Managing Stormwater by Sustainable Measures: Preventing Neighborhood Flooding and Green Infrastructure Implementation in New Orleans

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I. INTRODUCTION

Stormwater management is a challenge for every community. Improper stormwater management can affect the health of the population as well as its economy. Green infrastructure presents a sustainable and eco-friendly method of stormwater management at both the municipal and private landowner levels. This technology is still quite new, and proper installation of green infrastructure measures is unique to the environment being managed.[1] Several major cities and states—for example, New York, Illinois, Ohio, and Philadelphia—have legislatively embraced green infrastructure implementation as a method for stormwater management.[2] These cities have begun documenting the success of such endeavors, providing a framework for other cities. This Comment identifies some of the current stormwater drainage challenges faced specifically in New Orleans, Louisiana, and creates a potential political and practical roadmap for the implementation of green infrastructure in New Orleans.

Part II looks at the current state of stormwater management in New Orleans. Part III provides an overview of the city's Master Plan in relation to its commitment to environmentally sound measures and sustainable practices, including the city's outstanding commitment to the Environmental Protection Agency (EPA) to employ green measures in its second modified consent decree. Part IV analyzes the city's draft Comprehensive Zoning Ordinance (CZO), identifying both the employment of green infrastructure in stormwater management as well as the draft CZO's critical failure to address localized flooding holistically. Part V presents viable solutions to address the gaps in stormwater management left by the draft CZO through political and legal measures, including an innovative utility fee structure.[3] Part VI identifies the necessary support efforts required to ensure the overall success of these measures in implementing a comprehensive green infrastructure stormwater management plan.

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1. *See* Low Impact Dev. Ctr., *Low Impact Development (LID): A Literature Review*, EPA 3 (Oct. 2000), http://water.epa.gov/polwaste/green/upload/lid.pdf.

2. A.B. 7058, 2013-2014 ASSEMB., REG. SESS. (N.Y. 2013); 415 ILL. COMP. STAT. 56/1-99 (2009); OHIO REV. CODE § 3701.344 (2013); 35 PA. CONS. STAT. § 691.1 (2012).

3. This utility fee structure is based on Maryland's Stormwater Management—Watershed Protection & Restoration Program.

II. STORMWATER AND NEW ORLEANS

A. Stormwater and Green Infrastructure

Stormwater is made up of naturally occurring rainfall that is not absorbed into the ground. In urban areas, stormwater becomes a problem where there are many impervious surfaces, such as buildings and pavement, which do not absorb rain or snowmelt, but instead create a "runoff" effect: water flows quickly over the landscape rather than soaking into soil or being absorbed by plant life.[4] Because stormwater carries with it surface pollutants (such as oil, bacteria, sediment, and pesticides), the runoff often poisons watersheds, rivers, and streams.[5] Frequently, stormwater runoff creates flooding within neighborhoods, making stormwater a serious concern for city planning, public health, and utility management.[6]

As cities spread out further, urban landscapes increase impervious surface coverage. Consequently, stormwater management has become increasingly important to the well-being of cities and their watersheds.[7] Persistent flooding creates the potential for repetitive damage to property, eventual property loss, increases in insurance rates—both for homes and automobiles—due to flood zones.[8] Retailers may also avoid conducting business in areas where there is known flooding and subsequently higher flood insurance costs.[9] New Orleans participates in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP), which provides federally backed flood insurance protection for property owners.[10] Louisiana has the third most premiums through NFIP, and insurance rates continue to rise.[11] The proper

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4. *Water: After the Storm*, EPA, http://water.epa.gov/action/weatherchannel/stormwater.cfm (last updated Sept. 11, 2013).

5. *See id.*

6. *See id.*

7. CHRISTOPHER KLOSS & CRYSTAL CALARUSSE, NATURAL RES. DEF. COUNCIL, ROOFTOPS TO RIVERS 4-5 (2006), *available at* http://www.nrdc.org/water/pollution/rooftops/rooftops.pdf.

8. *See* Bernadette J. Visitacion et al., *Costs and Benefits of Storm-Water Management: Case Study of the Puget Sound Region*, 135 J. URBAN PLAN. & DEV. 150, 154 (2009).

9. *See* Deirdre Fernandes, *FEMA's New Flood Map Reaches Deep into City*, BOS. GLOBE (Nov. 16, 2013), http://www.bostonglobe.com/business/2013/11/16/fema-new-flood-map-reaches-deep-into-city/gl4gJqCKtBcCFXprN8P7nL/story.html.

10. *Community Status Book Report: Louisiana*, FED. EMERGENCY MGMT. AGENCY, http://www.fema.gov/cis/LA.html (last visited Mar. 22, 2014); *About The National Flood Insurance Program: Overview*, FLOODSMART.GOV, http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp (last visited Mar. 22, 2014).

11. Jennifer Larino, *New Orleans-Area Flood Rates Rise as Congress Considers Flood Fix*, NEW ORLEANS CITY BUS. (Nov. 22, 2013, 3:27 PM), http://neworleanscitybusiness.com/blog/2013/11/22/flood-rates-rise-as-congress-considers-flood-fix/.

management of stormwater can lower insurance rates and increase economic development by creating a friendly landscape for businesses to establish themselves in.[12]

Furthermore, successful stormwater management through green measures can recharge groundwater and alleviate ground subsidence, which is the slow but steady sinking of the ground—along with everything built on it—relative to sea level.[13] Green infrastructure can actually improve the quality of the environment by "cleaning" the stormwater as it enters the ground through the natural root filtration of plant life.[14] This eases the level of pollution the watershed experiences, further preserving surrounding fish and wildlife habitats.[15] Another important effect of certain green measures implemented in stormwater management—such as local public rain gardens—is an increased aesthetic to the neighborhood and potentially an increased sense of community in its maintenance efforts and overall enjoyment of green spaces.[16]

Green infrastructure is a "green" method of stormwater management. In this context, "green" indicates methods that employ the use of soil, vegetation, eco-friendly materials, and environmentally natural processes to deal with the absorption of water in a way that does not harm the natural environment. The term "infrastructure" refers to the composition of these different measures that together create a comprehensive method for catching, retaining, and slowing rainwater runoff. These composite measures include downspout disconnection, rainwater harvesting through cisterns and rain barrels, rain gardens, planter boxes, bioswales, green roofs, alleyways and streets, permeable pavement and porous surfaces, urban tree canopy, and land conservation measures, including constructed wetlands.[17]

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12. *See* Anna Killius, *Sea Level Rise, Stormwater Management, and the National Flood Insurance Program: How Norfolk's Best Management Practices Can Lower Local Flood Insurance Rates*, VA. COASTAL POLICY CLINIC, WILLIAM & MARY LAW SCH. 6-11 (2013), http://law.wm.edu/academics/programs/jd/electives/clinics/vacoastal/documents/march2014reports/sealevelrise.pdf (showing how stormwater management affects the discount levels of NFIP's Community Rating System—a voluntary incentive program that encourages floodplain management by discounting flood insurance premium rates in direct relation to community action that reduces flood risk).

13. Ctr. for Neighborhood Tech., *The Value of Green Infrastructure: A Guide to Recognizing Its Economic, Environmental and Social Benefits*, AM. RIVERS 22 (2010), http://www.americanrivers.org/wp-content/uploads/2013/09/Value-of-Green-Infrastructure.pdf.

