CLIMATE CHANGE LEGAL REMEDIES: HURRICANE SANDY AND NEW YORK CITY COASTAL ADAPTATION

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In the wake of Hurricane Sandy and legislative changes to the federal flood insurance program, flood insurance costs have or will increase for many coastal property owners due to climate change causing activities. Property owners that wish to be compensated for either property damage or their insurance premium increases may seek to file a claim against their local government based upon the premise that the city did not adapt reasonably to climate change in light of the risks known. Yet, for the government to be found liable, it must have breached a legal duty. There is no affirmative duty for governments to provide protection from natural hazards, including climate change. Yet, it has been argued that once a city decides to adapt, it triggers a duty to adapt reasonably under the circumstances. The failure to do so can result in liability for negligence.

New York City has decided to adapt to climate change, as it instituted adaptation measures in "PlaNYC," prior to Sandy and re-affirmed this commitment after Sandy in its updated "Resiliency Plan." This paper analyzes whether, under New York law, coastal property owners could claim successfully that the City acted unreasonably in its pre- and post-Sandy adaptation measures. Examining these claims reveals that the City is unlikely to be held liable for failing to adapt reasonably to climate change under current law. Given this outcome, New York common law (and many state jurisdictions) signals to cities that they do not need to adapt to climate change and consequently, coastal homeowners must bear their own risk. These signals show why legislation is necessary to properly address climate adaptation on a large-scale.

INTRODUCTION

New York City ("NYC" or "the City") has over 520 miles of coastline, more than any other American city, and over 200,000 New Yorkers own

property in the 100-year floodplain, making them vulnerable to storms.[1] NYC coastal property owners endured significant physical damage to their homes and businesses during "superstorm" Hurricane Sandy ("Sandy"), the "worst natural disaster ever to hit New York City."[2] And now, they face exponential increases in their flood insurance premiums due to the Biggert-Waters Act of 2012 and the Homeowner Flood Insurance Affordability Act of 2014.[3] These coastal property owners may potentially seek relief for the aforementioned physical and monetary damages under common law.[4] Climate adaptation[5] claims against polluters that contribute to climate

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1. CITY OF NEW YORK, PLANYC UPDATE APRIL 2011: A GREENER, GREATER NEW YORK 10, 155 (Apr. 2011), *available at* http://nytelecom.vo.llnwd.net/o15/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf [hereinafter PLANYC]; NEW YORK CITY OFFICE OF EMERGENCY MANAGEMENT, NEW YORK CITY NATURAL HAZARD MITIGATION PLAN, 147 (Mar. 2009), *available at* http://s-media.nyc.gov/agencies/planyc2030/pdf/planyc_2011_planyc_full_report.pdf; FED. EMERGENCY MGMT. AGENCY, THE 100 YEAR FLOOD MYTH 2–4, *available at* http://www.training.fema.gov/EMIWeb/edu/docs/hazrm/Handout%203-5.pdf (last visited Oct. 29, 2014). Note that in this article, "New York City" is referred to as "the City" or "NYC." "New York State" is referred to as "New York" or "N.Y.".

2. CITY OF NEW YORK, PLANYC: A STRONGER, MORE RESILIENT NEW YORK (2013), *available at* http://www.nyc.gov/html/sirr/html/report/report.shtml [hereinafter NYC RESILIENCY PLAN].

3. Laura Vecsey, *Coastal Area Residents Stunned by Flood Insurance Rate Hikes*, FORBES (Oct. 22, 2013), http://www.forbes.com/sites/zillow/2013/10/22/coastal-area-residents-stunned-by-flood-insurance-rate-hikes/; Bruce Alpert, *For Those Who Overpaid Flood Insurance Premiums, Refunds Start Flowing on Wednesday*, NOLA.COM (Oct. 26, 2014), http://www.nola.com/politics/index.ssf/2014/09/for_those_who_overpaid_flood_i.html.

4. Karen Sudol, *N.J.'s Superstorm Sandy Victims Turn to Court for Unpaid Flood Claims*, NORTHNEWJERSEY.COM (Apr. 27, 2014), http://www.northjersey.com/news/n-j-s-superstorm-sandy-victims-turn-to-court-for-unpaid-flood-claims-1.1003818?page=all (explaining that over 2,000 coastal homeowners in New York and New Jersey have filed suit against their flood insurance providers —private insurance companies that work with FEMA to provide flood insurance—for monetary compensation for property damage from Hurricane Sandy; they claim that their flood insurance did not adequately cover their substantial property damage, and according to some, "the number of cases filed so far is not indicative of large-scale dissatisfaction.").

There is debate as to whether homeowner compensation for increased flood insurance premiums or even property damage is a positive action, since such compensation signals that homeowners shall continue living on the coast, which is risky behavior. But the focus of this paper is primarily on the legal duty of local governments to adapt to climate change and the government incentives that stem from the duty, or lack thereof, as determined by the courts.

5. MICHAEL B. GERRARD, THE LAW OF ADAPTION TO CLIMATE CHANGE: U.S. AND INTERNATIONAL ASPECTS 3 (Michael B. Gerrard & Katrina Fischer Kuh eds., 2012) (explaining that "adaptation" describes "efforts to moderate, cope with, and prepare for the current and anticipated impacts of climate change on human and natural systems;" whereas "resilience" is a "closely related" concept that describes "the capability to anticipate, prepare for, respond to, and recover from climate

change are largely precluded under common law.[6] Yet, Professor Maxine Burkett of the University of Hawaii School of Law advocates that climate adaptation claims against cities for negligence may provide relief; because, once cities institute climate adaptation measures, they have a legal duty to adapt reasonably.[7]

New York City has taken significant steps to adapt to climate change. In 2007, the City released PlaNYC, which included a preliminary climate adaptation plan focused primarily on information gathering and risk assessment of local climate change vulnerabilities. Under Burkett's theory, NYC property owners may seek to file claims against NYC for failing to adapt to Sandy reasonably through PlaNYC.[8] After Sandy, the City adopted "A Stronger, More Resilient New York," a plan to further prepare the City for the next major storm. In the plan, the City promotes a more resilient re-development in vulnerable coastal areas, as opposed to a more stringent policy of managed coastal retreat.[9] Thus, NYC property owners injured in the future may seek to file claims after the next major storm, asserting that the City did not adapt reasonably after Sandy.[10]

To file a successful climate adaptation claim under a tort theory of negligence, a plaintiff must first show that a defendant has a legal duty.[11] In

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impacts."). When describing the City's efforts in PlaNYC and "A Stronger, More Resilient New York," I primarily use the word "adaptation" because I am referring to the City's efforts to "moderate, cope with, and prepare for" increased climate risks, primarily more frequent and intense storms like Sandy, as opposed to its efforts to bounce back from Sandy. Yet, I also use the word "resilient" in instances where the City does to refer to its adaptation measures in its pre- and post-Sandy plans.

6. *See* Native Vill. of Kivalina v. ExxonMobil Corp. (*Kivalina*), 696 F.3d 849, 869 (9th Cir. 2012) (holding plaintiffs' claim against polluters for public nuisance under federal common law was precluded by the Clean Air Act and Entvironmental Protection Agency action authorized thereunder).

7. Maxine Burkett, *Duty and Breach in an Era of Uncertainty: Local Government Liability for Failure to Adapt to Climate Change*, 20 GEO. MASON L. REV. 775, 790–91 (2013). This note builds on Burkett's analysis by applying her argument to a concrete case, NYC and Hurricane Sandy, and by analyzing the signals that common law is sending as a result of that application.

8. *Id.* at 781–82 (suggesting that NYC's failure to adapt actually exacerbated Sandy's physical damage and caused an increase in flood insurance rates).

9. Robert R.M. Verchick & Lynsey R. Johnson, *When Retreat is the Best Option: Flood Insurance After Biggert-Waters and Other Climate Change Puzzles*, 47 J. MARSHALL L. REV. 695, 697 (2013) (stating coastal retreat "involves the migration of people, property, businesses, and perhaps wildlife. Its goal is to minimize hazards and environmental impacts by removing development (or animal habitat) from the most vulnerable areas. In its most extreme form, retreat means abandoning development that cannot reasonably be protected or serviced in another way. But retreat can also mean imposing limits, such as restricting development in existing communities or prohibiting development in sensitive undeveloped landscapes.").

10. Joshua Dawsey, *Cuomo Lays Out Plan for Sandy Recovery Money*, WALL ST. J. (Jan. 7, 2014), http://online.wsj.com/news/articles/SB10001424052702304617404579307033953274754 (explaining that according to New York Governor Andrew Cuomo, "[t]he new reality in New York is we are getting hit by 100-year storms every couple of years.").

11. David Hunter & James Salzman, *Negligence in the Air: The Duty of Care in Climate Change Litigation*, 155 U. PA. L. REV. 1741, 1744–45 (2007).

determining a city's legal duty, New York common law (like many other state jurisdictions) distinguishes between government structural measures, such as dikes and levees, and non-structural measures, which are discretionary decisions.[12] The City is afforded sovereign immunity for the latter, which courts are unlikely to waive to consider a climate adaptation negligence claim. Nevertheless, examining claims of both structural and non-structural breaches of duty reveals that NYC is unlikely to be held liable for failing to adapt reasonably to climate change prior to and after Sandy under New York common law.

Generally, common law doctrine in any substantive area of the law sends signals as to preferred modes of conduct and thus encourages or discourages certain behavior. An analysis of the above claims under New York tort common law reveals certain signals. To cities, common law in New York (and states with similar laws) indicates that cities do not need to adapt to climate change because they are immune from most climate adaptation claims. As such, the common law signals to coastal property owners that they cannot depend on their municipalities to adapt adequately to climate risks. Rather, they must bear their own risk of occupying property on the coast, even if that means relocating somewhere else. Overall, these signals are problematic because they fail to encourage climate adaptation measures on a larger scale, which are critically needed given the increased climate risks that NYC and the rest of the country face. Thus, in the absence of national or state climate legislation, "tort litigation has the power to determine the course of climate adaptation."[13]

While tort litigation can and should play a role in encouraging local climate adaptation, the analysis below suggests that tort litigation is not the ideal tool to address local adaptation; rather, legislation is. When federal or state regulations are passed that properly address climate adaptation on a larger scale, plaintiffs, litigators, and legal scholars will no longer need to rely on torts as the primary mechanism to mandate adaptation. Further, with legislation, courts will be empowered to analyze cities' adaptation efforts more effectively.

This paper also argues that both cities and property owners should bear the costs of adaptation. While cities should be subject to climate adaptation legislation, coastal property owners should be subject to flood insurance premiums that reflect the true cost of their behavior. The affordability of

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12 *Id.* at 1748 (explaining that discretionary decisions include: whether to adapt and if so, how to adapt).

13. Maxine Burkett, *Litigating Climate Change Adaptation: Theory, Practice, and Corrective (Climate) Justice*, 42 ENVTL. L. REP. 11,144, 11,147 (2012).

such premiums can be addressed without encouraging property owners to live on the coast.

Section I presents the relevant background information regarding climate science and increased flood insurance premiums. Section II describes NYC's climate change adaptation efforts prior to Sandy and Sandy's effects on NYC, as well as NYC's climate change adaptation plan after Sandy in light of the potential adaptation tools available today. Section III gives a brief background on climate change common law, explains why local governments are viable defendants in a climate change adaptation suit, and lays out the legal framework for such a suit under New York common law. Section III applies the factors that a court would use to assess claims against NYC that the City failed to adapt reasonably prior to and after Sandy under New York common law. Section IV takes a step back to examine the signals that both New York common law and common law more generally are sending to coastal property owners, particularly local governments, and concludes by making policy suggestions to address climate adaptation going forward.

I. BACKGROUND

A. Climate Science

Today, it is widely accepted that anthropogenic climate change is occurring, as the increase in greenhouse gas emissions from burning fossil fuels is altering earth's climate.[14] Observed climate change effects include a rise in average temperatures, sea level, and more frequent and intense storms.[15] Regarding the latter, "public awareness about the role of climate change in the development of so-called 'superstorms' seems to be gaining some traction, in part due to Superstorm Sandy."[16] The heightened risk of such "superstorms" threatens coastal areas and river floodplains.[17] Indeed,

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14. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), SUMMARY FOR POLICYMAKERS 4, 13 (2013), *available at* http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf ("Warming of the climate system is unequivocal . . . [and] . . . [n]atural and anthropogenic substances and processes that alter the Earth's energy budget are drivers of climate change.").

15. *Id.* at 7.

16. Kate Margolis & Bradley A. B. Cummings, *Insurance Coverage Crossroads: The Industry Appears Largely Unprepared to Weather Risks of Climate Change*, BLOOMBERG LAW (July 2, 2013, 3:32 PM), http://www.bna.com/insurance-coverage-crossroads/.

17. J. PETER BYRNE & JESSICA GRANNIS, *Coastal Retreat Measures*, *in* THE LAW OF ADAPTATION TO CLIMATE CHANGE 267, 267 (Michael B. Gerrard & Katrina Fischer Kuh eds., 2012) ("Recent disasters should serve as a wake-up call—climate change will cause serious harm in both coastal and riverine floodplains.").

"[S]cientists predict that, over the next century . . . storms that batter coastal communities will be more intense, and storm surges will push farther inland. Large portions of low-lying coast will be permanently inundated. Climate change is also predicted to increase precipitation and rapidly melt snowpack, with resultant flooding in river valleys."[18] In 2008, Mayor Bloomberg convened the New York City Panel on Climate Change ("NPCC") to develop the first official climate change projections for NYC.[19] After Hurricane Sandy, Mayor Bloomberg convened the second NPCC ("NPCC2") to provide updated climate risk information for NYC.[20] According to the NPCC2's latest report, sea level around NYC is expected to rise 4–8 inches by the 2020s and between 11–24 inches by the 2050s, a significant increase from the NPCC's initial sea level rise projections in 2010.[21] (Appendix, Figure 1). The NPCC2 also states that the number of intense hurricanes, extreme hurricane winds, and intense hurricane precipitation will "more likely than not" increase by the 2050s.[22]

B. Flood Insurance Premiums

1. Nationally

The National Flood Insurance Program ("NFIP"), administered by the U.S. Federal Emergency Management Agency ("FEMA"), was created in 1968 to "provide subsidized insurance to communities in areas particularly vulnerable to floods," as privatized insurance became "prohibitively expensive."[23] Property owners can choose to purchase flood insurance from

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18. *Id.*

19. Modeled on the IPCC, the NPCC consists of leading climate and impact scientists, academics, economists, and risk management, insurance, and legal experts. The purpose of the NPCC is to provide state-of-the-art climate projections to the New York City Climate Adaptation Task Force, which, based on the science and other relevant factors, decides which adaptation strategies to implement. PLANYC, *supra* note 1, at 150; Interview with Leah Cohen, Deputy Director for Federal Policy, NYC Mayor's Office of Long-Term Planning and Sustainability (July 2012).

20. NEW YORK CITY PANEL ON CLIMATE CHANGE, CLIMATE RISK INFORMATION 2013: OBSERVATIONS, CLIMATE CHANGE PROJECTIONS, AND MAPS 1 (2013), *available at* http://www.nyc.gov/html/planyc2030/downloads/pdf/npcc_climate_risk_information_2013_report.pdf [hereinafter NPCC].

21. *Id.* at 19 ("For sea level rise, the timeslice represents a 10-year average centered around the given decade (i.e., the time period for the 2020s is from 2020-2029), and changes are expressed relative to the 2000–2004 baseline. Projections rounded to the nearest half degree, five percent and inch.").

22. *Id.* at 22 (explaining that "[m]ore likely than not" means greater than 50% probability of occurrence, as defined by the IPCC).

23. ANNE SIDERS, COLUM. CTR. FOR CLIMATE CHANGE LAW, MANAGED COASTAL RETREAT: A HANDBOOK OF TOOLS, CASE STUDIES, AND LESSONS LEARNED 9 (2013), *available at* http://web.law.columbia.edu/sites/default/files/microsites/climate-change/files/Publications/Fellows/ManagedCoastalRetreat_FINAL_Oct%2030.pdf.

the NFIP if their community joins the NFIP. Regardless, the NFIP requires that property owners purchase flood insurance if they live in a "Special Flood Hazard Area" ("SFHA") and have a mortgage from a federally backed or regulated lender.[24] By providing subsidized flood insurance to coastal properties, the NFIP encourages Americans to purchase property on the coast.[25] Almost 50 years later, the NFIP is $25 billion in debt, partly because of these subsidized rates that do not reflect the true cost of owning coastal property.[26]

To help mitigate this debt, Congress enacted the Biggert-Waters Flood Insurance Act in 2012.[27] Biggert-Waters is designed to eliminate the NFIP's debt by increasing flood insurance rates to reflect the true cost of owning coastal property.[28] Upon Biggert-Waters' enactment, the U.S. Government Accountability Office estimates that about 438,000 policies nationwide had higher premiums immediately. Additionally 715,000 policies will undergo premium increases through one of the legislative triggers: an insurance policy lapse, a sale of the insured property, substantial flood damage to the insured property, substantial improvement to the property, or the purchase of a new policy.[29]

In areas where FEMA Flood Insurance Rate Maps ("FIRMs") have not yet been updated, insurance rates on existing properties suffering repetitive losses would increase 25 percent annually until the premium represented

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24. CAROLYN KOUSKY & HOWARD KUNREUTHER, RESOURCES FOR THE FUTURE & THE WHARTON RISK MGMT. & DECISION PROCESSES CTR., ISSUE BRIEF: ADDRESSING AFFORDABILITY IN THE NATIONAL FLOOD INSURANCE PROGRAM 2–3 (Aug. 2013), *available at* http://www.rff.org/RFF/Documents/RFF-IB-13-02.pdf (explaining that SFHAs refer to properties in the 100-year-flood zone. To join the NFIP, communities must "adop[t] a floodplain ordinance based on the most up-to-date maps and flood data provided by FEMA. At a minimum, communities must require that new development and substantially improved or damaged properties in high hazard areas be built at or above the level of the 100-year flood. Only then is flood insurance made available for purchase by residents in the community.").

