy. These programs are open to the 31,700 households in owner-occupied one- to four-family residences that are low, moderate, or middle income (up to an income cutoff of \$128,000 for a family of three). Of these 31,700 households, 9,700 are housing burdened and the most in need.

Design 1 provides substantial premium subsidies for very low-income households and more modest subsidies for other low-, moderate-, and middle-income households. The advantage of this program is simplicity: To qualify for the program, a household just needs to provide documentation of household income. The disadvantage is that this design provides benefits to 31,700 households, but only 9,700 are housing burdened (see first row of Table 2). The outcome is the same for a program that allows households to buy a cheaper policy with a \$10,000 deductible but then receive reimbursement for part of the deductible should a loss occur (Design 3). Eligibility for this program is also based only on income. In contrast, the subsidy based on housing burden (Design 2) benefits only the 9,700 housing-burdened households. The result is that larger benefits are delivered to the target population by this design—average flood premiums are reduced from \$2,100 to \$150—even though the program cost is substantially less than that for the income-based subsidy (Design 1) (\$19 million per year versus \$33 million per year). The downside of Design 2 is that, in addition to income, households must provide information on PITI to receive benefits.

The premium reductions and benefit costs for the deductible subsidy design (Design 3) are more modest than in the other two premium subsidy designs. More narrowly targeting Designs 1 and 3 can reduce the benefits provided to households that are not housing burdened. However, there are trade-offs. Lowering the income eligibility cutoff, for example, excludes the relatively small number of middle-income households that are housing burdened.

Grants and low-interest loans are not particularly attractive given the current rate structure and flood maps but become much more attractive when maps are revised to reflect increasing risk and when pre-FIRM rates and grandfathering are eliminated.

Mitigation measures are attractive ways to reduce premiums because, rather than funding subsidy payments year after year, mitigation reduces risk and the need for subsidies in the first place. Mitigation measures make homes less vulnerable to flood risk and thus less costly to insure. Mitigation

also means the households experience fewer and less severe flood losses and the associated inconveniences and uncompensated losses.

The results for the mitigation measures (Design 4) are disappointing. Relatively few of the housing-burdened households in the study area would be eligible to participate in the program, primarily because the present discounted value of premium reductions exceeds the mitigation costs for relatively few structures (a low of 30 and a high of 930) given the 2007 FIRM and the 2015 NFIP rate schedule. But the mitigation measures become considerably more attractive when assuming rates based on the PFIRM without grandfathering or pre-FIRM rates. Even so, mitigation cannot be the only vehicle for assistance to housing-burdened households because it is still not cost-effective for many structures.

The government can save a great deal with an option of combining an income-based subsidy with mitigation but only under certain conditions.

One attractive feature of combining an income-based premium subsidy with mitigation (Design 5) is that it counters the reduced incentive of households that receive a premium subsidy to mitigate risk. A second is that the cost of a combined mitigation and premium subsidy program to the government is potentially lower than it is with the premium subsidy alone. Savings of up to hundreds of millions dollars for certain multiyear scenarios are possible when assuming risk-based rates based on the PFIRM, but only if the low-income households that qualify for the income-based subsidies continue to own and live in the property for at least ten years after the start of the program.

Moving Forward

Regardless of which design policymakers choose to implement, moving forward requires addressing a number of questions. First, what is the funding source for the program? Is it funded at the city, state, or federal level, and who bears the cost? Second, how should the program be administered? The administrative requirements for some of the designs are complex. For example, the mitigation grant and loan program (Design 4) would require a process to determine what mitigation measures were cost-effective for each structure. Third, how long should the program remain in effect? Should it be available only to current residents or also to future buyers who subsequently find themselves with high housing costs relative to income? Finally, to reduce the need for future subsidies, should program participants be required to agree to a buy-out when the property is sold? The answers to these questions will play an important role in determining how best to proceed with design options.

This brief describes work done in the RAND Center for Catastrophic Risk Management and Compensation within RAND Justice, Infrastructure, and Environment and documented in *The Cost and Affordability of Flood Insurance in New York City: Economic Impacts of Rising Premiums and Policy Options for One- to Four-Family Homes*, by Lloyd Dixon, Noreen Clancy, Benjamin M. Miller, Sue Hoegberg, Michael M. Lewis, Bruce Bender, Samara Ebinger, Mel Hodges, Gayle M. Syck, Caroline Nagy, and Scott R. Choquette, RR-1776-NYCEDC, 2017 (available at www.rand.org/t/RR1776). To view this brief online, visit www.rand.org/t/RB9957. The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors. RAND® is a registered trademark. © RAND 2017.

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