14. KLOSS & CALARUSSE, *supra* note 7, at 9.

15. *Id.*

16. *Id.* at 10.

17. *See What Is Green Infrastructure?*, EPA, http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm (last updated Jan. 3, 2014).

These methods comprise a sustainable and environmentally friendly way of dealing with urban stormwater and can be employed at the community or private landowner level. Examples of implementation of these methods are being used in the following cities: Philadelphia (Green City, Clean Waters),[18] Chicago (GO TO 2040),[19] New York City (Green Roof Tax Abatement Program),[20] and Washington, D.C. (Clean Rivers Project).[21] These major cities have all undertaken the green infrastructure approach to stormwater management, consequently creating new documentation of methods and implementation, creating model policy changes, and documenting the much-needed metrics validating the economic and environmental benefits of their green endeavors.

B. Stormwater in New Orleans

There are few places in America that understand the challenges of managing flooding better than the city of New Orleans, Louisiana. After being devastated by flooding in 2005 during Hurricane Katrina, the city has taken a hard look at flood prevention from storm events. Working with the United States Army Corps of Engineers and using FEMA funds for research and implementation of flood prevention measures such as levees, floodwalls, and pumps, New Orleans has sought to insulate the region from floods caused by future hurricane events.[22] However, New Orleans residents regularly suffer with local neighborhood flooding due to poor stormwater management.

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18. *Green City, Clean Waters*, PHILA. WATER DEP'T, http://www.phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan (last visited Mar. 25, 2014).

19. Chicago's City Hall building has a green rooftop, and on October 7, 2013, Mayor Emanuel announced that $50 million of current spending on upgrades and improvements to the city's water and sewer infrastructure over the next five years will be dedicated to investments in green stormwater management. Press Release, Office of the Mayor, City of Chicago, Mayor Emanuel To Devote $50 Million of Water Infrastructure Spending To Improve Stormwater Management in Chicago (Oct. 7, 2013) (on file with author); *City Hall's Rooftop Garden*, CITY OF CHI., http://www.cityofchicago.org/city/en/depts/dgs/supp_info/city_hall_green_roof.html (last visited Mar. 25, 2014); *see also GO TO 2040: Comprehensive Regional Plan*, CHI. METRO. AGENCY FOR PLANNING 95 (Oct. 2010), http://www.cmap.illinois.gov/documents/10180/17842/long_plan_FINAL_100610_web.pdf/1e1ff482-7013-4f5f-90d5-90d395087a53.

20. *Green Roofs*, N.Y.C. BUILDINGS, http://www.nyc.gov/html/dob/html/sustainability/green_roofs.shtml (last visited Mar. 25, 2014).

21. *Clean Rivers Project*, D.C. WATER & SEWER. AUTH., http://www.dcwater.com/cleanrivers (last visited Mar. 25, 2014).

22. *See* Mark Schleifstein, *Upgraded Metro New Orleans Levees Will Greatly Reduce Flooding, Even in 500-Year Storms*, NOLA.COM (Aug. 16, 2013, 6:02 AM), http://www.nola.com/hurricane/index.ssf/2013/08/upgrated_metro_new_orleans_lev.html.

1. Existing Stormwater Management in New Orleans

The city of New Orleans is mostly concave[23] and is largely covered with impervious surfaces. Without proper stormwater drainage, those factors are a recipe for localized flooding. Created in 1893, the New Orleans Sewerage & Water Board (S&WB) (originally the Drainage Advisory Board) was established to deal with the drainage in the below-sea-level city.[24] Ever since the establishment of the city's first drainage master plan in 1895, the city has been dealing with stormwater drainage via pumping methods.[25] Large pump stations drain stormwater and groundwater, but to a deleterious effect. Overpumping, the continual pumping of water out of the ground, serves to destabilize local soil and cause subsidence, causing the former marsh and swamp areas the city was built on to sink.[26] The effects of overpumping and subsequent subsidence are clear in the broken foundations, potholes, uneven streets, and, most importantly, extensive damage to the underground sewerage and drainage pipe infrastructure beneath the city's soil.[27]

The currently fragmented stormwater management regime in place in New Orleans proves to be one of the primary hurdles to implementing any new stormwater management plan. The Department of Public Works (DPW) controls nearly two-thirds of the city's stormwater drainage system, including at least 20,000 catch basins and nearly 1288 miles of the city's over 1500 miles of drainage pipes.[28] The S&WB manages the rest of the drainage structure, including the remaining catch basins and drainage pipes, as well as drainage culverts, canals, and pumps.[29] Smaller pipes (less than thirty-six inches in diameter) are the responsibility of the DPW, while the larger portions of the drainage system fall under S&WB control.[30] Neither the DPW nor the S&WB

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23. WAGGONNER & BALL ARCHITECTS, GREATER NEW ORLEANS, INC., GREATER NEW ORLEANS URBAN WATER PLAN: VISION 52 (2013), *available at* http://issuu.com/wbarchitects/docs/gno_urban_water_plan_vision_2013 ("That is, each house, each neighborhood, and each district in the Urban Water Plan area is situated on the backslope of the [Mississippi] river levee, on a ridge, in a bowl, or in a lowland area.").

24. *Id.* at 48.

25. *Id.* at 48-49.

26. *Id.* at 49-50.

27. *Id.* at 50.

28. Thomas Strategies & New Orleans Citizen Sewer, Water & Drainage Sys. Reform Task Force, *Assessing the City & SWBNO Drainage System: Recommendations for Enhancing New Orleans Stormwater Protection*, NOLA.COM 5 (Apr. 2012), http://media.nola.com/politics/other/Stormwater%20Management%20Report%20City%20Water%20Management%20Task%20Force%20April%202012.pdf.

29. *See id.*

30. *Id.* at 5 n.5.

have been formally charged with the responsibility of stormwater management. This creates a problem when it comes to funding the maintenance of the drainage system. There are questions of who unclogs the drainpipes when needed and who is responsible for pipe repair. Budgeting for the actual necessary drainage improvements has become a significant challenge, with each department directing disproportionate amounts of its budget at drainage improvements, creating a chasm in the proper repair and maintenance of the current stormwater drainage infrastructure.[31]

2. A New Water Management Scheme for New Orleans

The current stormwater management regime does not adequately meet the stormwater drainage needs of the citizens of New Orleans. In order to improve the overall management of stormwater in New Orleans and create a new, comprehensive, and sustainable water management scheme, the responsibility of the entire stormwater drainage management system must be assigned to one primary agency. The S&WB is the most logical choice for several reasons. Foremost, the S&WB is the successor to the Drainage Advisory Board and, therefore, carries the legacy of water drainage management as intended by the city's founders.[32] The DPW is primarily responsible for the construction and maintenance of streets, bridges, and roads that run through the city.[33] The DPW was not created to manage water, whereas the S&WB grew out of the express purpose of water drainage management.[34] As the department that manages the delivery of water to homes, as well as the carrying away of sewage and wastewater from homes and its treatment, the S&WB is the logical choice to deal with stormwater drainage.