25. *See* James Wilkins, *Is Sea Level Rise "Foreseeable"? Does it Matter?*, 26 J. LAND USE & ENVTL. L. 437, 438 (2011) ("Government efforts to reduce flooding damage through programs like the National Flood Insurance Program have not been very effective and have actually encouraged risky development by providing flood insurance that would be difficult to obtain otherwise.").

26. CAROLYN KOUSKY & HOWARD KUNREUTHER, WHARTON RISK MGMT. & DECISION PROCESSES CTR., ISSUE BRIEF: ADDRESSING AFFORDABILITY IN THE NATIONAL FLOOD INSURANCE PROGRAM: MEANS-TESTED VOUCHERS COUPLED WITH MITIGATION LOANS, (2013), *available at* http://opim.wharton.upenn.edu/risk/library/WRCib2013d_Affordability_NFIP.pdf (stating that pre-Biggert Waters "FEMA estimates that about 20 percent of flood insurance policies currently receive premium discounts of about 40–45 percent of full-risk rates.").

27. *Flood Insurance Reform – The Law*, FED. EMERGENCY MGMT. AGENCY, https://www.fema.gov/flood-insurance-reform-law (last updated Nov. 18, 2014).

28. KOUSKY & KUNREUTHER, *supra* note 24, at 4–5.

29. *Id.* at 5.

the actual risk of owning that property.[30] For all other properties, the premiums' rate of increase was capped at 20 percent annually.[31] The biggest rate increases were expected to occur in areas affected by changes in FEMA flood maps, since Biggert-Waters phased out grandfathering, a practice that enables property owners to keep their old premium prices when a new FEMA flood map reclassifies them into a higher-risk flood zone.[32] As such, property owners who were affected by FEMA map changes would have had their subsidies phased out over five years.[33] (Appendix, Figure 2).

To improve the affordability of premiums for coastal homeowners, the Homeowners Flood Insurance Affordability Act of 2014 ("Act" or "Affordability Act") was passed in March 2014 as an amendment to Biggert-Waters.[34] The Act favors a more gradual increase to full-risk premiums and thus softens the "blow" of Biggert-Waters on coastal homeowners.[35] Under the Act, FEMA must still raise premiums by at least 5 percent annually, but cannot increase most premiums more than 18 percent annually (reduced from 20 percent).[36] Accordingly, the Act repeals the Biggert-Waters provision that phased out grandfathering and required premiums for properties affected by FIRMs to increase 20 percent annually for five years.[37] Now, previously grandfathered properties cannot have premium increases that exceed 18 percent annually and properties newly mapped into the SFHA will have their first year premium remain the same as properties outside of the area.[38]

The Act retains the 25 percent annual premium increase for severe repetitive loss properties with subsidized rates, older business and non-primary residential properties with subsidized rates, and properties damaged or built before the FIRMs went into effect (pre-FIRM

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30. NYC RESILIENCY PLAN, *supra* note 2, at 96 (explaining that losses are defined as when cumulative NFIP claims payments exceed the fair market value of the property); KOUSKY & KUNREUTHER, *supra* note 24, at 4, 8.

31. KOUSKY & KUNREUTHER, *supra* note 24, at 5.

32. *Id.*

33. NYC RESILIENCY PLAN, *supra* note 2, at 96.

34. FED. EMERGENCY MGMT. AGENCY, HOMEOWNER FLOOD INSURANCE AFFORDABILITY ACT OVERVIEW (2014), *available at* http://www.fema.gov/media-library-data/1396551935597-4048b68f6d695a6eb6e6e7118d3ce464/HFIAA_Overview_FINAL_03282014.pdf.

35. Verchick & Johnson, *supra* note 9, at 711 ("In the spring of 2014, Congress blunted the impact of [Biggert-Waters] by repealing its most dramatic changes and delaying most 'actuarial' reform until 2017. This turn of tide can be credited, at least in part, to Hurricane Sandy.").

36. *Id.* at 716. In other words, FEMA has latitude in deciding a flood insurance policy's premium increase. In addition, under the Act, policyholders who renewed their policy after the Act passed in March 2014, and whose premium increased more than 18 percent may be eligible for refunds.

37. *Id.*

38. *Id.*

properties).[39] (Appendix, Figure 2). But the Act enables new coastal property purchasers, as well as policyholders renewing their policies, to keep their property's pre-FIRM rates while FEMA develops revised premium rates under the Act.[40] Consequently, policyholders in high-risk areas who purchased flood insurance after Biggert-Waters went into effect, and had to pay a full-risk rate, are eligible for a refund under the Act.[41]

To compensate for the Act's increased subsidies compared to Biggert-Waters, a $25 surcharge will be added to all primary residential policies and a $250 surcharge will be added to all other policies.[42] FEMA will develop regulatory proposals to address the affordability of flood insurance premiums, especially for low-income policyholders.[43] In addition, FEMA will designate a "Flood Insurance Advocate" to inform policyholders of mitigation measures that can reduce their premiums and assist them in implementing such measures.[44] Accordingly, the Act seemingly broadens FEMA's ability to account for flood mitigation measures in determining a property's premium.[45] In sum, while the Act alleviates Biggert-Water's financial effect, coastal homeowners will still face substantial increases in their flood insurance premiums.

2. Locally

In NYC, most large commercial property owners purchase flood insurance through the private market, while homeowners and small business owners purchase flood insurance through the NFIP.[46] When Sandy hit NYC, most NYC homeowners did not own flood insurance for the following reasons: they were unaware that their homeowner's insurance did not cover flood damages, they neglected the mortgage requirement to purchase flood insurance, or they were unaware that their properties were

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39. FED. EMERGENCY MGMT. AGENCY, *supra* note 34, at 2–3; Verchick & Johnson, *supra* note 9, at 716-717 (noting that "[r]ental properties are not covered by the 18 percent cap, but rather seem governed by the 25 percent cap that remains in place for commercial properties.").

40. FED. EMERGENCY MGMT. AGENCY, *supra* note 34 at 3.

41. *Id.* at 2.

42. *Id.* at 3.

43. *Id.* at 4 (providing an exhaustive explanation of the Act's amendments to Biggert-Waters).

44. *Id.* at 3.

45. FED. EMERGENCY MGMT. AGENCY, *supra* note 34 at 4 ("The new law permits FEMA to account for property specific flood mitigation that is not part of the insured structure in determining full-risk rate.").

46. NYC RESILIENCY PLAN, *supra* note 2 at 15. This paper focuses on the NFIP, as opposed to private flood insurance, because Sandy had the most dramatic impact on the NFIP.

subject to heightened flood risk since the FEMA FIRMs for NYC were last updated in 1983.[47] (Appendix, Figures 2 and 3).

NYC property owners that suffered substantial property damage from Sandy are now facing large increases in their flood insurance premiums, due to Biggert-Waters, and will continue to do so even under the Affordability Act.[48] Specifically, it is estimated that 75 percent of the roughly 26,000 NFIP policies that New Yorkers had during Sandy received heavily subsidized premiums.[49] In 2015, when FEMA's new FIRMs are published for NYC, the updated maps will likely affect these policyholders and consequently, their insurance subsidies will begin to phase out.[50] Additionally, the many new policyholders that are classified into the FIRM will have to pay significantly more for their flood insurance.[51] (Appendix, Figures 3 and 4).

The true cost of living on the coast is much greater than the NFIP subsidized premiums indicated, and New York residential property owners are now facing premiums that range from about $9,000 to $15,000 annually.[52] Though the Affordability Act may reduce these premiums, property owners will still face significant premium increases. Undoubtedly, these rate increases would not be as sharp if coastal properties had adequate adaptation measures. But could the local government's failure to institute coastal adaptation measures be a basis for liability?

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47. *Id.* at 15, 93-94, 97 ("In fact, the City estimates that less than 20 percent of residential buildings in areas inundated by Sandy had coverage through the NFIP. The numbers are believed to have been even lower for businesses; approximately 26,400 businesses with fewer than 50 employees were in the Sandy inundation zone in New York, but only 1,400 commercial NFIP policies were in effect when Sandy hit . . . The new [FEMA] maps show a significantly expanded 100-year floodplain compared with the 1983 maps, with approximately 32,000 more buildings in the floodplain (an increase of 91 percent).").

48. Jenny Anderson, *Outrage as Homeowners Prepare for Substantially Higher Flood Insurance Rates*, N.Y. TIMES (July 28, 2013), http://www.nytimes.com/2013/07/29/nyregion/overhaul-and-a-hurricane-have-flood-insurance-rates-set-for-huge-increases.html?pagewanted=all.

49. NYC RESILIENCY PLAN, *supra* note 2, at 96; Press Release, Fed. Emergency Mgmt. Agency, FEMA Overview of Homeowner Flood Insurance Affordability Act (April 4, 2014), *available at* http://meeks.house.gov/press-release/overview-homeowner-flood-insurance-affordability-act-provided-fema (explaining this is so despite the fact that FEMA states that "[C]lose to 80 percent of NFIP policyholders [nationally] paid a full-risk rate prior to either [Biggert-Waters] or [the Affordability Act], and are minimally impacted by either law.").

50. NYC RESILIENCY PLAN, *supra* note 2 at 96.

51. *Id.*

52. Anderson, *supra* note 48; *see generally* Lizette Alvarez & Campbell Robertson, *Cost of Flood Insurance Rises, Along With Worries*, N.Y. TIMES (Oct. 12, 2013), http://www.nytimes.com/2013/10/13/us/cost-of-flood-insurance-rises-along-with-worries.html?pagewanted=2&_r=0 (stating that coastal property owners are "Confronted with premiums that can range from $3,000 to $33,000 or much more, depending on the cost of the home and its risk.").

II. NYC'S CLIMATE ADAPTATION EFFORTS

A. NYC's Pre-Sandy Adaptation Efforts

In 2007, Mayor Bloomberg undertook the effort to create and implement PlaNYC, NYC's sustainability plan to be achieved by 2030.[53] In 2011, the City issued an update report to PlaNYC, in which the City described its climate adaptation goal to increase the "resilience" of communities, natural systems, and infrastructure to climate risks by 2030.[54] The City's approach to climate adaptation was one of risk-management, meaning the City focused primarily on information gathering and risk assessment.[55] The NPCC's findings suggest that the City promoted action only when it made sense to do so given the risk involved.[56] The City's general adaptation goals, as relevant to sea level rise and storm surge, included the following: "assess vulnerabilities and risks from climate change;" "increase the resilience of the city's built and natural environment;" "increase the city's preparedness for extreme climate events;" and "create resilient communities through public information and outreach."[57]

In assessing future climate change risks, the City planned to keep abreast of climate change projections and develop tools to more accurately measure the City's climate risks.[58] Additionally, the City intended to work with FEMA to update their FIRMs "to better represent our current climate exposure to improve the risk management available through the NFIP."[59] Yet, FEMA did not release updated FIRMs for NYC prior to Sandy; therefore, outdated 1983 FIRMs were in effect when Sandy hit.[60](Appendix, Figure 3).

The City planned to increase the resiliency of its environment and infrastructure through:

1. Updating regulations, such as amending zoning regulations to require "freeboard"[61] for a larger variety of buildings;

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53. CITY OF NEW YORK, *About PlaNYC*, NYC.GOV, http://www.nyc.gov/html/planyc2030/html/about/about.shtml (last visited Nov. 22, 2014).
54. PLANYC, *supra* note 1 at 151.
55. Interview with Leah Cohen, *supra* note 19.
56. *Id.*
57. PLANYC, *supra* note 1 at 151.
58. *Id.* at 151.
59. *Id.* at 151, 155.
60. *See supra* Section I.B.1.
61. NYC RESILIENCY PLAN, *supra* note 2 at 72 (explaining that "freeboard" means raising buildings "an incremental elevation" above the FEMA base flood elevation).

2. Working with the insurance industry to "understand the current state of flood insurance and protection in the City"[62] and to develop strategies to encourage flood protections in buildings;
3. Safeguarding the City's infrastructure through coastal protection measures; and
4. Identifying and evaluating potential coastal protective measures.[63]

Prior to Sandy, coastal protections such as bulkheads and floodgates were already in place.[64] In PlaNYC the City identified and began implementing additional coastal protection measures,[65] including infrastructure elevation, sea walls and levees, as well as measures that involve natural infrastructure, such as restoring wetlands and nourishing beaches.[66]

Ultimately though, PlaNYC was an "indirect procedural adaptation of a process for deciding among substantive adaptations," rather than a plan of substantive climate adaptations itself.[67] In other words, in PlaNYC the City focused more on information gathering and risk assessment in anticipation of future implementation, rather than implementing a range of coastal retreat measures and structural coastal protections. Yet, had the City known

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62. PLANYC, *supra* note 1, at 157.

63. *Id.* at 151.

64. NYC RESILIENCY PLAN, *supra* note 2, at 43, 53, 276 (explaining how bulkheads and tidegates were destroyed during Sandy; bulkheads are structures made of stone or concrete at the water's edge and floodgates (or tidegates) are devices that prevent water from flowing backwards through the drainage system).

65. Interview with Leah Cohen, *supra* note 19 (describing, for example, that the City designed a new park and public spaces on Governor's Island with sea level rise in mind. Certain areas were created to flood, based on projections. Salt-water species were planted in these areas. To protect trees that depend on fresh groundwater, the City raised the roots of newly planted trees above projected flood zones by altering the island's topography. The Sims Recycling Center and Willets Point Redevelopment, a new neighborhood, were raised out of the future 1-in-100 year flood plain.); Cynthia Rosenzweig et al., *Developing Coastal Adaptation to Climate Change in the New York City Infrastructure-shed: Process, Approach, Tools, and Strategies*, 106 CLIMATIC CHANGE 93, 114, 123 (2011), *available at* http://pubs.giss.nasa.gov/abs/ro06110e.html (describing that at La Guardia Airport, the Port Authority of New York and New Jersey has surrounded exposed structures with local sea walls and dykes (levees). The NYC Department of Environmental Protection is currently raising the pumps and electrical equipment in its Far Rockaway Treatment Plant from below sea level to fourteen feet above sea level.).

66. NYC RESILIENCY PLAN, *supra* note 2 at 58 (explaining that beach nourishment is a coastal protection measure that involves adding large quantities of sand to the beach on a regular cycle to prevent sand erosion and protect infrastructure during storm surges).

67. GERRARD, *supra* note 5 at 9 (citing Alejandro E. Camacho, *Adapting Governance to Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L. J. 1, 17–25 (2009)).

that Hurricane Sandy was headed its way, PlaNYC might have read differently.[68]

1. Hurricane Sandy Hits NYC

Hurricane Sandy, which was three times the size of Hurricane Katrina, hit New York City on October 29, 2012.[69] Mayor Bloomberg proclaimed Sandy "the worst natural disaster ever to hit New York City."[70] Causing over $19 billion in damages, Sandy's storm surge eroded shorelines and flooded entire communities, damaging and destroying homes, buildings, and critical infrastructure.[71] South Queens, Southern Brooklyn, and the East and South Shores of Staten Island were hit particularly hard. Also hit hard, were the Brooklyn-Queens Waterfront and Southern Manhattan.[72] These neighborhoods accounted for over 90 percent of inundated areas in the City.[73] Many of these neighborhoods were outside the 100-year-flooplain boundaries set in the 1983 FEMA FIRMs for NYC, as "Sandy's storm tide caused flooding that exceeded the 100-year floodplain boundaries by 53 percent citywide."[74] (Appendix Figure 3).

Seventy-thousand NYC housing units were registered with FEMA as sustaining at least some level of damage.[75] Elevated developments, such as Battery Park City in Lower Manhattan, survived Sandy with minimal damage compared with nearby locations that were not elevated.[76] Despite barges, bulkheads, dunes, and nourished beaches, which helped to mitigate the storm's impact, the storm had an "incredibly destructive" impact on the City's coastline and an "extensive" impact on waterfront infrastructure,

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68. NYC RESILIENCY PLAN, *supra* note 2 at 1 ("[S]andy's magnitude, its effects on so many parts of the city, and the threat of ever greater risks from climate change also taught a second lesson: we needed to redouble our efforts.").