Furthermore, the S&WB also has a legally binding commitment to the EPA to undertake Clean Water Act remedial measures.[35] On April 24, 2013, the S&WB entered into a second modified consent decree with the EPA, which identified the S&WB as operator of the drainage system designed and used for conveying stormwater runoff.[36] The agreement enables the S&WB to take all measures necessary in order to comply

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31. *Id.* at 5.

32. *See* WAGGONNER & BALL ARCHITECTS, *supra* note 23, at 48.

33. *Department of Public Works: About Us*, CITY OF NEW ORLEANS, http://www.nola.gov/dpw/about-us/ (last updated Feb. 28, 2014).

34. WAGGONNER & BALL ARCHITECTS, *supra* note 23, at 48.

35. Second Modified Consent Decree, United States v. New Orleans Sewerage & Water Bd., No. 93-3212, at 3 (E.D. La. 2013).

36. *See id.* at 12.

with the Clean Water Act.[37] Considering the effect that city stormwater runoff has on the watershed and nearby rivers, those measures would naturally include stormwater drainage management.[38] An important part of the second modified consent decree agreement between the S&WB and the EPA is article XXVII—Coordination Commitments, section 99, which commits the S&WB to include green infrastructure measures as part of its Remedial Measures Action Plans (RMAPs) for all water basins.[39] In order to meet its outstanding commitment to the EPA to employ green measures, the S&WB must begin incorporating green infrastructure in future plans to deal with stormwater. Upholding section 99 of the second modified consent decree, in its presentation made at the Louisiana Civil Engineering Conference and Show held September 25-26, 2013, the S&WB identified its objective to submit a green infrastructure proposal to the EPA by April 24, 2014.[40] This presentation exclusively incorporated green infrastructure methods for managing stormwater drainage, and if carried out, the S&WB will be considerably closer to meeting its commitment to the EPA.[41]

Finally, of its own accord, the S&WB has undertaken the task of researching a stormwater drainage utility fee structure. In November 2012, the S&WB's Board of Directors adopted a resolution authorizing a study to determine the allocation of drainage system expenses substantiating a drainage service charge.[42] The S&WB employed Raftelis Financial Consultants to conduct the study and, in May 2013, amended its existing contract to include certain policy-focused tasks that would result in the development of the main policies for ultimately implementing a user fee for stormwater drainage management.[43] The S&WB is stepping up to the task of stormwater drainage management. By consolidating management of drainage within the municipal corporation of the S&WB, comprehensive stormwater management

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37. *Id.* at 11.

38. *See generally* Thomas G. Echikson & Gregory P. Lauro, *When It Rains It Pours: Past, Present, and Future Regulation of Wet Weather Discharges*, 34 Envtl. L. Rep. (Envtl. Law Inst.) 10,150 (2004) (discussing in-depth the role of stormwater management in the federal government's past and present attempts to control wet weather discharges through the EPA's regulation and permitting under the Clean Water Act).

39. Second Modified Consent Decree, *supra* note 35, at 50.

40. Madeline Fong Goddard, Sewerage & Water Bd. of New Orleans and Green Infrastructure, Address at the La. Civil Engineering Conference and Show (Sept. 25-26, 2013).

41. *Id.*

42. Letter from Robert K. Miller, Deputy Dir., Sewerage & Water Bd. of New Orleans, to Financial Committee, Sewerage & Water Bd. of New Orleans (May 7, 2013), *available at* http://lensnola.wpengine.netdna-cdn.com/wp-content/uploads/2013/05/copy_Finance-May.pdf.

43. *See id.*

becomes a possibility. Implementing green infrastructure in any future stormwater management plan set out by the S&WB will also serve to keep such plans in alignment with the eco-friendly vision of the New Orleans Master Plan.

III. THE NEW ORLEANS MASTER PLAN

The New Orleans Master Plan (formally titled *Plan for the 21st Century*) was adopted by the City Planning Commission and the City Council and was signed by Mayor Mitchell Landrieu in 2010.[44] The Master Plan is a planning framework that has the force of law in its land use plan, and as the city's primary policy and planning document, serves to guide and inform the decisions of elected and appointed officials.[45] The Master Plan touches future improvements of every part of the city. Because a community participation process was employed in its drafting, the Master Plan reflects the values and priorities of the New Orleans community.[46]

Unfortunately, the Master Plan does not directly mention stormwater drainage management. However, an entire chapter of the Master Plan is devoted to environmental quality, and within this chapter, the Master Plan identifies green roofs as a method to reduce stormwater runoff.[47] The Master Plan also identified and included the GreeNOLA rebuilding plan, which was adopted by the City Council in 2008 to make New Orleans more sustainable.[48] The Master Plan promotes the adoption of several green infrastructure initiatives within the GreeNOLA plan and directs the implementation of policies for sustainable growth and development.[49] The entire GreeNOLA plan itself is included in the appendix to the Master Plan. Under the green buildings and energy efficiency section, the GreeNOLA plan prescribes that New Orleans create a comprehensive zoning plan and standards for green building that

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44. New Orleans, La., Ordinance 024079 (Aug. 12, 2010).

45. "All land use actions *must be consistent* with the goals, policies and strategies in the element (section) of the Master Plan called the 'Land Use Plan.' The strategies include a set of land use principles, an urban design framework, urban design principles, and zoning principles, all designed to implement the land use goals and policies." 2 GOODY CLANCY ET AL., PLAN FOR THE 21ST CENTURY: NEW ORLEANS 2030 pt. 1, at 1 (2010, as amended through 2012).

46. 1 *id.* Executive Summary, at 9.

47. 2 *id.* at 13.24.

48. *Id.* at 13.15.

49. *Id.* at 13.15-.16.

include stormwater retention,[50] specifically mentioning green infrastructure measures as a method for doing so.[51]

Although the GreeNOLA plan includes some measures for stormwater management, a more recent and dynamic plan—the Greater New Orleans Urban Water Plan (GNO Plan)—has been developed by Greater New Orleans, Inc. (GNO). Unfortunately, the Master Plan was amended before this plan was published on September 6, 2013. The GNO Plan was developed and funded in 2010 by the Disaster Recovery Unit of Louisiana's Office of Community Development in partnership with GNO.[52] The GNO Plan directly addresses stormwater issues within the east banks of Orleans, Jefferson, and St. Bernard Parishes.[53] The $2.5 million in funding to develop the GNO Plan came from the federal Department of Housing and Urban Development's (HUD) Community Development Block Grant for Disaster Recovery Assistance.[54] The GNO Plan is incredibly comprehensive and expansive. It addresses stormwater and groundwater at all levels of management—from public to private—and provides a guided framework for implementation of different green infrastructure measures. The GNO Plan includes a discussion of the many financing methods available and also examines case studies of communities and cities that have successfully employed and financed green infrastructure.[55]

The GNO Plan offers recommendations that encompass measures as expansive as drain system upgrades to measures as localized and individualized as private homeowner participation in dealing with water in New Orleans.[56] While such an expansive plan may be overwhelming for city planners and officials, the GNO Plan is meant to be implemented piecemeal over time.[57] This is a holistic, green, and sustainable selection of implementation methods with which to revamp and manage the New Orleans stormwater drainage system successfully. Mayor Landrieu noted

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50. LA. DISASTER RECOVERY FOUND., GREENOLA: A STRATEGY FOR A SUSTAINABLE NEW ORLEANS 13-14 (2008), *available at* http://www.nola.gov/getattachment/bece551e-5cf8-421c-ac27-48db26194c40/Appendix-Ch-13-GreeNOLA-A-Strategy-for-a-Sustainab/.

51. *Id.* at 12.

52. WAGGONNER & BALL ARCHITECTS, GREATER NEW ORLEANS, INC., GREATER NEW ORLEANS URBAN WATER PLAN: IMPLEMENTATION 7 (2013), *available at* https://www.dropbox.com/s/ninm529xo1rqe5s/GNO%20Urban%20Water%20Plan_Implementation_03Oct2013.pdf.

53. *Id.*

54. *Id.*; Press Release, *Greater New Orleans Urban Water Plan Released*, GREATER NEW ORLEANS, INC. (Sept. 6, 2013), http://gnoinc.org/news/publications/press-release/greater-new-orleans-urban-water-plan-released.

55. *See* WAGGONNER & BALL ARCHITECTS, *supra* note 52, at 108-25.

56. *See id.* at 93, 108-25.

57. *Id.* at 20.

that the GNO Plan is an innovative water management strategy that will be a part of rebuilding New Orleans and managing the city's stormwater.[58] Senator Mary Landrieu also endorsed the plan in her public comment on the GNO Plan's release.[59]

However, at the first opportunity the city had to implement any green measures from the GNO Plan—the 2014-2018 Draft Capital Improvement Plan (CIP)—the City Planning Commission balked. The CIP included only one proposed provision for stormwater management: the Department of Parks and Parkways' budget request for Citywide Green Space Restoration.[60] The City Planning Commission deferred funding for the project, leaving green measures entirely out of the CIP for the next four years.[61] Regardless of the support for such measures clearly heard in the comments from the public, the City Planning Commission approved the draft CIP without the inclusion of green infrastructure or sustainable stormwater management efforts. Public comments to the draft CIP reflected that New Orleans is ready for green infrastructure—in fact, many are requesting it. The series of letters sent to the City Planning Commission for public comment regarding the draft CIP were written by prominent people in the stormwater management community who requested the incorporation of some or part of the GNO Plan, or at least the inclusion of green infrastructure in stormwater management.[62]

Unfortunately, the City Planning Commission passed the draft CIP without mention of the GNO Plan, failing entirely to incorporate stormwater management. After forwarding its recommendations to Mayor Landrieu, the CIP informed the Mayor's budget. The 2014

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58. "'As we continue to rebuild our city, innovative water management strategies, including the Greater New Orleans Urban Water Plan, will be at the forefront,' said New Orleans Mayor Mitch Landrieu. 'We have an opportunity to create a template for water management that can serve as an international model for resiliency.'" Press Release, *Greater New Orleans Urban Water Plan Released*, *supra* note 54.

59. "'The people of Louisiana need a new model that allows us to live with water, harnesses opportunities to mitigate flood risks and supports sustainable development,' said U.S. Senator Mary Landrieu. 'The report released today identifies specific projects in St[.] Bernard, Jefferson, and Orleans Parishes that will increase regional resiliency and lay a solid foundation for future economic growth.'" *Id.*

60. *2014-2018 Draft Capital Improvement Plan*, NEW ORLEANS CITY PLANNING COMM'N 33 (2013), http://www.nola.gov/nola/media/One-Stop-Shop/CPC/CIP-2014-2018-DRAFT-09102013.pdf (prescribing green stormwater management measures in the Citywide Green Space Restoration project description).

61. *Id.*

62. *See* Memorandum from the City Planning Comm'n Staff to City Planning Comm'n Compiling Public Comment on the 2014-2018 Draft Capital Improvement Plan, CITY OF NEW ORLEANS (Sept. 16, 2013), http://cityofno.granicus.com/MetaViewer.php?meta_id=218430&view=&showpdf=1.

Annual Operating Budget was passed by the City Council with barely a nod to stormwater management.[63] Furthermore, the adopted 2014 Executive Capital Budget makes no provision for stormwater drainage management or green infrastructure.[64] The city's failure to adopt any part of the GNO Plan or to incorporate green measures in planning does not support the Master Plan's vision for improving environmental quality or the S&WB's commitment to the EPA to employ green infrastructure in its remedial measures action plans. It appears that the only action taken by the city of New Orleans to either address stormwater drainage or incorporate the green infrastructure measures supported by the Master Plan are reflected in the city's draft CZO.

IV. THE DRAFT COMPREHENSIVE ZONING ORDINANCE

The most recent action taken by the city to incorporate the Master Plan's vision of environmental quality is the new draft CZO. In early 2014, the draft CZO will be considered by the City Council. If approved by the City Council, the draft is then passed to the Mayor for approval. Once approved and signed into law by the Mayor, the draft CZO will replace the current CZO as the city's land-use planning device for defining standards and types of use for distinct types of properties in New Orleans. The draft CZO is a complete overhaul of the original CZO established in the 1970s, which is out of alignment with the city's current Master Plan.[65] Specifically addressing the environmental chapter of the Master Plan, the draft CZO contains explicit green infrastructure provisions for managing stormwater.[66] Although the draft CZO contains green infrastructure provisions, its reach is limited.

Article 23 (Landscape, Stormwater Management, and Screening) of the draft CZO includes requirements that support the implementation of green infrastructure in landscape design and stormwater management.[67] The requirements' stated purposes are to use green infrastructure as a means of reducing urban runoff, easing subsidence, and promoting

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63. *See 2014 Executive Capital Budget*, CITY OF NEW ORLEANS (2013), http://www.nola.gov/getattachment/Mayor/Budget/2014-Adopted-Executive-Capital-Budget.pdf/.

64. *Id.*

65. *See* Leslie Allie, *Why You Should Participate in the Draft CZO Process*, NEW ORLEANS BUS. ALLIANCE (Sept. 24, 2013), http://nolaba.org/why-you-should-participate-in-the-draft-czo-process/.

66. *Id.*

67. *See* New Orleans, La., Draft Comprehensive Zoning Ordinance art. 23 (2013), *available at* http://www.nola.gov/getattachment/b8d6195f-ea85-49af-937d-333c090aa3a6/Art23-Landscape,-Stormwater-Management-Screening/.

conservation of water resources.[68] Furthermore, the landscape and stormwater management standards contained in the draft CZO are intended to encourage development that is "environmentally functional" and "economically viable."[69]

These policy changes affect all new developments, including redevelopment, with the exception of single-family, two-family, and multifamily dwellings of six units or less.[70] A landscape management plan is required for parking lots ten spaces or larger and require retrofit landscape plans conditioned upon certain changes being made to existing parking lots or its principal building.[71] A stormwater management plan is required for all new and redeveloped sites of 10,000 square feet or more of impervious surface or for development of a site of one acre or more in size.[72] The stormwater management plan must be prepared by a landscape architect in conjunction with a civil engineer licensed in Louisiana and must include the predevelopment runoff rate and the postdevelopment runoff rate.[73] The plan must also specify best management practices (BMP), both permanent and temporary.[74]

The performance standard set by the draft CZO requires the use of stormwater BMPs in order to "minimize runoff, increase infiltration, recharge groundwater, and improve water quality."[75] The stormwater BMP measures come from the Bayou Land Resource Conservation & Development Council (Bayou Land RC&D) Stormwater BMP Guidance Tool.[76] Any stormwater BMP must follow the design described within

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68. Article 23 is intended to "[r]educe urban runoff and mitigate the effect of new development, redevelopment, or infill development on the existing drainage system by ensuring the preservation of permeable surfaces and requiring the installation of stormwater Best Management Practice (BMPs) to slow surface flow of stormwater runoff and promote filtration, plant uptake, absorption, and infiltration into sub-soils to reduce subsidence rates" and to "[p]rovide for the conservation of water resources through the efficient use of irrigation, appropriate mix of plant materials, recycling water elements, and regular maintenance of landscaped areas." *Id.* art. 23.1(B), (D).