69. NYC RESILIENCY PLAN, *supra* note 2 at 5; *see* Kim Ann Zimmermann, *Hurricane Katrina: Facts, Damage, and Aftermath*, LIVE SCIENCE (Aug. 20, 2012, 12:47 PM), http://www.livescience.com/22522-hurricane-katrina-facts.html. Hurricane Katrina hit New Orleans in 2005 and was one of the deadliest hurricanes in U.S. history.

70. NYC RESILIENCY PLAN, *supra* note 2 at 1.

71. *Id.* at 5.

72. *Id.* at 11, 18.

73. *Id.* at 18.

74. *Id.* at 13, 69 ("Sandy's waters inundated an area that included approximately 88,700 buildings, more than half of which were located outside the 1983 floodplain boundaries that were in effect when the storm arrived.").

75. NYC RESILIENCY PLAN, *supra* note 2 at 14–15, 74 (explaining that building damage varied widely; of 70,000 housing units inspected by FEMA, 49 percent sustained damage in excess of $10,000 and 12 percent in excess of $30,000; of 22,000 rental-housing units inspected, 26 percent sustained "substantial damage.").

76. *Id.* at 43.

such as boardwalks and terminals.[77] Most relevant to this analysis, the storm "overtopped" and even "destroyed" bulkheads around the City, and also damaged several tide and floodgates.[78]

In reflecting on Sandy's impact, the City stated, "The long-term sustainability plan we launched in 2007—PlaNYC—included forward-looking resiliency initiatives that provided important protections during Sandy. But the storm set the bar higher—and as the possibility of more severe weather increases with climate change, we must rise to the occasion."[79] The City is attempting to rise to the occasion with PlaNYC: "A Stronger, More Resilient New York."

B. NYC's Post-Sandy Adaptation Efforts

In "A Stronger, More Resilient New York," ("the Resiliency Plan") the City acknowledged that the combined risk of storm surge and sea level rise threatens the City's coasts and buildings, and consequently, could cause flood insurance rates to increase.[80] The Resiliency Plan strives to make NYC safer and more resilient to these expected future climate change impacts.[81]

Generally, the City's coastal planning strategy involves:

1. "Hard armoring," which are man-made coastal protection structures such as bulkheads, dikes, and levees;
2. "Soft armoring," which describe natural infrastructure measures such as restoring wetlands, beach nourishment, and beach dunes; and
3. Further research on effective coastal and flood protections with the U.S. Army Corps of Engineers ("USACE").[82]

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77. *Id.* at 14, 43.

78. *Id.* at 276, 374.

79. *Id.* at 1 (explaining that the City stated: "New York City had been right to invest in protections against extreme weather. Our resiliency investments performed well during Sandy: recently restored wetlands helped to soak up floodwaters like sponges; new, elevated buildings in inundated areas emerged with significantly less damage; much of the sewer system continued to operate and was restored almost completely within five days of the storm. But Sandy's magnitude, its effects on so many parts of the city, and the threat of ever greater risks from climate change also taught a second lesson: *we needed to redouble our efforts.*") (emphasis added).

80. *Id.* at 44–46, 76, 100.

81. NYC RESILIENCY PLAN, *supra* note 2 at 1–2.

82. *Id.* at 48, 51–56 (providing on pages 51–52 a comprehensive map of planned hard armoring and soft armoring protection measures around NYC, which include: beach nourishment, armor stone (revetments), bulkheads, and tide gates to increase coastal edge elevations; dunes, offshore breakwaters, wetlands, living shorelines, reefs, and groins to minimize upland wave zones, and integrated flood protection systems, floodwalls/levees, local storm surge barriers, and multi-purpose levees to protection against storm surge. See pages 53–56 for definitions and graphics of these coastal protection measures; and see page 48 for a comprehensive graphic of all coastal resiliency measures.).

The City plans to begin implementing this strategy through 37 Phase-I initiatives, which are specific, localized, and marked for completion either in the near future or sometime in the next decade.[83]

To increase the resiliency of its buildings, the City has a two-prong approach: (1) Strengthen both new and "substantially improved" buildings to meet the highest possible resiliency standards; and (2) Protect existing buildings by encouraging targeted retrofits of "core flood resiliency measures" over time.[84]

Substantially improved buildings are "buildings for which the cost of alteration is greater than 50 percent of their previous value."[85] The City plans to improve the resiliency of new and substantially improved buildings primarily through regulations that require "increased resiliency measures" during construction or major retrofits.[86] For instance, the City now requires new and substantially improved buildings in the updated FEMA 100-year-floodplain to include freeboard, which raises buildings above the FEMA base flood elevation level.[87]

Though not a central part of its buildings resiliency plan, the City is also cooperating with New York State in identifying NYC communities that are eligible for the state's $171 million New York Smart Home Buyout Program, which encourages highly vulnerable property owners to relocate through a "buyout" of their properties.[88]

The City's real challenge is retrofitting existing buildings, many of which were built prior to the issuance of FEMA maps, and thus "it is either prohibitively expensive, physically infeasible, or both, to retrofit these buildings to meet national flood-resistant construction standards in full."[89] In this situation, some local governments might choose to pursue a policy

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83. *See id.* at 57–65 (explaining the City's description of these initiatives).

84. *Id.* at 78.

85. *Id.*

86. NYC RESILIENCY PLAN, *supra* note 2 at 78–81 (explaining that the City has six initiatives to strengthen new and substantially improved buildings: (1) "Improve regulations for flood resiliency of new and substantially improved buildings in the 100-year floodplain;" (2) "Rebuild and repair housing units destroyed and substantially damaged by Sandy;" (3) "Study and implement zoning amendments to encourage retrofits of existing buildings and construction of new resilient buildings in the 100-year-floodplain;" (4) "Launch a competition to encourage development of new, cost-effective housing types to replace vulnerable stock;" (5) "Work with New York State to identify eligible communities for the New York Smart Home Buyout Program;" and (6) "Amend the Building Code and complete studies to improve wind resiliency for new and substantially improved buildings.").

87. *Id.* at 71–72, 79 (defining base flood elevations as the "height to which floodwaters potentially could rise").

88. *Id.* at 79, 81 (supporting the assertion that NYC is not pursuing a policy of managed retreat from the coast, which would mean more buyouts; the City states "buyouts would be a tool in the City's tool kit, but one that would be used sparingly and, where used, would most commonly be used with the goal of redeveloping acquired properties in a more resilient fashion").

89. *Id.* at 79.

of retreat from the coast. Yet, the City claims that pursuing a policy of managed coastal retreat is "not a practical option" given the many buildings on the coast and the limited alternatives for a growing population in NYC. The City also contends that new buildings can be constructed to address the flood risks faced by most coastal neighborhoods.[90]

Thus, the City is consciously *not* pursuing a coastal retreat strategy. Rather, it is encouraging existing buildings in the updated 100-year-floodplain to strengthen their resiliency by taking advantage of over one billion dollars in monetary incentive programs, such as grant, loan, and sales tax abatement programs, to implement its "core flood resiliency measures."[91] Core resiliency measures involve elevation and other flood protections for critical equipment and utilities in buildings.[92] Through these monetary incentive programs, the City encourages property owners to implement core resiliency measures and to develop additional innovative strategies to improve building resiliency.[93]

The City plans to mandate resiliency in existing buildings through enacting and amending applicable regulations; for example, by requiring large buildings to undertake certain flood-protection measures by 2030.[94] A Community Design Center will assist property owners in resilient reconstruction and retrofits, and also connect them to available City programs.[95]

In addition to coastal protection and building resiliency, the City is addressing flood insurance. The City publicly supports the Biggert-Waters Act because it believes in principle that flood insurance premiums should reflect the true risk of living near the coast.[96] At the same time, the City

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90. *Id.*

91. NYC RESILIENCY PLAN, *supra* note 2 at 79, 83, 85 (explaining that the City is (1) Providing a $1.2 billion incentive program of grants and loans; (2) Dedicating $108 million to retrofit public housing units damaged by Sandy for increased resiliency; (3) Launching a sales tax abatement program to subsidize flood resiliency in industrial buildings; and (4) Launching a competition to increase flood resiliency in building systems, with grants from the competition's $40 million budget to be awarded to winners in 2014).

92. *See id.* at 83 (providing more information on these core measures).

93. *Id.*

94. *Id.* at 85 (explaining that the mandatory resilience regulation for large buildings applies to buildings with seven or more stories that are over 300,000 sq. ft. in size; additionally, the City plans to "clarify regulations relating to the retrofit of landmarked structures in the 100-year floodplain," and "amend the Building Code to improve wind resiliency for existing buildings and complete studies of potential wind resiliency retrofits").

95. *Id.* at 84.

96. Katherine Greig, Senior Policy Advisor at the NYC Mayor's Office of Long Term Planning and Sustainability, Presentation at the Penn. Program on Regulation and the Wharton Risk Management Center Seminar on Learning from Hurricane Sandy: A Panel Discussion on Reducing Future Disaster Loses (Nov. 12, 2013) [Presentation at the Penn. Program]; *see also* Katherine Greig, *A Stronger, More Resilient New York*, PLANYC 9 (Nov. 12, 2013),

encourages New Yorkers to buy flood insurance policies in order to enhance their storm resiliency. Thus, the City also supports the Affordability Act so that FEMA can address the affordability of rising premiums.[97]

To promote the purchase of flood insurance, the City had FEMA release preliminary work maps ("PWMs") for NYC's FIRMs in June 2013. The City expects FEMA to release the updated FIRMs for NYC in 2015.[98] An important point to note—these maps do not represent the full flood risk to NYC because they are based on historical data and do not account for expected changes in coastal storms or projected sea level rise going forward.[99] (Appendix Figure 4).

In addition, the City is calling on New York State, with the help of insurers, brokers, and agents, to educate the public about flood insurance by raising policyholder awareness at the point of a policy's sale or renewal.[100] The City also plans to encourage the purchase of flood insurance by launching a consumer education campaign.[101] To address affordability, the City is considering joining FEMA's Community Rating System, which would require NYC to implement extra floodplain management activities in exchange for reduced premiums for all NYC policyholders.[102] Additionally, the City is calling on FEMA to develop premium mitigation credits, which would enable policyholders to reduce their premium costs by implementing resiliency measures. Lastly, the City is asking FEMA to offer policyholders flexible pricing options to make flood insurance more affordable.[103]

If no progress is made on the affordability of flood insurance policies under the Affordability Act by the time FEMA's new FIRMs take effect in 2015, the City may directly increase affordability by creating a fund to cost-share premiums or deductibles in the event of the next major storm.[104] Yet,

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http://opim.wharton.upenn.edu/risk/downloads/2013-StrongerNewYork.pdf (presenting WHARTON SCHOOL, *Learning from Hurricane Sandy: A Panel Discussion on Reducing Future Disaster Losses*, YOUTUBE (Dec. 17, 2013) https://www.youtube.com/watch?v=Xz_-9R-8TIE).

97. *See* Presentation at the Penn. Program, *supra* note 96 (supporting the idea that flood insurance premiums should be more reflective of the actual risk of owning coastal property, but also supports premium affordability for its constituents).

98. NYC RESILIENCY PLAN, *supra* note 2 at 45, 80 ("[The 2013 PRMs] reflect an expansion of the city's 100-year floodplain by 15 square miles, or 45 percent, over the 1983 FIRMs. The new floodplain consists of larger portions of all five boroughs, with significant expansion in Brooklyn and Queens. The new 100-year floodplain on the PWMs now includes 67,700 structures (an increase of 91 percent over the number of structures in the 100-year floodplain in the 1983 FIRMs).").

99. *Id.* at 69 (warning that sea level rise could expand the size of the City's floodplain to include more than 88,000 buildings by the 2020s and more than 114,000 buildings by the 2050s).

100. *Id.* at 102–03.

101. *Id.* at 103.

102. *Id.* at 102.

103. NYC RESILIENCY PLAN, *supra* note 2 at 102.

104. *Id.* at 101.

the City emphasized that it is not able to "take broad action on this issue," which is why its focus is on FEMA regulations.[105]

In sum, after Sandy's devastating impact, the City is strengthening its resiliency to the next major storm through: installing hard and soft coastal protection measures; offering monetary incentives and enacting regulations to encourage "core" building resiliency measures; and advocating for affordable flood insurance premiums to encourage New Yorkers to purchase flood insurance.

1. NYC's Adaptation Tools vs. Potential Adaptation Tools

While NYC is using many resiliency tools to adapt to the aforementioned climate risks, there are additional resiliency tools, and variations of tools, that the City is not using.[106]

For example, the City is instituting "building and rebuilding restrictions" through requiring freeboard and other core resiliency measures to be implemented in certain new and existing buildings.[107] Yet, the City does not plan to impose a temporary building moratorium. This would forestall new building permits while the new regulations are enacted to ensure that all buildings receiving new permits are subject to the latest resiliency restrictions.[108] Nor is the City "limit[ing] the extent or number of repairs after disasters," though doing so could maximize the City's adaptation efforts.[109] Additionally, although the City is using information disclosure to encourage resiliency awareness and implementation, it can make more use of this tool by requiring coastal property sales to inform prospective purchasers of the risks of coastal living.[110]

As mentioned, the City is cooperating with New York State's Buyout Program in a limited fashion. For those few NYC properties deemed eligible under the Program, the City plans to redevelop the space with high resiliency as opposed to converting the property to open space.[111] Yet some argue that abandoning development of highly vulnerable, bought-out properties and creating a floodplain in those areas instead would most effectively increase the City's resiliency in future storms.[112]

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105. *Id.*

106. *See* SIDERS, *supra* note 23 at 5–7 (outlining coastal management tools).

107. SIDERS, *supra* note 23 at 6; NYC RESILIENCY PLAN, *supra* note 2 at 79, 83.

108. SIDERS, *supra* note 23 at iii (explaining that, in implementing regulations quickly, the City will also prevent further "grandfathering" of buildings under the old regulations).

109. *Id.* at 6.

110. *Id.* at iii.

111. NYC RESILIENCY PLAN, *supra* note 2 at 79, 81.

112. *See* SIDERS, *supra* note 23 at iv ("Managed Retreat is not only about re-locating existing communities but also about preventing new development in vulnerable areas.").

Indeed, the City's no-retreat policy manifests itself through its decision not to pursue numerous coastal retreat measures such as: downzoning,[113] zoning overlays,[114] conservation easements,[115] setbacks,[116] exactions,[117] and condemnations,[118] all of which limit development on vulnerable coastal property and none of which are mentioned in the City's Resiliency Plan. If the City were to implement some of these tools, it could mitigate the resulting economic burden on vulnerable property owners. This can be done through transferrable development credits ("TDCs"), which "sever development rights from property ownership" so that "landowners in vulnerable areas can sell their development rights to landowners in less-vulnerable areas."[119] But the City does not use TDCs.

In sum, rather than using coastal retreat tools to discourage coastal property development, the City is using incentives and regulations to encourage development on the coast, albeit in a more resilient way. For instance, the City's capital improvement plans provide an opportunity to "study the vulnerability of their infrastructure to projected climate change impacts and then decrease investment in infrastructure in vulnerable areas."[120] In its plan, the City states that 58 "at-risk" pumping stations, which are located in low-lying areas and are vulnerable to storm surges, are scheduled for capital improvement.[121] Yet, rather than decrease investment at these sites and re-build pumping sites in a safer location, the City plans to implement resiliency projects at these vulnerable pumping stations.[122]

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113. *Id.* at 6 (explaining that downzoning "[l]imit[s] potential uses and intensity of use in areas vulnerable to the effects of climate change to decrease development potential").

114. *Id.* (explaining that zoning overlays "provide an additional layer of zoning requirements in specialized areas such as coastal hazard areas").

115. WOLTERS KLUWER, BOUVIER LAW DICTIONARY 367 (Stephen Michael Sheppard, ed. 2011) (explaining that conservation easements are "a limitation on the use and development of lands owned by a governmental agency or charitable organization, that thereby may prohibit the owner of the property from engaging in certain activities on the land or requirement certain practices on the land that would protect the environment"). Although there could be a takings issue if the City tried to limit development through a conservation easement, the latter action has been upheld in New York courts. *See* JON A. KUSLER & EDWARD A. THOMAS, NO ADVERSE IMPACT AND THE COURTS: PROTECTING THE PROPERTY RIGHTS OF ALL 34–35 (2007) (citing Smith v. Town of Mendon, 822 N.E.2d 1214 (N.Y. 2004)).

116. SIDERS, *supra* note 23 at 6 (explaining that setbacks "[r]equire new development to be sited upland to avoid flooding").

117. *Id.* (explaining that exactions, also known as conditional permits, "[g]rant development permits with retreat conditions (e.g. no armoring, setback requirement, rolling easement)").

118. *Id.* (explaining that condemnations "[e]stablish [a] policy of declaring homes too close to shore (and therefore exposed to erosion and storms) as being unsafe for habitation").

119. *Id.* at 7.

120. *Id.* at 5.

121. NYC RESILIENCY PLAN, *supra* note 2 at 330.

122. *Id.*

The City's coastal resiliency plan is primarily dependent on hard armoring tools, such as bulkheads, levees, and dikes.[123] While these tools offer "strong and predictable levels of security" and can be integrated into other infrastructure to enhance development, they have significant long-term economic and environmental costs, including: eliminating ocean beaches, estuarine beaches, and wetlands; decreasing intertidal habitats; increasing maintenance costs; and fostering a false sense of security that encourages development in vulnerable areas.[124] The City is also using soft armoring tools like beach nourishment, dunes, and restoring wetlands, which have their own environmental consequences, but overall are more cost efficient and environmentally friendly. [125] Consequently, "[m]any scientists, planners, and civil engineers now argue that the use of soft armoring should be dramatically expanded, and . . . soft armoring should be preferred to hard armoring."[126] Thus, the City should arguably prioritize soft-armoring measures over hard-armoring measures in its planning.

In sum, the City is using adaptation tools that promote coastal resiliency as opposed to coastal retreat. Yet, according to Burkett, "Balancing retreat against the current approaches of armoring, rebuilding, and starting all over again increasingly demonstrates that *reasonable conduct will militate in favor of actively moving away from the coasts*."[127] In other words, potential plaintiffs could argue that coastal cities are not adapting reasonably "when they neither seriously consider nor actively pursue [coastal] retreat through regulation," and instead continue rebuilding.[128] In looking at NYC's pre and post Sandy adaptation measures,

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123. ROBERT R.M. VERCHICK & JOEL D. SCHERAGA, *Protecting the Coast*, *in* THE LAW OF ADAPTION TO CLIMATE CHANGE: U.S. AND INTERNATIONAL ASPECTS 241 (Michael B. Gerrard & Katrina Fischer Kuh eds., 2012).

124. *Id.* at 241. Additionally, if these structures fail, there will be huge costs in life and property, as seen during Hurricane Katrina when the levees broke. *Id.* And, as discussed *infra*, if these structures fail in the next storm, the City can be held liable.

125. VERCHICK & SCHERAGA *supra,* note 123 at 250–51; *see also Shoreline Stabilization Techniques*, N.Y. DEP'T OF ENVTL. CONSERVATION (July 2010), http://www.dec.ny.gov/docs/permits_ej_operations_pdf/stabiltechguid.pdf (stating that "softer" shoreline protections can be more efficient because they have lower maintenance costs and are more durable and resilient, aesthetically pleasing, and environmentally friendly). For example, beach nourishment has environmental consequences, such as the introduction of species from additional foreign sand and the impact of removing large quantities of sand from another ecosystem. Yet, overall soft infrastructure tools enhance ecosystem services and are more flexible, making incremental adaptation management easier.

126. VERCHICK & SCHERAGA *supra,* note 123 at 251.

127. Burkett, *supra* note 7 at 799 (emphasis added).

128. Burkett, *supra* note 7 at 799; Paul M. Coltoff et al., *Continuing Immunity for Performance of Governmental Functions, Generally*, 62 N.Y. JUR. 2D GOV'T TORT LIAB. § 17 (2014) (stating that the process of a city "considering" an adaptation action involves a decision based on "adequate deliberation and study").

would a New York court rule that NYC was unreasonable for failing to pursue a more stringent climate adaptation plan that promotes a policy of coastal retreat?

III. CLIMATE CHANGE LIABILITY

A. Climate Change Common Law Precedent

In the last decade a series of climate mitigation suits, known as "carbon torts," were filed wherein defendants sued polluters (primarily oil, energy, and utility companies) under tort claims of nuisance and negligence, seeking an injunction to reduce or stop the emission of greenhouse gases.[129] These claims have largely proved unsuccessful on "standing or justiciability grounds."[130] The Supreme Court basically closed the door on climate change torts in *American Electric Power Company, Inc. v. Connecticut*, when it held that, "the Clean Air Act and the [Environmental Protection Agency] actions it authorizes displace any federal common law right to seek abatement of carbon-dioxide emissions from fossil-fuel fired power plants."[131] In short, based on common law precedent, "it does not appear that tort litigation is a fruitful legal avenue for addressing climate change."[132]

While common law precedent has largely precluded successful carbon torts, such precedent has not precluded all climate adaptation claims. This is primarily because there have not been many adaptation claims filed in U.S. court and thus the courts have yet to rule on the issue.[133] Despite proving unfruitful so far, Burkett argues that tort law can potentially "address climate impacts directly, by spurring compensation for harms incurred, and

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129. *See, e.g.*, Comer v. Murphy Oil USA, Inc., 718 F.3d 460, 465 (5th Cir. 2013); Am. Elec. Power Co., Inc. v. Connecticut, 131 S. Ct. 2527, 2532–34 (2011) (providing examples of "carbon tort" suits). *See also* WOLTERS KLUWER, *supra* note 115 at 741, 1109 (explaining that a "Private Nuisance" is "the use of one's property in a manner that creates a significant harm in another's use or enjoyment of private lands," while a "Public Nuisance" "includes not only unlawful conduct on private property but also...persistent conduct that is not associated with real property but can still create a harm or risk of harm to the public health, safety, or convenience," as opposed to a "Negligent Tort" which is "a wrongful act resulting in an unintended harm.").

130. David Rivkin, Jr. et al., *Climate Change Litigation Since Mass v. EPA*, 9 ENGAGE: J. FEDERALIST SOC'Y PRAC. GRPS. 1 (2008); WOLTERS KLUWER, *supra* note 115 at 1047. A plaintiff does not have standing to sue when he "cannot demonstrate an interest sufficient" for the court to hear his claim. *See* Michael B. Gerrard, *What the Law and Lawyers Can and Cannot Do About Global Warming*, 16 SOUTHEASTERN ENVTL. L.J. 33, 40 (2007) ("The district courts in *Connecticut*, *Comer*, and *General Motors* all expressed a strong reluctance to forge a judicial solution to what they considered a political problem, especially when difficult technical questions were involved.").

131. 131 S. Ct. at 2537.

132. Gerrard, *supra* note 130 at 40.

133. Burkett, *supra* note 13 at 11,146.

indirectly, by galvanizing both mitigation and adaptation measures to avoid the threat of liability."[134] In other words, she argues plaintiffs could potentially succeed on a climate adaptation claim seeking direct damages from climate impacts (i.e. monetary compensation), as opposed to a claim seeking an injunction on a given action to mitigate climate change. If a claim for climate adaptation damages did succeed (which seems unlikely given this paper's analysis), the court would encourage defendants and similarly situated entities to institute adaptation or mitigation measures, or both, to prevent future liability.[135]

Suing the appropriate defendant is "key" to a successful climate change adaptation suit.[136] But common law precedent seemingly precludes climate adaptation claims against polluters in *Kivalina*.[137] In *Kivalina*, the Alaskan native village of Kivalina sued oil, energy, and utility companies seeking monetary damages to compensate the cost of relocating their village, which would no longer be habitable due to climate change impacts.[138] The Ninth Circuit dismissed the case on standing and judiciability grounds.[139] Specifically, the plaintiffs could not satisfy the causation requirement needed to assert Article III standing, as they could not show that the defendants' emissions in particular contributed to the erosion of Arctic sea ice near their village, forcing them to relocate.[140] A similar causation issue would likely arise if New Yorkers tried to sue polluters for monetary damages to compensate for property destruction or increased flood insurance premiums after Hurricane Sandy. It would be difficult to prove that a polluter's particular emissions exacerbated the effects of Hurricane Sandy, and in doing so, caused particular property damage or insurance rate increases.

Yet, if NYC coastal property owners sued the City for negligence in instituting adequate adaptation measures prior to Sandy, thereby exacerbating Sandy's damage and subsequent flood insurance rate increases, causation would be easier to prove. Indeed, "a defendant's unreasonable action with respect to climate hazard preparedness and its link to plaintiff's harms will be much easier to prove, at least in theory, than the

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134. *Id.* at 11,144.

135. BEN SCHUELER, *Governmental Liability: An Incentive for Appropriate Adaptation? in* CLIMATE CHANGE LIABILITY 237 (Michael Faure & Marjan Peeters, eds., 2011) ("Liability systems are supposed to stimulate actors to make the right decisions, because these actors are expected to limit their responsibility for compensation.").

136. Burkett, *supra* note 13 at 11,144.

137. *Kivalina*, 696 F.3d at 854.

138. *Id.* at 853.

139. *Kivalina*, 696 F.3d at 867.

140. *Id.* at 867–68 (Pro, J., concurring).

causal link between a carbon emitter's actions and a given harm."[141] This is especially so given that the probability of damages attributed to climate change is documented more frequently, which "allow for stronger arguments on causation," and thus "strengthen[s] plaintiffs' cases for a breach of the duty of reasonable care."[142] Even though NYC is not responsible for the weather, Burkett argues that if the City is aware of climate risks and takes on an affirmative duty to adapt to those risks, negligence in its adaptation efforts could result in liability.

B. Why Sue the Local Government?

Local governments are appropriate defendants in climate adaptation suits because they have the ability to implement local adaptation measures and in many cases have done so. Thus, climate adaptation suits can hold cities responsible for adapting responsibly and encourage them to do so.[143] Local governments have the jurisdiction to implement adaptation measures as they "are responsible for everything from land-use planning and development to infrastructure management to public health and emergency planning."[144] Not only can cities institute adaptation measures, cities are the appropriate scale of government to address the issue because "experiences of climate-induced weather events will vary at much smaller geographical scales."[145] Climate adaptation suits can motivate cities to implement adaptation measures, either directly as the result of a particular suit, or indirectly to avoid the liability risk of a potential suit. Yet, local governments have sovereign immunity in certain contexts and thus do not always have a legal duty for which they can be held accountable in court.

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141. Burkett, *supra* note 13 at 11,148.

142. Hunter & Salzman, *supra* note 11 at 1764.

143. "Local government" can include municipalities, boroughs, towns, districts, and more. Given this paper's focus on NYC, "local government" refers to a municipality or a city, but can apply to other forms of local government as well. Of course, other entities might be appropriate defendants in climate adaptation suits, such as the state government, the federal government, a developer, an insurance agency, or a utility company. Indeed, the New York State Public Commission Service recently ordered Con Edison to implement climate adaptation measures in its gas, steam, and electric systems, indicating that utilities in NY will have a legal duty to adapt to climate change. Ethan Strell, *Public Service Commission Approves Con Ed Rate Case and Climate Change Adaptation Settlement*, COLUMBIA CLIMATE LAW BLOG (Feb. 21, 2014), http://blogs.law.columbia.edu/climatechange/.

144. Burkett, *supra* note 7 at 783. In a poll, New Yorkers found that the local government had the most potential to improve environmental quality in NYC [in addition to individuals]. PlaNYC, *supra* note 1 at 174–75.

145. Burkett, *supra* note 7 at 778.

C. Local Government Climate Adaptation Liability

1. Legal Duty: Ministerial vs. Discretionary Actions

To file a successful climate adaptation claim under a common law tort negligence theory, a plaintiff must satisfy the four classic elements of a tort suit: duty, breach, causation, and injury.[146] Before a plaintiff can assert the latter three elements, a defendant must first have a legally recognized duty.[147] NYC does not have a statutory mandate from New York State or the federal government to adapt to climate change and thus has no specific legal duty. Given the City's lack of an affirmative duty, New York common law is significantly less likely to hold the City liable for its climate adaptation efforts.

Generally, New York State has sovereign immunity against lawsuits unless it waives its immunity.[148] New York State partially waived sovereign immunity on behalf of its municipalities, including NYC, so that NYC is "subject to that liability for which an individual or corporation would have been liable" but "it is not liable for the exercise of governmental functions, which are sovereign in character."[149] This principle manifests in New York common law, which like other jurisdictions, distinguishes between ministerial functions and governmental functions in determining the City's legal duties and thus potential liability.[150]

NYC can be held liable for landowner actions that it conducts as part of its "ministerial" or operational duties.[151] In this capacity, the City is subject to liability for impacts from the design, construction, operation, and maintenance of structural measures, such as dams, levees, and groins.[152]

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146. Hunter & Salzman, *supra* note 11 at 1744–45.

147. John J. Dvorske, *Existence of Legal Right and Duty* 103 N.Y. JUR. 2D TORTS § 6 (2014).

148. Paul M. Coltoff et al., *Sovereign Immunity and Waiver Thereof, Generally*, 62 N.Y. JUR. 2D GOV'T TORT LIAB. § 1 (2014).

149. Coltoff, *supra* note 128 (citing McLean v. New York, 905 N.E. 2d 1167 (2009)).

150. JON A. KUSLER, ASS'N OF STATE FLOODPLAIN MANAGERS, A COMPARATIVE LOOK AT PUBLIC LIABILITY FOR FLOOD HAZARD MITIGATION, 13–15 (Feb. 2009), *available at* http://www.floods.org/PDF/Mitigation/ASFPM_Comparative_look_at_pub_liability_for_flood_haz_mitigation_09.pdf (explaining that in regards to the legal duties of local governments, general common law distinguishes between "discretionary" acts done in a "governmental capacity" and "landowner" acts done in a "ministerial capacity").

151. Valdez v. New York, 960 N.E.2d 356, 362 (2011). *See also* KUSLER, *supra* note 150 at 21 (stating that "operation or administration of a hazard mitigation measure is considered ministerial," as opposed to discretionary).

152. Burkett, *supra* note 13 at 11,154 (citing KUSLER, *supra* note 150 at 13–14 ("Structural flood loss reduction activities are *not* exempted from suit at state or local levels.")). Structural measures are physical adaptation tools, whereas non-structural measures are non-physical adaptation tools, such as an adaptation plan, a building code regulation, or a FEMA map.

But under New York law, NYC can only be held liable for its ministerial actions if it violates a special duty to the plaintiff; in other words, a plaintiff must prove that he had a special relationship with the City.[153] To demonstrate a special relationship with the City, plaintiffs must demonstrate that the municipality violated a special duty owed to the plaintiff apart from any duty to the public in general.[154] Specifically, under the *Valdez* test plaintiffs must show: (1) "an assumption by the municipality, through promises or actions, of an affirmative duty to act on behalf of the party who was injured [the individual, not the public at large];" (2) "knowledge on the part of the municipality's agents that inaction could lead to harm;" (3) "some form of direct contact between the municipality's agents and the injured party;" *and* (4) "that party's justifiable reliance on the municipality's affirmative undertaking."[155]

Proving a special relationship with the City in a climate adaptation suit is a high burden for plaintiffs, as adaptation measures are typically implemented for the public at large. It is arguable that the City erects coastal barriers to prevent flooding of coastal properties and thus the City owes a special duty to coastal property owners. Indeed, NYC coastal property owners might be able to show with relative ease that in implementing a particular structure, the City assumed an affirmative duty by instituting structural adaptation measures on behalf of the plaintiffs. Further, that the City knew that failure to institute such structural adaptation measures could lead to harm in the event of a storm. It might be a bit more difficult, but not impossible, for such plaintiffs to show that they relied on the City's implementation of this structural measure by choosing to live on the coast or failing to institute their own measures. Yet, assuming the plaintiffs could get over these hurdles, it would be more difficult to show that some form of direct contact between the City and the property owners occurred regarding the structure at issue. Thus, even though the City can be held liable for negligence regarding its structural measures, the special relationship requirement limits the extent of this liability.

Outside of structural measures, NYC retains its immunity for "discretionary" actions performed in the exercise of "governmental

153. *Valdez*, 960 N.E.2d at 361. In other jurisdictions, local governments can be held liable for their ministerial actions regardless of whether or not there is a special relationship between the government and the plaintiff. *See also* Burkett, *supra* note 13 at 11,154; KUSLER, *supra* note 150 at 14–15 (discussing "ministerial" liability in common law jurisdictions generally where no duty must be shown to establish liability).

154. *Valdez*, 960 N.E.2d at 362.

155. *Id.* at 365.

functions."[156] In other words, the City is immune from claims against non-structural measures, which are "governmental and administrative decisions based on adequate deliberation and study."[157] Such non-structural measures include decisions to institute an adaptation plan, and if so, what measures the subsequent adaptation regulation should contain.[158] Specifically, NYC's decisions to both enact PlaNYC and decide what initiatives PlaNYC's climate adaptation strategy should include are considered discretionary actions that are generally immune from liability.[159] Additional municipal discretionary acts that are afforded sovereign immunity include: the issuance of City building permits, weather and flood predictions, inspections, and regulation enforcement.[160]

In sum, discretionary measures, such as the planning of adaptation measures, are generally not subject to liability; only once a structural measure is implemented may the government potentially be held liable for negligence.[161] An exception to the City's immunity from discretionary decisions is if the City is statutorily mandated to implement an action, such as an adaptation plan.[162] In that case, the City would have an affirmative duty to institute such measures and could be held liable for failing to do so reasonably.[163]

NYC does not have an affirmative duty to implement climate adaptation measures.[164] But "[Federal] [c]ourts have repeatedly held that once a governmental unit elects to undertake government activities, even

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156. *Id.* at 361 ("[T]he common-law doctrine of governmental immunity continues to shield public entities from liability for discretionary actions taken during the performance of governmental functions.").