69. *Id.* art. 23.3(E)(1).

70. *Id.* art. 23.3(A)(3). Also note that these landowners must still comply with all other applicable federal, state, and local stormwater ordinances.

71. *Id.* art. 23.7(A)(1), (4).

72. *Id.* art. 23.3(A)(2).

73. *Id.* art. 23.3(C).

74. *Id.* art. 23.3(C)(4).

75. *Id.* art. 23.12(B).

76. *Id.* The Bayou Land Resource Conservation & Development Council is a nonprofit whose mission is to promote the conservation of natural resources while promoting healthy, sustainable communities in the Bayou Land area. The Stormwater BMP Guidance Tool project was a federally funded effort to create a standardized and strategic approach to BMP selection in the region. *Who We Are; What We Do*, BAYOU LAND RC&D COUNCIL, http://bayoulandrcd.org/about (last visited Mar. 25, 2014); *Programs*, BAYOU LAND RC&D COUNCIL, http://bayoulandrcd.org/programs (last visited Mar. 25, 2014).

the Bayou Land RC&D Stormwater BMP Guidance Tool; alternatives to the BMPs will be considered, but must gain approval before implementation.[77] The draft CZO includes a list of stormwater BMPs to guide the site-specific stormwater management regime by means of green measures.[78] By suggesting a combination of one or more stormwater BMPs, the draft CZO recognizes that there is no one-size-fits-all stormwater management plan that can be applied to all sites. Some of these green BMPs include bioswales or grass swales, circular depressions, constructed wetlands, wet retention and dry detention basins, disconnected roof tops, recycling and irrigation, permeable pavers, porous surfaces, rain gardens or groves, and cisterns.[79]

A. Conflict Between the Louisiana Administrative Code and the Draft CZO

One apparent problem with the draft CZO's recommendation of wet retention basins and cisterns is their conflict with the Louisiana Administrative Code. Retention basins are localized depressions in the ground that collect stormwater, often including underdrainage or subgrade perforated pipe collection systems.[80] Wet retention basins are best used in larger areas, such as business parks or golf courses, and are meant to remain wet, where the permanent pool is displaced by incoming stormwater flows.[81] Cisterns are large barrels that catch and store rainwater runoff from roofs, which prevents the water from entering the storm drainage system.[82] The reserved water in cisterns can be used for garden and landscape irrigation or inside the home for nonpotable water needs, such as toilet flushing.[83]

By Louisiana Administrative Code definition, wet retention basins are "impounded" waters[84] and are illegal if not properly controlled to prevent mosquitos.[85] By the same regulation, cisterns (as man-made containers holding water located within one mile of a community)[86] are

77. New Orleans, La., Draft Comprehensive Zoning art. 23.12(B).
78. *Id.* art. 23.12(B)(1)-(21).
79. *Id.*
80. *See id.* art. 23.12(B)(4).
81. GEOSYNTEC CONSULTANTS, STORMWATER BMP GUIDANCE TOOL: A STORMWATER BEST MANAGEMENT PRACTICES GUIDE FOR ORLEANS AND JEFFERSON PARISHES 3-51 (2010), *available at* http://bayoulandrcd.org/yahoo_site_admin/assets/docs/Bayou_Land_Guidance_NO_BMP.176113438.pdf.
82. New Orleans, La., Draft Comprehensive Zoning art. 23.12(B)(21).
83. *Id.*
84. LA. ADMIN. CODE tit. 51, pt. V, § 101(A) (2013).
85. *Id.* tit. 51, pt. V, § 103(D).
86. *Id.* tit. 51, pt. V, § 103(A).

also not permitted for the prevention of mosquito breeding. The naturalistic or biological (read: green) control measures suggested by the Louisiana Administrative Code include introducing mosquito-larvae-eating fish or larvicide to standing water,[87] neither of which are feasible solutions employable in cisterns or wet retention basins due to the nature of their function.[88] However, properly executed cisterns and wet retention basins alleviate much of the concern regarding mosquito breeding, eliminating the need to introduce chemicals into natural environments for pest control. Proper landscape maintenance, consistent inflows of stormwater, and seasonal drying of wet retention basins all naturally limits potential mosquito breeding. Keeping cisterns lidded and regularly emptied, or stored underground, also curbs the potential for mosquito breeding environments.

The Louisiana Administrative Code's regulation of mosquito control appears to create a conflict with the best practices suggested by the draft CZO. To resolve this conflict, the Louisiana legislature might amend the language of the Louisiana Administrative Code to incorporate green infrastructure. Such amendments could provide that green infrastructure measures properly executed according to the Bayou Land RC&D Stormwater BMP Guidance Tool are exempt from the Public Health—Sanitary Code regulation. This would create continuity between the draft CZO directives and the Louisiana Administrative Code. Simple, careful management of wet retention basins and cisterns alleviates the health concerns from which the regulations were drafted. Amending the mosquito control regulations creates greater, fully legal opportunities to employ green infrastructure stormwater management techniques on public lands with wet retention basins and on plots of land too small for other green infrastructure measures with cisterns.

B. Deficiencies of the Draft CZO

While the draft CZO supports the use of green infrastructure to manage stormwater, the effects are not far-reaching. These regulations primarily affect only larger land developers and never affect the private homeowner, regardless of the amount of impervious surfaces they own.

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87. *Id.* (in both the instances of man-made water containers and impounded waters).

88. Adding pesticides to cistern water would likely preclude the owner from using the water for nonpotable household functions indoors and limit outdoor landscape uses. Adding pesticides to wet retention basins would not only potentially threaten delicate surrounding ecosystems and possibly contaminate groundwater, but the constant flow of stormwater would require frequent and unsustainable treatment practices. Furthermore, the use of mosquito-larvae-eating fish would not be sustainable in either environment because neither are designed to sustain aquatic habitation.

Because the regulations will not affect the developer who builds single and double family homes, or the developer who builds multifamily residencies for fewer than 6 families, most private residences are not required to undertake green measures to manage their stormwater runoff.[89] Because there is no retrofit requirement within the draft CZO, current landowners whose impervious surfaces exceed 10,000 square feet are not required to participate in green infrastructure stormwater management unless they redevelop.[90] One of the key issues with stormwater management is whole-community involvement. The draft CZO is a good start, but the Louisiana legislature needs to take further measures—specifically regarding these smaller dwelling and retrofit concerns—to ensure holistic success.

V. CLOSING THE GAP CREATED BY THE DRAFT CZO

Even assuming that the draft CZO will pass, if the goal is to have a comprehensive, city-wide stormwater management plan, then the draft CZO leaves certain gaps unfilled. Primarily, the draft CZO will not affect developers who are building on a smaller scale, such as building private homes and limited-unit multifamily housing. Most importantly, the draft CZO's redevelopment provisions will leave private homeowners without any mandate to participate in stormwater remediation. These gaps in stormwater management can create a huge impact on how much localized stormwater flooding can occur in New Orleans neighborhoods. However, there are certain solutions that can be employed with the support of the city, the S&WB, and the Louisiana Legislature that will serve to create a green and sustainable stormwater management program.

A. Developer Incentivization

Because developers may not live near the community in which they are developing land, there is often no personal incentive for them to employ green infrastructure. Mostly, green infrastructure must be a financially attractive option for developers. There are few mechanisms that will create incentives for the developer that will not require an increase in city budget overhead and oversight. A strategic approach to incentivizing developer participation in green infrastructure must not generate so much processing that it would require an increase in

89. New Orleans, La., Draft Comprehensive Zoning Ordinance art. 23.3(A)(1) (2013), *available at* http://www.nola.gov/getattachment/b8d6195f-ea85-49af-937d-333c090aa3a6/Art23-Landscape,-Stormwater-Management-Screening/.

90. *Id.* art. 23.3(A)(2).

manpower at the city level. There are a few ways to incentivize developers that would just add tasks to the current job descriptions of one or two city employees or, alternatively, become an additional undertaking of state agencies, such as the New Orleans Redevelopment Authority (NORA).[91]

1. Developer Solutions: Expedited Permitting

Expedited permitting may be one solution that could incentivize developers to include green infrastructure measures in their landscaping design. For example, the city of Indianapolis developed the Sustainable Infrastructure Initiative, which expedites building permits that incorporate green infrastructure measures to manage stormwater runoff in new development.[92] The development plan must meet Indianapolis's stormwater best practices.[93] Projects that incorporate these green measures receive immediate permit review processing, expedited to the greatest extent possible.[94] Each project requires the developer to complete a Sustainable Infrastructure checklist (provided by the state) denoting the proposed green infrastructure tactics employed.[95] The green checklist attached to the project design alerts Department of Code Enforcement staff that the project being submitted incorporates green infrastructure, and the permit review will be immediately processed.[96] A similar incentive could be employed in New Orleans without adding to the city's budget. The New Orleans Safety and Permits Agency would be able to provide this incentive at no cost, but would need to employ a standard operating procedure that incorporates express consideration for green permits. The extra processing paperwork would be minimal (one checklist to review), so there would be no increase in overhead for the agency.

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91. *See* WAGGONNER & BALL ARCHITECTS, *supra* note 52, at 108-25 (providing a broad overview of some of the funding solutions discussed here).

92. Margaret E. Byerly, *2009-2011 James D. Hopkins Professor of Law Memorial Lecture: Research Report: A Report to the IPCC on Research Connecting Human Settlements, Infrastructure, and Climate Change*, 28 PACE ENVTL. L. REV. 936, 956 (2011) (discussing the expedited permit review process in Indianapolis).

93. *See Sustainable Infrastructure*, CITY OF INDIANAPOLIS & MARION CNTY., http://www.indygov.org/eGov/City/DPW/SustainIndy/WaterLand/Pages/SustainableInfrastructure.aspx (last visited Mar. 25, 2014).

94. *Id.*

95. *See id.*

96. *Id.*

2. Developer Solutions: Grant Refunds

Cities like Philadelphia have had marked success with grant programs incentivizing developers' use of green infrastructure in their plans.[97] A federal grant could be used to fund a rebate program to incentivize developers of single-family, two-family, and multifamily units to incorporate green measures, successfully closing the gap that the draft CZO leaves for holistic green infrastructure policy. A grant could be applied for through the Office of Community Development, which already utilizes the HUD program to create low-income housing opportunities and promote community stabilizing activities. This money could fund a rebate program for developers who employed one or more of the stormwater management measures outlined in the Bayou Land RC&D Stormwater BMP Guidance Tool in their landscaping plans. The rebate request would be submitted to the Office of Community Development (OCD), and upon showing material costs of the green infrastructure measures successfully installed, the costs of materials could be refunded until the grant monies are exhausted.

Similarly, NORA could provide incentives to developers who bid on its properties with the intention of building low-income housing. NORA currently receives grants from HUD and could seek to increase these fund amounts to incorporate a green infrastructure rebate program that would provide a refund to developers for materials used for green infrastructure in low-income development plans. Furthermore, NORA could potentially require green measures be a part of the landscaping scheme for these developments as a condition of sale. NORA supports green infrastructure measures, having procured a FEMA grant to implement green infrastructure in the Gentilly Woods and Pontchartrain Park areas, which will serve as pilot programs for future green infrastructure measures.[98] Providing incentivization for, or even mandating, the incorporation of green infrastructure in low-income housing development on the land they sell would align with NORA's forward direction. In addition, these pilot programs are essential to serve as models for future projects and, most importantly, provide the metrics needed for organizations to support proposals employing green infrastructure efforts and create a baseline for the overall success of green stormwater management measures.

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97. Robert B. McKinstry Jr. et al., *Unpave a Parking Lot and Put Up a Paradise: Using Green Infrastructure and Ecosystem Services to Achieve Cost-Effective Compliance*, 42 Envtl. L. Rep. (Envtl. Law Inst.) 10,824, 10,831 (2012) (discussing Philadelphia's successful green stormwater program).

98. Interview with Colleen McHugh, New Orleans Redevelopment Auth. (Jan. 9, 2014).

B. Landowner Incentivization

Because there are no mandates for single-, double-, and multifamily dwellings to incorporate or implement green infrastructure measures, private homeowners must do so on their own. Comprehensive stormwater management mandates may not come down for years to come—if ever. Therefore, homeowners and other landowners must choose to participate in stormwater management. Such measures will serve to support the community as well as indicate to the city that the public is ready for green infrastructure and sustainable stormwater drainage methods; private participation will prove community support. Knowing that they are doing a good measure for their community and for the environment overall may be enough to get homeowners to consider green measures, but it usually takes some sort of incentive to prompt private participation. Incentive mechanisms allow local governments to encourage the voluntary participation of existing landowners and private homeowners in green infrastructure, in contrast to a mandated retrofit policy. There are several incentives that have been successful: grants and stormwater utility fees are among the most frequently used.

1. Landowner Solutions: Grants

In the context of green infrastructure, grants are a funding alternative to stormwater utility fees. Grants are sums of money awarded for a particular purpose. Grant money can come from a variety of sources, such as taxpayer contributions to state and federal funds, donations from corporations seeking to reap tax benefits and increase goodwill, and genuine philanthropic bodies seeking to promote the overall welfare of others.[99] Grants usually involve some form of "grant writing" inclusive of either a formal written request or an online application specifying the purpose for which the awarded monies will be used.[100] Grants generally require the beneficiary to meet certain criteria, because grants are usually set up to fund endeavors that satisfy a discrete end, such as improving community health in depressed neighborhoods or restoring a blighted area.[101] If those requirements are met and the application is approved, the monies will be disbursed to the beneficiary.