157. Coltoff et al., *supra* note 128.

158. KUSLER, *supra* note 150 at 12–14, 16 ("Courts at all levels of government have held, with few exceptions, that [municipalities'] decisions whether or not to mitigate hazards or adopt loss reduction measures are "legislative," "discretionary," or "policy" decisions which are not in themselves subject to liability.").

159. *See id.* at 14 (explaining generally that courts typically consider plan design and project design to be discretionary and not subject to liability).

160. *Id.* at 21, 22. Note that while inspections or enforcement are not subject to liability, maintenance of structural measures for adaptation are subject to liability, as mentioned *supra*. *See, e.g.*, Tuffley v. Syracuse, 442 N.Y.S.2d 326, 330 (N.Y. 1981) (holding the City liable for failure to conduct building inspections in New York). Also, NYC cannot be held liable for failing to accurately predict the weather. *See* Brown v. United States, 790 F.2d 199, 203 (1st Cir. 1986) (holding that the United States government was not liable for a fisherman's death because the government failed to predict the weather and labeling the maintenance of a weather buoy as a "discretionary undertaking"); *but see* discussion *infra* Part I.C.2 (explaining that when NYC takes on the responsibility to adapt to predicted climate risks, it must do so reasonably).

161. KUSLER, *supra* note 150 at 14.

162. Coltoff et al., *supra* note 128.

163. *Id.*

164. KUSLER & THOMAS, *supra* note 115 at 17 ("Courts have generally held that landowners and governments have no affirmative duty to remedy naturally occurring hazards.").

where no affirmative duty exists for such action, it must exercise reasonable care."[165] Similarly, a New York court held that the City could be held negligent for violating an assumed duty.[166] And in negligence cases, New York courts employ the standard of review common to most jurisdictions: "reasonable care under the circumstances."[167] Thus, Professor Maxine Burkett's argument that "while there is no affirmative duty to act to reduce naturally occurring flooding, for example, a municipality's ultimate decision to act triggers the duty to act reasonably," may be used by plaintiffs who wish to challenge NYC's voluntary climate adaptation efforts.[168]

2. Breach of Duty? Determining Reasonableness

There is no universal test that courts use to determine reasonable conduct in negligence cases.[169] However, courts widely use some version of Judge Learned Hand's utility "BPL" formula, which states that a local government is negligent when "the *b*urden (B) of preventing injury is less than the product of the *p*robability of loss (P) and the magnitude of injury or *l*oss (L) (B < P x L)."[170] Though New York courts may not use the BPL

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165. *Id.* (citing Indian Towing Co. v. United States, 350 U.S. 61, 69 (1955) (holding that "[O]nce [the Coast Guard] exercised its discretion to operate [the lighthouse] and engendered reliance on guidance afforded by the light, it was obligated to use due care . . . [and] [i]f the Coast Guard failed in its duty and damage was thereby caused to petitioners, the United States is liable under the Tort Claims Act.")).

166. Weyant v. New York, 616 N.Y.S.2d 428, 430 (N.Y. 1994) ("This Court upholds a jury finding of negligence for the violation of an assumed duty in the face of a statutory exemption." (citing *Indian Towing*, 350 U.S. at 61).

167. Scurti v. New York, 354 N.E.2d 794, 795 (N.Y. 1976) (holding that "[t]he liability of a landowner to one injured upon his property should be governed . . . by the standard applicable to negligence cases generally, i.e., the 'standard of reasonable care under the circumstances whereby foreseeability shall be a measure of liability.'") (citation omitted).

168. Burkett, *supra* note 7 at 785–86 (citing KUSLER *supra* note 150 at 10 and KUSLER & THOMAS, *supra* note 115 at 10). *See also* Christopher City, Note, *Duty and Disaster: Holding Local Governments Liable for Permitting Uses in High-Hazard Areas*, 78 N.C. L. REV. 1535, 1552 (2000) ("Under present law, a local government may be held liable for breaching a duty assumed when it takes actions that place third parties at risk of injury or otherwise induces reliance by third parties."). Courts are unlikely to waive the City's sovereign immunity in their discretionary decisions, but this paper shows that even if the City were to consider the plaintiff's substantive tort claims, the City is unlikely to be held liable for its pre- or post- Sandy adaptation efforts under current law.

169. Hunter & Salzman, *supra* note 11 at 1768 ("It is therefore not surprising to find that the problem of duty is as broad as the whole law of negligence, and that no universal test for it ever has been formulated . . . 'Duty' is not sacrosanct in itself, but is only an expression of the sum total of those considerations of policy which lead the law to say that the plaintiff is entitled to protection.").

170. *Id.* at 1756, 1768 ("Despite the attractive simplicity of the BPL calculus, in practice, no simple formula exists to determine the duty of care. Rather . . . courts generally balance a range of considerations [which include the utility factors].").

formula explicitly, they do use a utility analysis in negligence cases,[171] which incorporates the BPL factors.[172]

In the climate change adaptation context, "where the costs of accidents [such as floodwalls breaking] exceed the costs of preventing the accidents," the utility approach will impose liability.[173] And since the probability of damages caused by climate change is documented more frequently, plaintiffs will face an easier burden proving "two prongs of the BPL formula—the probability of harm (P) and the severity of the harm (L)."[174] Thus, "a BPL inquiry is possible and . . . the likely costs of avoidance may in some cases be less than the likely damages from climate change. Under Hand's formula, a defendant's failure to take those steps could be considered a breach of its duty to act reasonably under the circumstances."[175] In a climate change adaptation suit against NYC, a New York court would likely apply some version of the utility formula to assess the City's reasonableness in instituting adaptation measures.

Indeed, rather than applying the simple BPL formula, courts use a multifactor test to determine reasonable conduct, which includes the BPL elements: (1) the foreseeability of harm to the plaintiff; (2) the probability of harm; (3) proximate causation between the defendant's conduct and the injury suffered;[176] (4) moral blame attached to the defendant's conduct; (5)

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171. This is especially true in New York product liability cases—a type of negligence case—though New York courts recognize that the utility test is a traditional negligence test. *See, e.g.*, Denny v. Ford Motor Co., 662 N.E.2d 730, 735 (N.Y. 1995) ("The adoption of this risk/utility balance as a component of the 'defectiveness' element has brought the inquiry in design defect cases closer to that used in traditional negligence cases, where the reasonableness of an actor's conduct is considered in light of a number of situational and policy-driven factors . . . [T]he reality is that the risk/utility balancing test is a 'negligence-inspired' approach, since it invites the parties to adduce proof about the manufacturer's choices and ultimately requires the fact finder to make "a judgment about [the manufacturer's] judgment.") (citing United States v. Carroll Towing Co., 159 F.2d 169, 173 (2d Cir. 1947) [Judge Learned Hand]).

172. *Id.* ("This [risk/utility] standard demands an inquiry into such factors as (1) the product's utility to the public as a whole, (2) its utility to the individual user, (3) the likelihood that the product will cause injury, (4) the availability of a safer design, (5) the possibility of designing and manufacturing the product so that it is safer but remains functional and reasonably priced, (6) the degree of awareness of the product's potential danger that can reasonably be attributed to the injured user, and (7) the manufacturer's ability to spread the cost of any safety-related design changes.").

173. Hunter & Salzman, *supra* note 1 at 1757.

174. *Id.* at 1764.

175. *Id.* at 1768.

176. Note that causation is a separate element in the tort analysis, but one that is also considered in determining reasonableness or breach of duty.

policy of preventing future harm;[177] (6) the burden of preventing the injury; and (7) the availability and cost of insurance for the risk involved.[178]

In assessing municipalities' climate change adaptation efforts, courts typically consider the following factors: (1) the magnitude of harm threatened; (2) the foreseeability of the harm; (3) industry custom;[179] (4) whether the municipality acted in an emergency situation; (5) whether a special relationship exists between the injured party and the government; and (6) relevant statutes, ordinances, or regulations.[180] New York courts use multifactor tests in negligence cases[181] but do not apply a standard multi-factor test in all negligence cases, let alone in climate change adaptation cases. Still, in analyzing a climate change adaptation case against NYC, a New York court might use some of the aforementioned factors.

The negligence standard is "reasonable care under the circumstances."[182] It is unclear what "under the circumstances" means in the climate-change context. However Burkett purports that "local governments will need to act reasonably in light of the increased risk of extreme events caused by climate change, not the absolute certainty of their cause or occurrence."[183]

3. Filing Suit: Timing and Policy Concerns

A plaintiff who wishes to file a climate adaptation suit against NYC under a negligence theory must file his complaint within 90 days after "the accrual of such claim."[184] Alternatively, within 90 days after the accrual of the claim the plaintiff can provide the Attorney General with a written

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177. Hunter & Salzman, *supra* note 11 at 1770, 1775 ("Tort law is partly designed to deter [the] unreasonably risky conduct" of a case's particular defendants, as well as similarly situated defendants in the future. As such, courts adjudicating tort claims consider deterrence in determining liability.).

178. *Id.* at 1775–76 ("Despite the attractive simplicity of the BPL calculus, in practice, no simple formula exists to determine the duty of care. Rather, according to Prosser and Keeton, courts generally balance a range of considerations.").

179. KUSLER, *supra* note 150, at 13–14 (noting that industry custom is more informative with regard to structural adaptation; however, there is "no bright light to determine the unreasonableness of government decisions pertaining to nonstructural measures .")..Nevertheless, "Advances in hazard loss reduction measures create an increasingly high standard of care for reasonable conduct." KUSLER & THOMAS, *supra* note 115, at 14.

180. KUSLER & THOMAS, *supra* note 115 at 20–21.

181. *See, e.g.*, *Denny*, 662 N.E.2d at 735 ("[I]n traditional negligence cases . . . the reasonableness of an actor's conduct is considered in light of a number of situational and policy-driven factors.").

182. *Scurti*, 354 N.E.2d at 795.

183. Burkett, *supra* note 7 at 788.

184 Paul M. Coltoff et al., *Injuries to Property or Personal Injuries Caused By Negligence or Unintentional Tort*, 62A N.Y. JUR. 2D GOV'T TORT LIAB. § 301 (2014).

notice of intent to file a claim, in which case the plaintiff has two years after the accrual of the claim to file suit.[185] The statute of limitations has expired as of February 2013 for plaintiffs wishing to sue NYC for direct damages incurred due to Hurricane Sandy, except for plaintiffs who filed a notice of intent to sue with the Attorney General. Yet for those seeking indirect damages from Sandy, like increased flood insurance rate compensation, the "event giving rise to the action" is presumably the day plaintiffs were notified of their new premium. When the next "Sandy" hits NYC, potential plaintiffs have 90 days from the day of the storm to file a complaint or a notice of intent to sue.[186] Since a legitimate claim does not arise until the damaging event occurs, a plaintiff seeking *preventative* adaptation action in anticipation of future damages will likely not have a claim that is "ripe" or sufficient for adjudication.[187]

Even if a plaintiff can file suit and a court finds a municipality negligent in its adaptation efforts, it may refuse to hold the City liable for several reasons. For one, the duty to act reasonably does not extend to the unforeseeable plaintiff.[188] In the context of local adaptation, foreseeable plaintiffs seem to be restricted to property owners, workers, or residents in the municipality. A plaintiff outside of this group may not receive legal relief. Additionally, courts may not hold defendants liable if doing so would result in "an endless scope of liability" or a very large number of potential plaintiffs, which is counter to public policy.[189] Yet, courts can also prevent a large scope of liability by limiting the City's liability in a particular case.[190]

Plaintiffs may seek to file suit against NYC under a theory of negligence claiming that either a structural measure implemented by the City exacerbated damages during Sandy, or more generally, that the City did not adapt reasonably prior to Sandy. Assuming that a court was willing

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185. *Id.* at 1 (stating the time and requirements of accrual in regards to suits against a municipality, compared to claims against a state).

186. *Id.*

187. "Ripeness" is defined as "the timeliness of a claim for relief. Ripeness is the aspect of a plaintiff's claim for relief that would make a judgment timely and useful, rather than too early or too late." WOLTERS KLUWER, *supra* note 115 at 603. In other words, a plaintiff seeking an adaptation order in anticipation of damages from the next superstorm would likely have a claim that is too early to assess adequately and would thus be untimely.

188. Palsgraf v. Long Island R.R. Co., 162 N.E. 99, 99, 101 (N.Y. 1928); *see also* Hunter & Salzman, *supra* note 11 at 1780 ("Judge Cardozo found that Mrs. Palsgraf was not within the foreseeable zone of risk created by the defendant conductor's negligent effort to help another passenger on to the train. Thus, Mrs. Palsgraf, standing at the other end of the platform, was owed no duty, and, as a result, no liability was found.").

189. Hunter & Salzman, *supra* note 11 at 1781. This point will be discussed more in depth, *infra.*

190. *Id.* at 1782. This point is also discussed further, *infra.*

to forgo the City's sovereign immunity for the latter claim—which is unlikely—its analysis of both claims might read as follows.

D. Filing Suit Against New York City for Pre-Sandy Adaptation

1. Structural Measures

NYC could potentially be held liable for structures that it put in place before Sandy hit, which—due to improper design, construction, operation, or maintenance—failed during the storm in some way and thus worsened or exacerbated the storm's effects.[191] Specifically, assuming that the statute of limitations has not expired, property owners could file a claim against the City for the destroyed bulkheads and the damaged tidal gates and floodgates, all of which failed to reduce Sandy's inundation.[192]

The statute of limitations has expired for most structural claims from plaintiffs seeking compensation for property damage, as it has been over 90 days since Sandy hit the coast of NYC.[193] Yet, at the time of this writing, the statute of limitations has not expired if a plaintiff provided the Attorney General with a written notice of intent to file a claim, in which case the statute of limitations is extended to two years (to about November 2014).

As discussed, to successfully assert a claim against the City in its ministerial capacity under New York law, these plaintiffs need to show that the City had a "special duty" to them regarding the structural measures at issue.[194] This is practically impossible to assert in the climate adaptation context unless the plaintiffs are property owners in the flood zone. If the latter were the case, such plaintiffs could potentially claim a special relationship with the City if they could prove the more difficult prongs in the *Valdez* test: (1) direct contact with the City involving the structure and (2) reliance on the City's structure.[195] If plaintiffs were able to assert that the City had a special duty to them, they would still have the burden of showing the additional elements of a tort claim: breach of duty, causation, and proper damages. Thus under New York law, the City is unlikely to be

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191. KUSLER, *supra* note 150 at 23 ("[Governments] have been held liable for inadequate design, construction, operation, and (especially) maintenance of structures which *increase* natural hazard damages on private property.") (emphasis added).

192. Burkett, *supra* note 7 at 794 ("The clearest examples [of successful liability claims] are suits against governments for increased natural hazards or hazard risks resulting from government drainage ditches, fills, or structural flood hazard reduction measures. When a government acts in its capacity as a landowner it is similarly obligated. This will remain relevant under climate-change conditions.").

193. Coltoff et.al., *supra* note 184.

194. *Valdez*, 960 N.E.2d at 361.

195. *Id.* at 365.

held liable for negligence in its adaptation structures, such as bulkheads or levees that were implemented prior to Sandy. In state jurisdictions that do not require proof of a special relationship to assert the ministerial liability of cities, cities are more likely to be held liable for negligence in their adaptation structures.[196]

2. Non-Structural Measures

The City's decision as to what adaptation measures PlaNYC should propose is a discretionary decision and the City is typically immune from claims regarding such decisions.[197] But, as Burkett argues, the City's decision to institute adaptation measures through PlaNYC triggers the duty to adapt reasonably under the circumstances.[198] Consequently, a New York property owner who has or can still file suit under the timing constraints (either by having filed an intent to sue with the Attorney General or by suing for compensation of increased insurance rates that occurred in the past 90 days) might be able to assert that the City breached its duty to adapt reasonably prior to Hurricane Sandy because it failed to institute more concrete adaptation measures. Specifically, the City could have: strengthened and heightened its existing bulkheads and floodgates to prevent their destruction and mitigate the flooding during the storm; implemented additional hard and soft armor measures like bulkheads, dunes, and restored wetlands to mitigate the coastal erosion and flooding; and ensured the elevation of critical infrastructure in buildings to mitigate building damage and electrical outage.[199] There is an argument that any

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196. *See* KUSLER, *supra* note 150, at 23 (discussing how cities can be held liable for failure of structural measures which increase a storm's impact, without mention of a special relationship requirement). As a side note, under the Flood Control Act of 1928, the federal government is immune from flood damages, as affirmed by the Supreme Court in *United States v. James*, 478 U.S 597, 612 (1986). This is why in the first *Katrina Canal Breaches* case, the "private tort claims based on the failure of that flood-control project [levees] consistently foundererd on the shoals of *United States v. James*." *See also* VERCHICK & SCHERAGA, *supra* note 123, at 246–47. *See In re* Katrina Canal Breaches Consolidated Litigation, 577 F. Supp. 2d 802, 808-17 (E.D. La. 2008). Yet in the *Katrina Canal Breaches II* case, plaintiffs were successful in claiming that the government's negligence in the design, construction, and maintenance of the Mississippi River Gulf Outlet (MG-GO) "increased Katrina's storm surge and made the levee system more vulnerable than it otherwise would have been," because the MR-GO was not a flood-control project. In re Katrina Canal Breaches Consolidated Litigation (*Katrina Canal Breaches I*), 577 F. Supp. 2d 802, 826 (E.D. La. 2008) (holding the Army Corps of Engineers liable for constructing faulty flood protections); In re Katrina Canal Breaches Consolidated Litigation (*Katrina Canal Breaches II*), 696 F.3d 436 (5th Cir. 2012).

197. Coltoff et al., *supra* note 128; *Valdez*, 960 N.E.2d at 362.

198. Burkett, *supra* note 7 at 787–88.

199. *See generally* NYC RESILIENCY PLAN, *supra* note 2 (discussing NYC's failure to utilize physical and policy measures which could have mitigated Sandy's damage).

combination of such measures on a large scale could have significantly alleviated Sandy's damage on coastal properties.

In analyzing such a claim, a New York court might adopt some version of the Hand utility test or the multifactor test, tests widely used in common law jurisdictions to assess reasonableness and inform breach of duty in negligence claims. However, even if the court found a breach of duty in these analyses, the causation and proper damages elements would also need to be fulfilled.

i. Utility Test

Under the Hand utility test, a court would hold the City unreasonable in its pre-Sandy adaptation measures if the burden of instituting preventative measures were less than the product of the magnitude of the harm resulting from Sandy and the likelihood of Sandy's occurrence.

In monetary terms, the magnitude of the harm Sandy caused cost about $19 billion.[200] This figure is a conservative estimate, as it does not include non-financial impacts like the loss of life and injury that occurred as a result of the storm.[201] The current likelihood that a storm as damaging as Sandy will occur in NYC again is 1.4 percent annually, and the likelihood increases to 1.7 percent in the 2020s and 2 percent in the 2050s.[202] Taken together, the monetary product of the magnitude ($19 billion) and likelihood (.014%) of Sandy occurring at around the time it occurred is about $266 million per year.[203] It is difficult to measure the monetary burden of NYC in either executing PlaNYC or instituting greater adaptation measures (such as more structural measures). But, NYC's post-Sandy adaptation plan, "A Stronger, More Resilient New York"—which resembles what plaintiffs would argue the City should have done pre-Sandy—will cost about $19.5 billion to implement the Phase 1 initiatives over the next ten years.[204] PlaNYC presumably costs significantly less than the Resiliency Plan because it involved more information gathering and risk assessment within City agencies as opposed to substantive implementation of structural measures on the ground.

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200. *Id.* at 33. The $19 billion figure is comprised of $13 billion of physical damage and about $6 billion of lost economic activity.

201. *Id.* (explaining that forty-three New Yorkers died during the storm. This figure does not discuss the disproportionate impact of the storm on the elderly or medically vulnerable. According to the City, "these and other non-financial impacts should be and have been critical inputs.").

202. NYC RESILIENCY PLAN, *supra* note 2 at 34; *see* Dawsey, *supra* note 10.

203. NYC RESILIENCY PLAN, *supra* note 2 at 34. This is the total cost of the storm multiplied by the likelihood of a storm happening in any given year. Meaning, based upon the current risk, that there is a total cost to the City of $266 million per year.

204. *Id.* at 6, 401.

Even though it is unclear what the City's pre-Sandy adaptation burden was in monetary terms, it is clear under the utility test that a Court would not hold the City liable for failing to institute a $19.5 billion plan, or anything close to that value, to adapt to a $266 million per year storm. Under the utility test, the City's actual pre-Sandy adaptation measures, which were significantly less than $19.5 billion, would likely be held reasonable in light of the storm's estimated monetary damage. If the City's pre-Sandy adaptation burden was calculated accurately and it turned out to be less than $266 million per year, then the City could be held liable under the utility test for not adopting a more stringent, and thus costly, adaptation plan.

ii. Multifactor Test

In analyzing a claim against NYC's pre-Sandy adaptation, a New York court would potentially apply the following factors to determine the City's reasonableness:

Foreseeability. NYC could arguably have foreseen Sandy's effects prior to the storm. In PlaNYC, Mayor Bloomberg acknowledged that "New York was especially vulnerable to the storms that climate change was expected to bring," and the City specifically anticipated storm surges that would overtop the Battery and flood critical infrastructure like the Holland Tunnel, which is what happened during Sandy.[205] Based on foreseeability it is arguable that the City was unreasonable in failing to institute increased adaptation measures such as higher bulkheads, stronger floodgates, and dikes, as well as elevating critical infrastructure to mitigate the flooding. Foreseeability of a storm's results heightens the City's duty to adapt reasonably prior to the storm.

Proximate Causation. Causation is an independent element in the negligence analysis, but is also analyzed by some courts in determining reasonableness to inform breach of duty. The City's adaptation measures were a proximate cause of Sandy's impact. After the storm, the City acknowledged that some of its pre-Sandy adaptation efforts did mitigate Sandy's impacts.[206] The City also admitted that its pre-Sandy adaptation efforts did not do enough to mitigate the storm's devastating effect, implying that the City had the ability to further ameliorate Sandy's effects on NYC.[207] Indeed, additional bulkheads and dikes, as well as elevated infrastructure, would have certainly mitigated the storm's effects. Thus,

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205. *Id.* at 1.
206. *Id.* at 14, 43.
207. *Id.* at 1.

similar to the foreseeability analysis, given the City's proximate causation, it is arguable that the City was unreasonable in failing to institute more adaptation measures in PlaNYC and at least the City's adaptation duty is heightened.

Industry custom. When PlaNYC was released in 2007, and even when it was updated in 2011, the plan was considered ahead of the curve, as most cities did not have climate adaptation plans.[208] Thus in considering industry custom, NYC's pre-Sandy adaptation plan is reasonable.

Moral Blame. In the climate change negligence context, moral blame is attached to the City's conduct when its actions are unreasonable as compared with its peers.[209] According to this analysis, NYC was certainly reasonable in its pre-Sandy adaptation efforts as compared to other cities, which did not even have adaptation plans. But if NYC were judged for its moral blameworthiness irrespective of other cities, it is arguable that the City's failure to adapt more adequately in time for Sandy was unreasonable, especially in light of a storm's foreseeability and the City's ability to adapt. Yet, given that NYC attempted some adaptation through PlaNYC, it is unlikely a court would find the City to be so unreasonable in its adaptation efforts as to be morally blameworthy.

Policy of Preventing Future Harm. Since the court is adjudicating a tort claim, it will consider the deterrence of NYC and other cities from risky adaptation behavior in determining liability.[210] If the court sought to deter cities from unreasonable adaptation measures, then it would hold NYC's pre-Sandy adaptation efforts unreasonable to encourage local governments to strengthen their own adaptation measures.

The Availability and Cost of Flood Insurance. Prior to Sandy and the passage of Biggert-Waters and the Affordability Act, flood insurance was readily available and affordable for NYC residential and small business properties due to subsidies under FEMA's NFIP. Consequently, a court might be less inclined to hold NYC's adaptation measures unreasonable

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208. VICKI ARROYO & TERRI CRUCE, *State and Local Adaptation*, *in* THE LAW OF ADAPTATION TO CLIMATE CHANGE 585 (Michael B. Gerrard & Katrina Fischer Kuh eds. 2012). *See State and Local Adaptation Plans*, GEO. CLIMATE CTR., http://www.georgetownclimate.org/node/3325 (last visited Nov. 6, 2014) (listing local adaptation plans in the U.S.); *see also* Wilkins, *supra* note 25 at 438 ("[M]ost local governments do little more land use planning and building regulation than is required by the National Flood Insurance Program, or than other laws may require of them.").

209. Hunter & Salzman, *supra* note 11 at 1773 ("For a negligence theory, at least, the key inquiry may be what level of emissions is reasonable—or at what point did it become (or will it become) unreasonable to expand GHG emissions or other climate-changing activities without taking effective mitigation steps. In this regard, the issue of moral blameworthiness may be made in reference to the specific defendant's behavior as compared to industry custom.").

210. *See id.* at 1775 (explaining why courts consider deterrence in tort claims).

because many property owners did not minimize their property damage costs by purchasing readily available flood insurance.

Emergency Situation. Since the City instituted PlaNYC in a non-emergency situation,[211] its duty to act reasonably remains status quo.

Special Relationship. Whether a special relationship exists between the City and potential plaintiffs, and thus heightens the City's duty to adapt reasonably, is case specific. Given the high bar necessary to establish a special relationship with the City under New York law, especially in the climate adaptation context, such a relationship will likely only exist in unique cases involving coastal property owners.[212] As such, the City will typically not be held to a higher standard of reasonableness in pre-Sandy climate adaptation cases.

Relevant Laws. The City's adaptation measures were not statutorily mandated. Thus, the City did not have an affirmative duty to adapt, and a court will likely refuse to hold the City to a higher standard of reasonableness.

Act Reasonably "Under the Circumstances." In looking at the climate risks that were known to the City when PlaNYC was updated in 2011, a court might be inclined to hold the City unreasonable for failing to institute more adaptation measures. But NPCC's most recent climate change science report, released in 2013, reveals that the climate risks to NYC are greater than the City previously thought during PlaNYC's implementation.[213] Thus, a court could find the City's actions more reasonable in light of the risks known at the time. The court's determination of reasonable adaptation under the circumstances is also informed by the City's financial, legislative, and political constraints, which may lead a court to hold the City reasonable. For instance, it would be politically unfavorable for the City to enact a costly adaptation plan with limited financial resources during a time when climate science was still largely debated.

In sum, the City's pre-Sandy adaptation actions were reasonable because: (1) the actions were more advanced then those taken by peer cities; (2) flood insurance was readily available through the NFIP; and (3) the City volunteered to institute adaptation measures despite financial and political limitations. The utility analysis adds weight to the latter determination. At the same time, the City's foreseeability of Sandy and its

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211. *See* KUSLER & THOMAS, *supra* note 115 at 21 ("An emergency is a sudden and unexpected situation which deprives an actor of an opportunity for deliberation.").

212 *See* KUSLER, *supra* note 150 at 16, 26 (discussing that governments are generally not held liable absent a special relationship or duty and providing examples of when a special duty is present in a liability suit).

213. NPCC, *supra* note 20 at 4; *cf.* PLANYC, *supra* note 1 at 154.

effects, its conscious ability to mitigate those effects, and the court's desire to encourage other cities to address their own climate risks, all point toward holding NYC unreasonable in its pre-Sandy adaptation efforts. In weighing these factors, the City is unlikely to be held liable for not instituting more adaptation measures, such as building stronger structural measures and elevating critical infrastructure.

iii. Policy Limitations on Liability

Even if a court determined that the City was liable for its pre-Sandy adaptation measures, it might still refuse to hold the City liable if doing so would expose the City to an "endless scope of liability," which is counter to public policy.[214] This policy limitation is less of a concern in analyzing the City's pre-Sandy adaptation liability, since the statute of limitations has expired on most claims. This policy limitation is a real concern in assessing the City's adaptation liability after the next major storm hits NYC.

E. Filing Suit Against New York City for Post-Sandy Adaptation

The following analysis examines the potential claim of property owners against NYC for its failure to adapt reasonably after Hurricane Sandy in anticipation of the next major storm.[215] Specifically, future plaintiffs might argue that the City should have enacted a more stringent adaptation strategy; namely, a managed coastal retreat policy that included a heavier use of buyouts of highly vulnerable properties and land-use regulations that discouraged coastal development.

This analysis is hypothetical in nature, since there is no actual storm to measure the City's adaptation efforts against. It assumes that a future storm will be at least as strong, if not stronger, than Sandy given the expected increase in storm magnitude going forward.[216]

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214. Hunter & Salzman, *supra* note 11 at 1782; Burkett, *supra* note 7 at 790 ("Tort liability might be so great that it exceeds the bounds of adjudication and is more appropriate for legislative resolution. In these instances, arguably ones that climate change will introduce, courts may not impose a duty.").

215. The word "adaptation" is used here because this analysis primarily refers to the City's post-Sandy adaptation efforts, as oppose to its resiliency efforts to bounce back from Sandy. Since NYC also uses the word "resiliency" in describing its post-Sandy adaptation efforts, it is used here as well.

216. SIDERS, *supra* note 23 at 1.

1. Structural Measures

Given that NYC is implementing many structural measures as part of its Resiliency Plan, it faces a greater risk of liability for the design, construction, operation, and maintenance of these structures.[217] After the next storm the City could potentially be held liable for structures that it put in place after Sandy, which—due to improper design, construction, operation, or maintenance—exacerbated the storm's effects.[218] Yet again, this claim would only be successful if the plaintiff could assert a special relationship with the City.[219] This burden may prove easier for coastal property owners in the post-Sandy context. The first two elements of the *Valdez* test are arguably satisfied: (1) through enacting "A Stronger, More Resilient New York," the City is voluntarily instituting adaptation measures on behalf of NYC coastal property owners; and (2) the City knows that its failure to implement stronger adaptation measures will make coastal properties more vulnerable to harm in the next storm.[220] A plaintiff may be able to prove "some form" of direct contact with the City more easily in light of the City's increased public outreach and education efforts to encourage individual resiliency measures. Also, plaintiffs may have an easier time asserting that they relied on the City's structural adaptation measures, either by choosing not to move or by choosing not to implement their own adaptation measures. The reliance of plaintiffs is more probable post-Sandy given coastal property owners' increased awareness of both their vulnerability and the City's resiliency efforts. Most plaintiffs will still face a high burden to assert a special relationship with the City. Coastal property owners, however, may have a stronger argument in the post-Sandy context, and thus the City may more likely be liable for its structural measures.[221]

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217. KUSLER, *supra* note 150 at 23.

218. *Id.*

219. *Valdez*, 960 N.E.2d at 361.

220. *Valdez*, 960 N.E.2d at 365; NYC RESILIENCY PLAN, *supra* note 2 at 1 ("Sandy's magnitude, its effects on so many parts of the city, and the threat of ever greater risks from climate change also taught a second lesson: *we needed to redouble our efforts*.") (emphasis added).

221. Again, in another jurisdiction that does not require a "special relationship," but merely that a municipal adaptation structure failed in some way and exacerbated the storm's effects, a plaintiff may be more successful in structural adaptation claims against a City.

2. Non-Structural Measures

i. Utility Test

As stated, the current likelihood that a storm as damaging as Sandy will occur in NYC is 1.4 percent annually.[222] If a storm like Sandy were to occur now, it is estimated to have a magnitude of about $19 billion in damages, similar to Sandy itself.[223] Thus, the current estimate of the cost of the next major storm's damages is $266 million per year.[224] In the early 2020s, the City estimates that a storm like Sandy is expected to have a magnitude of about $35 billion in damages and have a 1.7 percent likelihood of occurring.[225] Thus in the early 2020s, when the Resiliency Plan's Phase 1 initiatives are still being implemented—based upon the increased risk—the estimated cost of a storm like Sandy is about $595 million per year.

Given that the Resiliency Plan's Phase 1 initiatives will cost about $19.5 billion to implement over the next decade, the adaptation burden to the City costs significantly more—between four and eight times more—than the storm's estimated damages of $266–595 million per year. Thus, under a utility analysis, the City is reasonable in implementing this plan and a court would not hold the City unreasonable for failing to institute more stringent adaptation measures.[226]

Further research is needed to determine the cost savings of the City's specific adaptation measures through avoided risks. A cross-sector working group of New York's "Storm Hardening and Resiliency Collaborative" is developing this type of cost-benefit model in the public utilities climate adaptation context.[227] Knowledge of the full costs *and* benefits of an

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222. NYC RESILIENCY PLAN, *supra* note 2 at 34.

223. *Id.*

224. *Id.* This is the total cost of the storm multiplied by the likelihood of a storm happening in any given year. Meaning, based upon the current risk, that there is a total cost to the City of $266 million per year.

225. *Id.* This is the estimated total cost of the storm in 2020 multiplied by the estimated likelihood of a storm happening in any given year. Meaning, based upon the increased risk in the 2020s, there is a total cost to the City of $595 million per year.

226. *Id.* at 401–02 (providing a breakdown of Phase 1 initiative costs).