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99. *A Detailed Introduction to (Government) Grants*, GREENPLANTS.COM, http://www.greenplants.com (last visited Mar. 25, 2014).

100. *See id.*

101. *Id.*

Awarded grant monies are used to fund only those activities that would further the purposes specifically intended by the grant.[102]

Federally funded grants for green infrastructure may come from agencies such as the HUD and the EPA.[103] Federal grants that support green infrastructure, such as HUD's Community Development Block Grant Program, can help to incentivize green infrastructure implementation in low-income communities.[104] These communities are often beset with environmental challenges, and such funds may provide a means for employing methods that would encourage sustainable stormwater management practices by homeowners. Private measures such as these also engender a sense of community, serving to strengthen the neighborhood itself.

Grants for green infrastructure stormwater management measures could also be written into a state or city budget. Money collected from state taxes could then be allocated to create a grant to incentivize green infrastructure implementation. While a Louisiana state grant might be possible, New Orleans would not likely include funding for green infrastructure grants within the city budget. Considering the New Orleans City Planning Commission's present reluctance to include city expenditures for implementation of green measures into the CIP and the void of funds allocated for green infrastructure or even stormwater management in the Mayor's Executive Capital Budget, it appears that the city is not willing to incur the cost of its *own* green infrastructure implementation, let alone create a fund for private landowner incentivization. Thus, incorporating green infrastructure *grants* into the city budget would likely fail the vote.

Procuring grants for private landowner incentivization could potentially come from the efforts of local New Orleans universities.[105] Universities local to New Orleans, such as Tulane University and University of New Orleans, feature urban planning and development in their curriculum.[106] Each university also employs an in-house grant writer who could potentially undertake the task of applying for grants

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102. *Id.*

103. *Water: Green Infrastructure—Funding Opportunities*, EPA, http://water.epa.gov/infrastructure/greeninfrastructure/gi_funding.cfm (last updated Jan. 11, 2013).

104. *Id.*

105. *See Rain Garden Rebate Program*, RUTGERS COOP. EXTENSION WATER RES. PROGRAM, http://www.water.rutgers.edu/Projects/RGRebate/RGRebate.html (last updated Feb. 11, 2014) (providing an example of a successful rebate program facilitated through the university incentivizing private landowner rain garden installation).

106. The Department of Planning and Urban Studies at the University of New Orleans and Tulane Regional Urban Design Center at Tulane University School of Architecture.

from private philanthropic resources. The funds procured would serve to benefit both the awarded universities as well as their surrounding communities. The university awarded the grant funds would be responsible for managing the disbursement of green infrastructure rebates to qualified private landowners. These private landowners would make their requests for rebates on their green infrastructure stormwater management efforts directly to the university department. At the university level, a department employee could be given the additional responsibility of reviewing refund requests and serve as a liaison with the accounting department. Alternatively, a student position could be created for refund request processing for students enrolled in urban planning programs, garnering either credit or a small stipend allocated from the grant award.

2. Landowner Solutions: A Stormwater Remediation Fee

New Orleans could greatly benefit from a stormwater remediation fee comparable to Maryland's Stormwater Management—Watershed Protection & Restoration Program discussed in Part V.B.3. But implementing stormwater fees in New Orleans is no easy task, in part because the S&WB would need to be given the legal authority to implement these fees. The S&WB was created as a municipal corporation and has no power to implement taxes and fees on its own accord.[107] Permitting such fees would take the support of the entire city—not just the approval of city council—and granting the S&WB the legal authority to implement stormwater utility fees might require legislative action.[108] The S&WB recognizes the need for stormwater utility fees and cited them as a likely part of its drainage system funding plan outlined in its 2011-2020 Financial Plan and Rate Study.[109] Within the plan, the fees were assessed as revenue fees in order to pay for operation and maintenance of the drainage system. To support its request for an implementation of stormwater drainage utility fees, the S&WB has employed Raftelis Financial Consultants to analyze the proposed fee rate and develop policies to support user fees for drainage

107. La. Op. Att'y Gen. 99-0024 (1999), *available at* http://lensnola.wpengine.netdna-cdn.com/wp-content/uploads/2013/05/AGOpinionSWB99.pdf.

108. *Id.*

109. Sewerage & Water Bd. of New Orleans, *Financial Plan and Rate Study 2011-2020*, CITY OF NEW ORLEANS 4 (Sept. 28, 2011), http://www.nola.gov/getattachment/City/SWB-Reform/NewOrleans-RateStudyReport.pdf/.

management.[110] Green infrastructure needs to be a part of these policy considerations.

Stormwater fees are based most often on the amount of impervious surface covering the land where the fee is being implemented.[111] The fee rate is structured in direct proportion to the amount of impervious surface on the property: the greater the amount of impervious surface on the land, the higher the stormwater fee.[112] This is the most equitable type of stormwater fee, as the charge is for the proportion of stress the property places on the drainage system.[113] Stormwater fees that are based on the size of the lot of land do not take into account that the property may be able to retain and absorb rainwater in storm events.[114] Similarly, stormwater fees that are based on a property's metered water flow are also inequitable because the amount of water used by a property bears no relation to the amount of stormwater runoff generated by the amount of impervious surface on the property.[115] For fees to be proportionate to the burden the property creates on the drainage system, care must be taken to inventory the imperviousness of each property subject to charge. The use of high-tech mapping software (as was used by the city of Philadelphia) is one way to inventory the gross area and impervious area of properties.[116] While this determination is a research-intensive task, the equitable identification of the burden on the drainage system legitimizes the rate of the stormwater remediation fee.

Many times, stormwater fees are too low to provide any incentivization that might prompt a homeowner to take action. Some stormwater fees can be as low as $2, which is insufficient to prompt private participation at the homeowner level.[117] The policy planning for stormwater utility fees must take into account when the proposed fee would be too small to either promote abating behavior or warrant a rebate to reward abatement efforts.[118] The proposed fees would need to be large enough to create an incentive to employ green infrastructure on

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110. *See* Letter from Robert K. Miller to Financial Committee, *supra* note 42.

111. *Fact Sheet: Funding Stormwater Programs*, EPA 3-4 (Apr. 2009), http://www.epa.gov/region1/npdes/stormwater/assets/pdfs/FundingStormwater.pdf.

112. *Id.* at 3.

113. *See id.* at 2-4.

114. *Id.* at 2.

115. *Id.*

116. *See Stormwater Billing*, CITY OF PHILA., http://www.phila.gov/water/Stormwater_how.html (last visited Mar. 25, 2014).

117. Hale W. Thurston et al., *Using Economic Incentives To Manage Stormwater Runoff in the Shepherd Creek Watershed, Part I*, EPA 11 (Oct. 2008), http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P1002Q4G.TXT.

118. *Id.*

properties that have enough impervious surface to make an impact on stormwater drainage. Therefore, the rate of an incentivizing fee would need to be greater than a fee covering only the operation and maintenance costs of the stormwater drainage utility. The new stormwater fees in New Orleans could not merely include the costs of operating the utility if they are meant to incentivize; an additional fee would need to be assessed to incentivize landowners. This additional fee could be used to establish something like a rehabilitation fund or future grant funding. The fee and the potential rebate would need to be high enough to prompt dispersed stormwater best management practices. Creating a stormwater fee that includes rehabilitation and restoration, such as that employed in Maryland, could legitimize the amount of the incentivizing stormwater fee charged to customers.