227. Jenna Shweitzer, *ConEd Invests $1 Billion in Infrastructure Resilient to Climate Change*, REGBLOG (Mar. 25, 2014), http://www.regblog.org/2014/03/25-shweitzer-infrastructure.html (stating that the Collaborative's innovative model considers a project's full societal benefit, meaning costs that are avoided when an outage is prevented or shortened, as opposed to just a project's risk reduction ability. This cost-benefit model will continue to be developed through another Commission proceeding, in which the Commission ordered a 'complete overhaul' as to how New York utilities measure the costs and benefits of energy efficiency projects.); *see also* CON EDISON, INC., STORM HARDENING AND RESILIENCY COLLABORATIVE REPORT 7 (Dec. 2013), *available at* http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={E6D76530-61DB-4A71-AFE2-17737A49D124}("Resiliency work that has been performed during 2013, and to present for the

adaptation strategy in monetary terms would help to demonstrate the effectiveness of various adaptation measures and help the City to prioritize measures in its adaptation strategy. This information would also enable courts to conduct higher quality utility analyses in determining a City's reasonableness.

ii. Multifactor Test

The multifactor test for a post-Sandy claim is analogous to the pre-Sandy analysis regarding most of the prongs: foreseeability,[228] proximate causation,[229] moral blame, [230] policy of preventing future harm, the lack of an emergency situation, special relationship, and relevant laws. Industry custom, the availability of insurance, and relevant circumstances vary a bit in the post-Sandy context.

Industry Custom. Since 2007, when PlaNYC was initially released, many more U.S. cities now have climate adaptation plans. [231] NYC's decision to institute the Resiliency Plan is on par with most of its peer cities in the U.S.[232] Whether the City's adaptation strategy is aligned with its peer cities is difficult to say, since there is no standard climate adaptation plan and such plans are local in nature. Yet, the more stringent coastal retreat tools are not considered the norm in adaptation plans. [233] For instance, Louisiana's 2012 Coastal Master Plan does not prioritize coastal retreat, but promotes a policy of development on the coast combined with structural and non-structural measures to protect against coastal hazards, similar to

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Commission's consideration Con Edison's proposed plans for resiliency work to commence during the period of 2014 to 2016.").

228. NYC RESILIENCY PLAN, *supra* note 2 at 1–3, 34 (noting that the City is aware of the approximate likelihood and magnitude of the next major storm to hit NYC. Indeed, NYC created the Resiliency Plan to prepare effectively for such an event).

229. *Id.* at 1 (explaining that the City's adaptation measures will directly affect the magnitude of the next storm's damages on NYC. The City acknowledges this fact in the Resiliency Plan, stating "Sandy's magnitude, its effects on so many parts of the city, and the threat of ever greater risks from climate change also taught a second lesson: we needed to redouble our efforts.").

230. *Id.*; *see also* Hunter & Salzman, *supra* note 11 at 1773 (discussing corporations' moral blameworthiness in risky or reckless behavior). Compared with its peers, NYC's post-Sandy adaptation measures are reasonable and so a court is unlikely to find the City morally blameworthy for them.

231. *See* Coltoff et.al., *supra* note 184.

232. *See State and Local Adaptation Plans*, GEO. CLIMATE CTR., http://www.georgetownclimate.org/node/3325 (last visited Nov. 6, 2014) (listing local adaptation plans in the U.S.).

233. SIDERS, *supra* note 23 at i. ("This Handbook collects examples, case studies, and lessons learned from some of these *early innovators* in the hope that their lessons can inform future efforts to limit the exposure of our communities to coastal threats.") (emphasis added).

NYC's Resiliency Plan.[234] Thus, the industry custom analysis points to NYC's reasonableness in climate adaptation.[235]

The Availability and Cost of Flood Insurance. Even though the Affordability Act mitigates insurance premium spikes from Biggert-Waters and strives to implement additional affordability measures, coastal property owners will still face significant rate increases in the foreseeable future. Consequently, public flood insurance for coastal homeowners and small businesses is arguably less available due to its increased cost. As such, a court may be more inclined to hold the City unreasonable for its adaptation efforts after Sandy, since flood insurance is no longer as cheap and attainable under the NFIP, which lessens the adaptation burden on property owners and heightens the City's adaptation duty. FEMA's development of mitigation measures would enhance the affordability and availability of NFIP for property owners, which would heighten owners' adaptation burden. In addition, the court might also consider the City's work to encourage New Yorkers to purchase flood insurance, which would enhance the City's reasonableness.

Act Reasonably "Under the Circumstances." The post-Sandy context increases the City's duty to adapt reasonably, as the City is more aware of the risk of the next storm, which is expected to be greater in magnitude than Sandy. Here too, the City's adaptation efforts are considered in light of its financial, legislative, and political constraints. It is arguable that the issue of climate change is less politically charged post-Sandy than it was pre-Sandy. Many New Yorkers, especially those in the flood zones, support stronger adaptation measures after Sandy.[236] Yet, given the high-density development in NYC, a coastal retreat strategy is still politically unfavorable to most stakeholders.[237] Further, the City is spending a lot of money on its Resiliency Plan despite its financial limitations. Thus, a court is likely to hold the City's post-Sandy adaptation measures reasonable under the circumstances. This is especially true given that more coastal property owners are also aware of the next storm's risk. As such, these plaintiffs might have a hard time holding the City liable for a failure to

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234. *Louisiana's 2012 Coastal Master Plan*, GEO. CLIMATE CTR., http://www.georgetownclimate.org/resources/louisianas-2012-coastal-master-plan (last visited Nov. 6, 2014).

235. NYC Resiliency Plan, *supra* note 2 at 27–28. NYC's reasonableness is further supported by the fact that New Jersey, which suffered tremendous damage from Sandy, does not have a state or local climate adaptation plan.

236. Presentation at the Penn. Program, *supra* note 96.

237. *See* Verchick & Johnson, *supra* note 9 at 695 ("We Americans are more interested in fortifying our castles or buildings them higher than in moving out of harm's way. And that is despite warnings of rising seas and stronger storms associated with climate change.").

adapt more stringently when they chose to remain on the coast in spite of the known risks.

In sum, the facts that the City's post-Sandy adaptation actions were at least on par with its peer cities and that the City volunteered to increase its adaptation efforts both weigh in favor of holding NYC reasonable in its post-Sandy adaptation efforts. The utility analysis adds weight to the latter determination. These factors outweigh the City's foreseeability of the next Sandy and its ability to significantly mitigate those effects through a coastal retreat strategy. Indeed, a court would likely hold that a coastal retreat strategy is unfeasible politically and financially for a high-density area like NYC.[238] Thus, the City is unlikely to be held unreasonable for its post-Sandy adaptation efforts.

iii. Policy Limitations on Liability

A court may refuse to hold the City liable for its post-Sandy adaptation measures due to large-scale practical concerns. Holding the City liable could open the floodgates to liability claims against the City or impose adaptation liability on municipalities that cannot afford to implement such measures effectively.[239] Such limitations are more relevant in the post-Sandy context because there is likely to be a greater number of plaintiffs after the next storm.[240] This is partly because timing is not a barrier to filing suit since the next storm has not hit yet and because public awareness of both climate change adaptation and adaptation lawsuits is increasing.[241]

At the same time, given the legal challenges to filing a successful adaptation suit against the City, absent an affirmative duty to adapt, it is likely that a court will only hold the City liable in a small number of cases, which mitigates the potential of widespread liability.[242] Additionally, a court can assign limited liability to the City on a case-by-case basis, so as

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238. *Id.* at 698 ("[Coastal] retreat can be expensive, particularly where government bears the cost buying out owners or providing space for relocation. When residents and businesses leave, local governments lose tax revenue. Owners on the coast or river shorelines also pack political clout and may resist efforts to drive them away.").

239. Hunter & Salzman, *supra* note 11 at 1782; Burkett, *supra* note 7 at 790 ("In adaptation litigation, courts will have to weigh the injuries of property owners against the costs to local governments of imposing adaptation measures. Courts may reject liability out of concern that the scale of liability will have the capacity to 'crush' defendant municipalities.").

240. Margolis & Cummings, *supra* note 16.

241. *See* Sudol, *supra* note 4 (explaining that George Kasimos, founder of *Stop FEMA Now*, stated that the number of people filing suits for property damage compensation from storms like Sandy "should be much higher," but "a lot of people still don't know they can file suit in federal court.").

242. Burkett, *supra* note 7 at 799 ("At the moment, these issues may be beyond the reach of the courts as nonstructural and policy-oriented planning decisions, for which courts do not uniformly find a cognizable duty or, if they do, they allow immunity to apply, respectively.").

not to overburden the City with responsibility it cannot handle.[243] For example, the court could limit the City's liability to the damages its negligent adaptation measures caused the particular defendants, as opposed to holding it liable for its adaptation efforts more broadly (i.e. by *not* issuing a general order for the City to institute more stringent adaptation measures). Alternatively, a court could reduce the City's liability in a given case based on its voluntary adaptation measures that have arguably mitigated potential damages to the defendants (though this might be hard to calculate). Still, a court reviewing post-Sandy adaptation claims may be more inclined to defer to the legislative branch to impose climate adaptation responsibilities on NYC and other municipalities.[244]

Overall, Section III has demonstrated that: (1) it is unclear whether coastal plaintiffs will be able to hold NYC liable for the failure of its structural measures, given the novelty of establishing a special relationship with the City in the climate adaptation context; and (2) potential plaintiffs have legitimate claims that NYC's choice of adaptation measures, pre- and post-Sandy, were unreasonable. Yet, plaintiffs' success depends on a court willfully bypassing the City's sovereign immunity for discretionary decisions and applying some form of the utility or multifactor tests to assess the City's reasonableness under a negligence claim, which is unlikely. Moreover, even if a plaintiff's claim is successful, a court may still refuse to assign liability due to the policy concerns. Thus, even though plaintiffs may have legitimate claims regarding the City's choice of adaptation measures, the City is not likely to be held unreasonable for its adaptation measures under current law.

IV. POLICY ANALYSIS

A. Common Law Signals and Implications

1. Signals to Cities

Under current New York law, NYC will not likely be held liable for failing to adapt to climate change reasonably because it is not statutorily mandated to do so and sovereign immunity protects its discretionary adaptation decisions. The same liability scheme applies to many U.S.

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243. Hunter & Salzman, *supra* note 11 at 1782 ("[S]uch [policy concerns] may be mitigated in ways other than dismissing the entire lawsuit. For example, courts could limit liability to the percentage of climate change attributable to the defendants in the case.").

244. Burkett, *supra* note 7 at 790 ("Tort liability might be so great that it exceeds the bounds of adjudication and is more appropriate for legislative resolution.").

jurisdictions, where municipal discretionary decisions are immune from liability and climate adaptation is not statutorily mandated.[245] In the absence of most state climate adaptation regulation, the most recent federal legislation—the Affordability Act—encourages governments to continue subsidizing the risky behavior of occupying the coast. In this way, common law signals to cities that they are not legally responsible for adapting to climate change because they will not be liable for their discretionary decisions regarding adaptation.

Similarly, with regard to structural measures, NYC will unlikely be held liable for failing to implement additional bulkheads and levees because this is a discretionary decision protected by sovereign immunity. But once the City builds a structural measure, potential liability attaches and the City can be liable if the structure is negligent in its design, construction, maintenance, or operation. The same is generally true in other U.S. jurisdictions.[246] In this way, cities can potentially be held liable for negligent adaptation structures, thus incurring some liability risk.[247] Consequently, common law may discourage risk-averse or under-resourced cities from instituting structural adaptation measures.

New York's special relationship requirement in proving structural liability can be a significant hurdle for plaintiffs, which makes it less likely that NYC will face liability for its structural measures. The degree of NYC's liability risk for structural measures depends on whether New York courts hold that the City owes a special duty to coastal property owners with respect to coastal structural measures, or whether such structures are built for the public at large. If the former is the case, then the City is more likely to be liable for its negligent structures when sued by coastal property owners. NYC presumably perceives such risk as minimal, as it plans to implement many structural measures in its Resiliency Plan. Yet, in jurisdictions that do not have the special relationship requirement, cities may be more discouraged from instituting structural adaptation measures because they are more likely to face liability for negligence.

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245. *See* KUSLER, *supra* note 150 at 16 (explaining that generally, absent statutory or regulatory requirements, discretionary decisions are not subject to liability); *see also* Burkett, *supra* note 13, at 11,154.

246. Burkett, *supra* note 13 at 11,154 ("[W]hen governments act as landowners they are subject to liability for impacts from their construction and operation of structural measures, such as dams, levees, and groins.").

247. *See* SCHUELER, *supra* note 135 at 238 ("If the liability standards for failure to act imply higher risk than the standards applying to action, the system will stimulate the development of appropriate adaptation policies. If, on the other hand, the risk is higher for actions than it is in case of not acting, the system will discourage the taking of adaptation measures.").

While some liability risk attaches to cities' structural measures, cities' discretionary adaptation actions (i.e. pursuing a particular adaptation strategy) have practically no liability risk because cities will not be held liable for these decisions. Although Burkett argues that a court should enable plaintiffs to sue on a theory of negligence of failure to adapt reasonably, it is unlikely that a court would waive a city's longstanding sovereign immunity for discretionary decisions. Thus, current common law does not discourage cities from adapting to climate change for fear of potential liability risk, but it does not encourage them either. If cities knew they could be held liable for failure to adapt they would be encouraged to adapt.

Further, common law's indifference to cities' adaptation may contribute to a city choosing not to institute the most effective adaptation strategy in light of the risks, knowing that it will not be held legally accountable for this decision. For example, coastal retreat may be the most effective adaptation regulation for a city, but since it knows it will not be liable for refusing this option, the city may opt for more resilient coastal buildings instead. Yet, other financial and political factors contribute to cities' decisions as well.

In sum, common law in New York, and potentially other jurisdictions, signals to cities that they are not legally responsible to adapt to climate change because they will not be liable for their lack of adaptation or negligent adaptation measures. Potential liability risk may attach to cities' negligent structural measures depending on the existence of a special relationship requirement and how courts apply it in the coastal adaptation context. Yet, there is no liability risk for cities' discretionary decisions regarding adaptation, which neither discourages cities from adapting nor encourages them. As more climate adaption suits are filed and common law shifts in response, these signals may change. Indeed, scholars anticipate that as more suits are filed, cities will be held liable for their adaptation measures. [248]

2. Signals to Property Owners

There are many challenges facing plaintiffs who wish to reclaim damages from NYC for pre- or post-Sandy adaptation through New York

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248. Burkett, *supra* note 7 at 799. ("Expanded liability appears to be an emerging trend . . . which may have serious implications for local governments that do not opt for the most climate-adaptive conduct in light of the high degree of risk to person and property." (citing Adam Liptak, *Justices Broaden the Basis for Damages Over Floods*, N.Y. TIMES, Dec. 4, 2012, at A23.)); *see also* Sudol, *supra* note 4 (providing information on increased coastal adaptation claims).

courts. The 90-day statute of limitations provides a short window for plaintiffs to assert their claims, and both the City's sovereign immunity for non-structural measures and the special relationship requirement for structural measures weigh in the City's favor. These challenges pertain to establishing an initial claim, let alone the additional challenges involved in establishing causation and damages that are required for a successful suit. Ultimately, common law in New York and other jurisdictions signal to coastal property owners that they bear the burden of adapting to local climate risks, as cities are not legally responsible for implementing adaptation measures.

Given property owners' lack of recourse in the courts, common law also signals to property owners that they should not purchase or occupy property on the coast, and if they do, they are responsible for the ensuing risk. For property owners who live in highly vulnerable coastal properties, personal responsibility for adapting to their local climate risks may translate into moving away from the coast, as they cannot depend on the City to institute reasonable adaptation measures or compensate them for supposed climate-related damages. In this way, common law passively supports coastal retreat.

This "you're on your own" signal is positive in that it encourages property owners to institute adaptation measures for themselves, and as such, may increase coastal resiliency and retreat in highly vulnerable areas. At the same time, this signal has negative consequences because complacent property owners will not take the appropriate adaptation actions in light of the risks they face, increasing the public's overall vulnerability and potential storm damages.[249]

According to Burkett, since "[t]ort litigation has the power to determine the course of climate adaptation [in the absence of legislation] . . . those seeking to advance greater safety and well-being would do well to harness tort liability to stimulate more affective and aggressive capacity building."[250] Burkett argues that property owners who wish to shift their adaptation burden to cities or other parties could potentially do so through litigation, using tort law as a de facto policy instrument. If successful (though unlikely), such plaintiffs could shift the common law signals regarding climate adaptation away from individual responsibility and toward more government responsibility. Yet, there are two problems with this approach. First, both government and coastal property owners should

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249. *See* Wilkins, *supra* note 25 at 438 ("We have learned that government will usually rush to our assistance in a disaster even if we are largely responsible for our own predicaments.."). Such knowledge may encourage complacent behavior.

250. Burkett, *supra* note 13 at 11,147.

bear the costs of adaptation. Second, just because tort liability can encourage cities' climate adaptation, it does not mean that it is the best tool to do so. The next section will suggest how legislation supplemented by tort liability can encourage proper climate adaptation in NYC and other U.S. cities by both cities and coastal property owners.

B. Policy Suggestions

As demonstrated, tort lawsuits are not the ideal tool to address local adaptation; rather, legislation is. Unlike tort cases, which focus on individual or group cases, legislation can mandate large-scale adaptation action. Indeed, the number of potential plaintiffs in climate adaptation cases "may exceed the bounds of adjudication," demanding a public policy response.[251] Similarly, if climate mitigation case law is any indication, courts might also be reluctant to pin responsibility for climate adaptation, which is essentially a policy issue, on a given defendant. In addition, tort cases cost a lot of money and ironically drain defendants of funds that could otherwise be used to implement adaptation measures. This is especially true in lawsuits against municipalities, which have the authority to institute climate adaptation measures, but often lack the resources to do so. The process of litigating a tort case is also time consuming, whereas climate adaptation action is needed immediately. Tort litigation has a role to play in encouraging local climate adaptation, but the above reasons suggest that this role is a limited one which must be supplemented by legislation.

Municipalities are reluctant to enact climate adaptation regulation—especially in coastal areas—because such regulations can be costly, stifle development which is often the "lifeblood" of local governments, and may trigger lawsuits claiming an infringement on private property rights.[252] Accordingly, some cities may believe that if they institute climate adaptation measures they will be at an economic disadvantage compared to cities that do not (at least in the short term). Since local governments have no legislative mandate to adapt to climate change, they are typically immune from lawsuits for failing to adapt.

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251. Burkett, *supra* note 7 at 790 ("Tort liability might be so great that it exceeds the bounds of adjudication and is more appropriate for legislative resolution.").

252. *See* Wilkins, *supra* note 25 at 438–39 ("The reasons so many local governments are loathe to enact and enforce regulations limiting development in hazardous coastal areas are undoubtedly varied; however, there are two obvious reasons that come to mind. Development is the lifeblood of local governments, resulting in increased business, population, and tax revenues upon which these governments depend. Another factor revolves around private property rights and the issues surrounding the protection of such rights.").

To directly encourage climate adaptation efforts at the local level, adaptation should be mandated through federal or state legislation or both. This way, local governments will have an affirmative duty to adapt to climate change for which it can be held accountable for in the courts.[253] Indeed, going forward, climate adaptation claims will only increase.[254] If cities have statutory mandates to adapt to climate change, then tort litigation can be more effective in analyzing whether cities are reasonably carrying out their affirmative legal duty to adapt. Rather than relying on common law multifactor analyses that were not created to address climate change claims, courts will have a clear objective standard as to what "reasonable adaptation" is from the cities' statutes. To ensure that such claims can be litigated properly on the merits, states should enact a statutory waiver of immunity for adaptation claims against cities.

To further facilitate climate adaptation claims going forward, New York courts should remove the special relationship requirement to prove structural measure liability, in accordance with many other state jurisdictions, to ensure that cities are held accountable for negligent adaptation structures.[255] If climate adaptation statutes are not enacted and courts still need to resort to common law negligence analyses in assessing climate adaptation claims, then courts should at least modify their industry custom prong as it applies to cities' adaptation behavior. Specifically, courts should compare a city's actions to local climate risks the city faces, as opposed to other cities' actions. Since industry custom for climate adaptation in U.S. cities is for politics to lag behind science, courts are reinforcing this inefficient behavior.

If the above suggestions are enacted, climate adaptation advocates will no longer need to rely on tort claims as a de facto policy tool to mandate adaptation, which is ineffective compared to legislation. Legislation supplemented by tort claims will ensure that cities are held accountable in their mandate to adapt to climate change reasonably and thus encourage appropriate adaptation.

Yet, in assigning climate change adaptation responsibility, one is essentially deciding who should bear the cost of adaptation. If NYC institutes specific coastal adaptation measures, this signals to coastal property owners that it is primarily the responsibility of the government,

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253. *See* Burkett, *supra* note 7 at 786. ("[D]uty is 'an expression of the sum total of those considerations of policy which lead the law to say that the particular plaintiff is entitled to protection.' In short, foreseeability coupled with other compelling policy concerns will determine whether or not a legal obligation [to adapt] exists or emerges.").

254. Sudol, *supra* note 4.

255. *See* Burkett, *supra* note 13 at 11,154; *see also* KUSLER, *supra* note 150 at 13–14 (discussing ministerial liability in common law jurisdictions generally).

and thus collective taxpayers, to address coastal resiliency. In other words, such a policy signals that collective taxpayers should subsidize, at least in part, the risky behavior of coastal property owners.[256]

Coastal property owners who heighten climate change coastal risks should bear proportionate responsibility to increased coastal resiliency. For instance, in alignment with Biggert-Waters and the Affordability Act, coastal homeowners who live in FEMA flood zones should pay higher flood insurance premiums that accurately reflect their risky behavior. Thus, NYC should have an affirmative, yet limited, duty to institute adaptation measures—meaning that the City should be responsible for adapting in a reasonable way in light of its legislative authority and available resources.[257] At the same time, property owners should pay the full cost to insure their risky behaviors, as doing so will force them to internalize the negative externalities of their actions and will encourage further individual adaptation.

Fortunately, there are policy tools available to address the affordability of increased flood insurance premiums under recent federal regulation, while encouraging adaptation implementation. Specifically, the City advocates for a mitigation program that would enable residents who reduce their flood risk to receive a discount from their higher flood insurance premiums.[258] To help low-income residents afford the initial adaptation investment, the City proposes a home-improvement loan to cover the full costs, which will be repaid with the money saved from the premium reductions that result from the adaptation measure.[259] The Wharton Center for Risk Management and Decision Processes advocates for a combined voucher and mitigation loan program. This combined program offers eligible homeowners vouchers to reduce their premiums upfront on the condition that they implement adaptation measures.[260] Once adaptation

256. The City should arguably have an increased burden to institute *general* climate adaptation actions with collective taxpayer money. A general climate adaptation plan that addresses not only the coasts, but also the resiliency of critical infrastructure and buildings across the City benefits the public at large from collective risky behavior contributing to climate change.

257. Ideally, state or federal legislation should clarify what "reasonable" adaptation means. For example, a city could be mandated to adapt where it makes sense to do so under a utility or cost benefit analysis. Yet, if this approach were used, costs must include externalities as best as possible to reflect true costs of potential actions, and the full benefits of adaptation actions should be accounted for. *See Valdez*, 960 N.E.2d. at 356. Also, a proper discount rate should be used to accurately reflect the short v. long-term adaptation investment.

258. NYC RESILIENCY PLAN, *supra* note 2 at 100.

259. *Id.* (explaining that the money saved from the flood insurance premium reduction would be greater than the loan amount, thus enabling homeowners to re-pay the loan).

260. KOUSKY & KUNREUTHER, *supra* note 26 (proposing that the insurance voucher would be decided based upon the policyholder's income and the mitigation loan would be decided based upon the policyholder's property).

measures are installed, homeowners' premiums should decrease, enabling the homeowner to repay the mitigation loan.[261] As the property owners' premiums decrease, the voucher amounts will decrease as well.[262] The combined voucher and loan program would save both the government and homeowner significant adaptation costs, while encouraging adaptation by vulnerable property owners.[263]

CONCLUSION

New York City (and cities with similar laws) is unlikely to be held liable for the quality of their adaptation efforts, as they are immune from liability for their adaptation decisions in the absence of climate adaptation legislation. If a court were willing to waive NYC's sovereign immunity and examine its adaptation efforts for reasonableness, based on the above analysis, it would be unlikely to hold NYC liable for failing to adapt to climate change reasonably either prior to or after Hurricane Sandy. In this way, common law signals to cities that they are not legally responsible for climate adaptation and, thus, do not need to adapt. Cities' immunity from adaptation negligence does not discourage voluntary adaptation, but this same immunity does not encourage cities to adapt either.

New York City may be liable for negligent adaptation structures, depending on whether plaintiffs can establish a special relationship with the City. Cities in jurisdictions that do not have a special duty requirement may be discouraged from instituting adaptation measures because of the greater risk of liability.

Given the overall ineffectiveness of tort law to mandate local climate adaptation, legislation is necessary to adequately address this large-scale issue and hold both cities and property owners responsible for their adaptation actions. Ultimately, the extent of adaptation measures mandated through legislation and enforced by the courts reflects a societal value preference between public and private rights, as well as long and short-term benefits. If New York City and the rest of the U.S. prioritize environmental and economic sustainability, then intelligent adaptation investments need to be made now to ensure the longevity of our coasts and cities going forward.

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261. KOUSKY & KUNREUTHER, *supra* note 24 at 15.
262. *Id.*
263. KOUSKY & KUNREUTHER, *supra* note 26.

APPENDIX

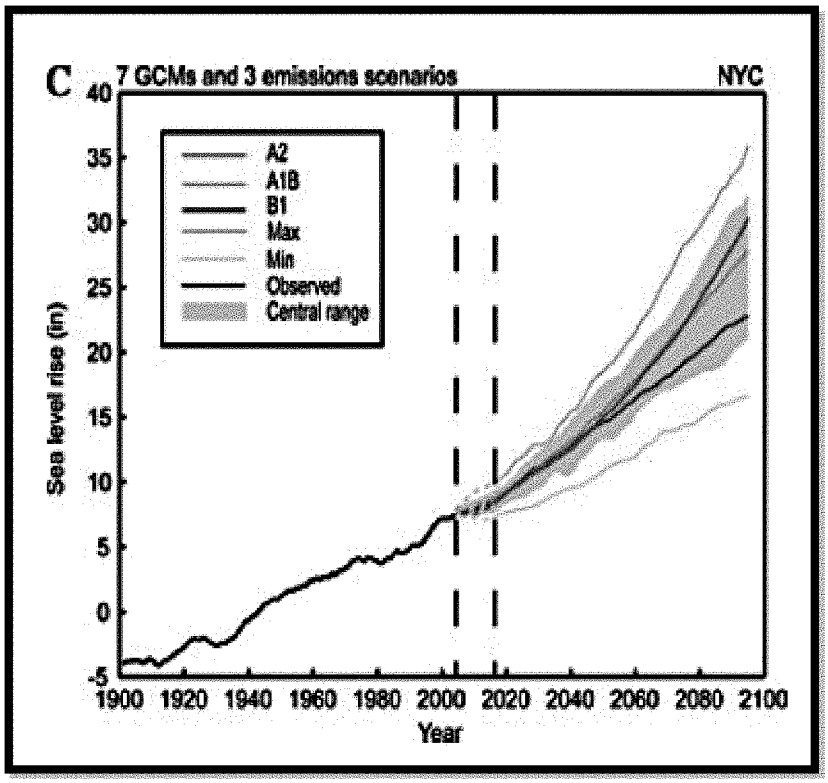

Figure 1. NPCC's 2010 Sea Level Rise Projections

Observed sea level rise (black line) and projected temperature, precipitation, and sea level rise as applied to the observed historical data, using 7 global climate models (GCMs) and 3 emissions scenarios, A2, A1B, and B1. 2002–2015 is not covered due to the "smoothing procedure." The central value is the middle 67 percent of values. According to the 2010 NPCC projections, sea level is expected to rise 2-5 in. in the 2020s, 7-12 in. in the 2050s, and 12-23 in. in the 2080s. Under the rapid ice-melt scenario, sea level is expected to rise even more. Radley Horton et al., *Climate Observations and Projections*, 1196 ANNALS OF THE N.Y. ACAD. OF SCI., CLIMATE CHANGE ADAPTATION IN NEW YORK CITY: BUILDING A RISK MGMT. RESPONSE 52 (2010).

Summary of Changes to NFIP Premiums Required by Biggert-Waters

Date of Implementation	What Will Happen	Who is Affected
January 1, 2013	• 25% premium increase per year until premiums reflect full-risk rates	• Homeowners with subsidized insurance rates on second homes or other non-primary residences
October 1, 2013	• 25% premium increase per year until premiums reflect full-risk rates	• Owners of business properties with subsidized premiums • Owners of properties with severe repetitive loss (cumulative NFIP claims payments exceeding the fair market value of the property)
October 1, 2013	• Up to 20% premium increase per year	• All policyholders not subject to other phase-outs
Late 2014	• 5 year phase-out of subsidies on existing policies • Immediate requirement to pay full-risk rate for new or lapsed policies	• All policyholders affected by map changes (FEMA's revised Flood Insurance Rate Maps are expected for New York City in 2015)

Source: FEMA

Figure 2. NYC RESILIENCY PLAN, *supra* note 2 at 96.

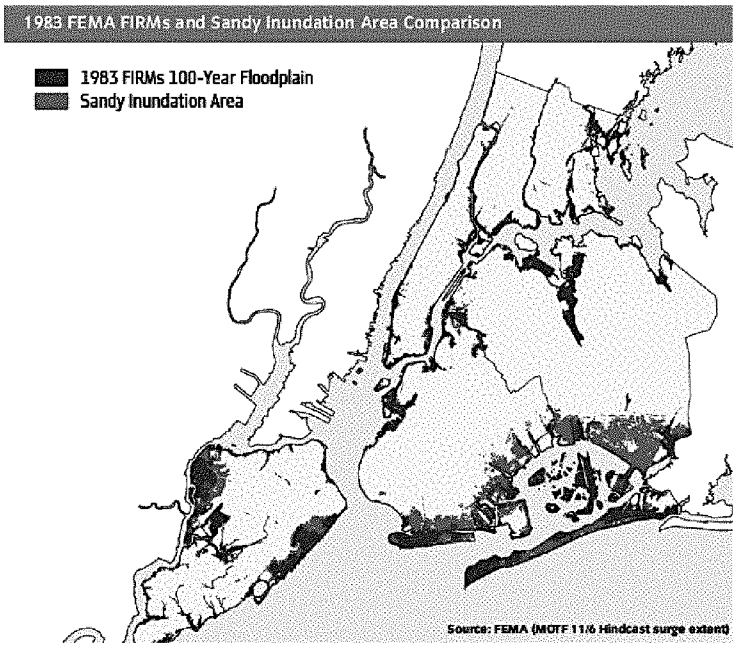

Figure 3. NYC RESILIENCY PLAN, *supra* note 2 at 24.

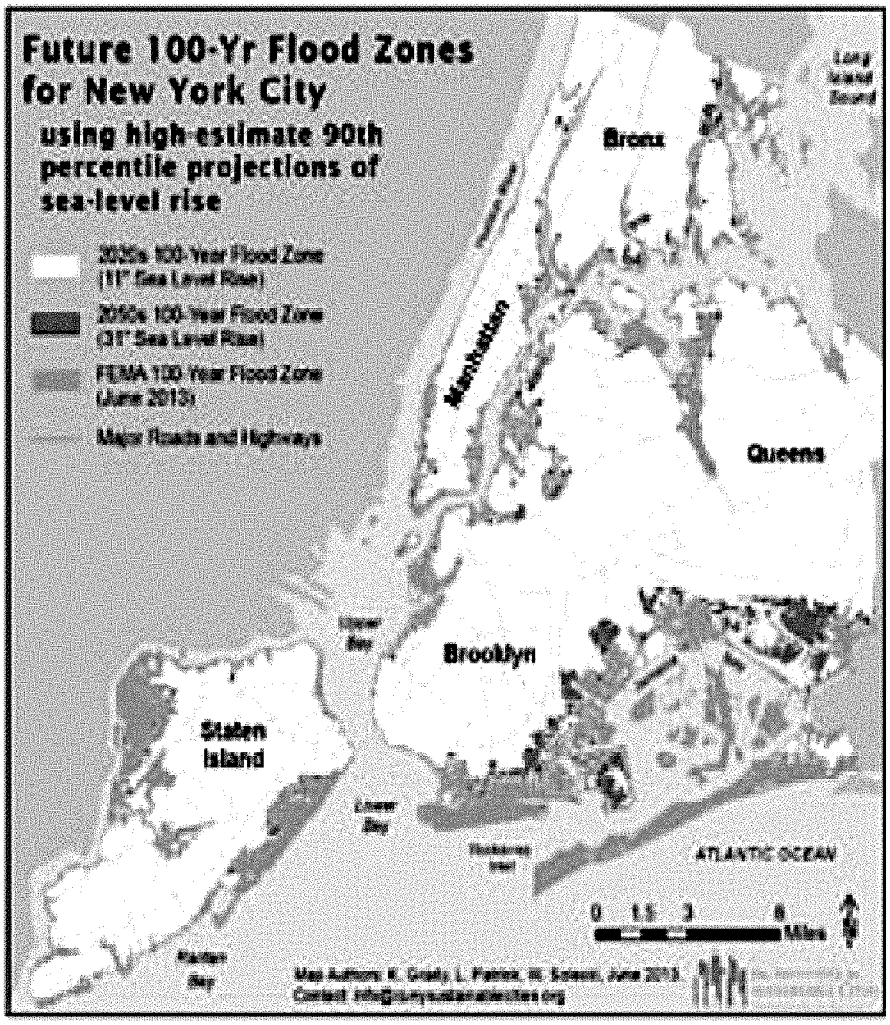

Figure 4. "The potential areas that could be impacted by the 100-Year flood in the 2020s and 2050s based on projections of the high-estimate 90th percentile sea level rise scenario." NPCC, *supra* note 20 at 6. (The June 2013 estimated 100-year-flood zone parallels FEMA's 1983 100-year-floodplain for NYC in addition to the area inundated by Hurricane Sandy. *See* Figure 3.)