3. Maryland: A New Orleans-Friendly Stormwater Remediation Fee Structure

In April 2012, the Maryland Legislature passed a bill requiring nine counties to implement a stormwater *remediation* fee.[119] The fee is used not only for the operation and maintenance of its stormwater utility; the fee also serves to fund the restoration and protection of the local watershed.[120] The ordinance requires each county and/or municipality to deposit the fee into a local watershed protection and restoration fund, after having specified which portion of the stormwater remediation fees were allocated for watershed protection and restoration projects.[121] The county or municipality must also specify the uses of the money in the fund; the fund can only be used for watershed protection and restoration, and funds may not revert or be transferred to the general fund of any county or municipality.[122] This kind of stormwater fee could be sufficient to create the kind of incentive needed for private landowner participation in green infrastructure in New Orleans.

Following Maryland's model, in an effort to prompt property owner action, New Orleans could establish a rehabilitation and restoration fund to which a certain percentage of the stormwater fees could be directed. For example, if the S&WB determined that for every square foot of impervious surface there would need to be a 7-cent fee charged monthly to cover the maintenance and operation of the stormwater drainage utility, then the fund might legitimize an additional 3 cents to fund the

119. *See* H.B. 987, 2012 Gen. Assemb., Reg. Sess. (Md. 2012).
120. *Id.*
121. *Id.*
122. *Id.*

rehabilitation and restoration fund, thus generating a fee large enough to incentivize.[123] This is the type of rate structure that must be considered by Raftelis Financial Consultants in order to create a fair rate structure that balances both ends sought—the costs of the utility and the restoration fund.

Another consideration in rate structure is geographic specificity. Because stormwater drainage affects neighborhoods very differently, the gross property/impervious surface rate could differ between geographically distinct areas within New Orleans. Those with a higher rate of flood occurrence may pay a higher rate until the area's stormwater management successfully controls rain events. Such fees could be reevaluated periodically, so that metrics could potentially support a lower fee.[124] On-site management of stormwater by private landowners would serve to lower the cost of the stormwater utility fee in the landowners' own neighborhoods. In conjunction with the Army Corps of Engineers, FEMA has created the Hurricane and Storm Damage Risk Reduction System (HSDRRS) for the city of New Orleans, including maps documenting the drainage basins for each neighborhood.[125] Or, more comprehensively, FEMA's Region VI Flood Maps are available online and use interactive web mapping to identify flood hazard areas in New Orleans.[126] These maps could be used in conjunction with the fourteen distinct planning districts that the City Planning Commission of New Orleans has broken the city into for planning purposes.[127] The planning district maps could provide a basis for the neighborhood breakdown for stormwater drainage evaluation. Whatever combination used, it is possible to identify localized flooding hazards caused by stormwater events in order to develop stormwater utility rates relative to the flooding that occurs in a landowner's neighborhood.

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123. These rates are an example only.

124. Such metrics would be the responsibility of the S&WB.

125. *USACE General Design Support Services and Multidisciplinary Planning Primarily Within the Limits of the New Orleans District*, ESPEY CONSULTANTS, INC., http://espeyconsultants.com/projects/usace.php5 (last visited Mar. 25, 2014); *HSDRRS FEMA Accreditation Map*, ESPEY CONSULTANTS, INC., http://espeyconsultants.com/images/HSDRRS.jpg (last visited Mar. 25, 2014).

126. *Flood Information Portal FEMA Region 6 Counties*, FED. EMERGENCY MGMT. AGENCY, http://maps.riskmap6.com/LA/Orleans/ (last visited Mar. 25, 2014).

127. *See CZO Planning District Maps*, CITY OF NEW ORLEANS, http://www.nola.gov/city-planning/draft-comprehensive-zoning-ordinances-(czo)/czo-planning-district-maps/ (last visited Mar. 25, 2014); *Planning Districts*, CITY OF NEW ORLEANS, http://www.nola.gov/getattachment/67f87d04-404f-4177-b063-dcdb32072781/Citywide-Planning-Districts/ (last visited Mar. 25, 2014).

Furthermore, the rehabilitation and restoration fund would be neighborhood specific, and monies from the funds would be used to employ green infrastructure measures that mitigate stormwater in the fee-payers' own community. Depending on the level of civic participation in the area, people directly affected by the stormwater remediation fee would have a say in how those monies were spent, such as a vote on where the green infrastructure measures would be best employed and in what order the projects should proceed. The funds would be managed by the S&WB, and disbursement of the rehabilitation and restoration funds could come from city-approved project proposals benefitting the appropriately related neighborhood. These neighborhood green infrastructure projects would be best used as learning opportunities for homeowners who have not yet taken any stormwater mitigation measures and to educate the overall community. This could be a task undertaken in conjunction with local schools and youth groups, as well, further serving to tie people with their neighbors and neighborhood, ultimately improving overall societal well-being.

VI. ENSURING SUCCESS IN NEW ORLEANS

A. Education

A stormwater remediation fee that is large enough to provide incentives for green infrastructure participation would require the cooperation and the support of the community. This means education of the public before the stormwater remediation fee is even passed by the legislature. Creating a supportive community educated about the benefits of such measures will alleviate some of the resistance that new utility fees often garner from the public. A public education program for New Orleans must begin now and must become increasingly aggressive in order to reach as much of the affected public as possible before any stormwater remediation fee can be successfully implemented.

There are already efforts in place to educate New Orleans residents. In December 2006, Groundwork New Orleans began providing education about, and implementation of, rain gardens in an effort to better manage stormwater and street flooding issues. Groundwork partnered with Timberland Boot Company, City Year, Ashe Cultural Arts Center, and the Oretha Castle Haley Main Street Program to install rain gardens in nine sites along Oretha Castle Haley Boulevard—an economically depressed section of the city.[128] Groundwork has also

128. *Our Raingardens*, GROUNDWORK NEW ORLEANS, http://groundworknola.org/Raingardens.html (last visited Mar. 25, 2014).

partnered with the Andrew Wilson School in the Broadmoor neighborhood to implement rain gardens around the perimeter of the LEED-certified school, helping to fulfill the school's goal of LEED Platinum designation.[129]

These kinds of education programs raise community awareness and increase local participation in green infrastructure and its maintenance. When a community better understands the methods being employed by green infrastructure, there is a better chance that it may employ its own green infrastructure measures to manage stormwater on-site, further relieving the city's drainage systems. When citizens have a clear understanding of what it takes for sustainable success in stormwater management, it is easier to embrace the unfamiliar, providing a lasting solution to their common problem. New Orleans residents are repeatedly exposed to the health and property hazards of reoccurring stormwater flooding. When they have an understanding of how their support of environmentally sound solutions will ultimately improve the overall social and economic health of their community and the future of their children, there is a greater likelihood that the community will support the green infrastructure measures proposed here.

B. Technical Guidance

Another important consideration is the need for clear and comprehensive technical documentation to be provided to private landowners undertaking green infrastructure to manage stormwater on their property. This documentation must include all available methods of green infrastructure *feasible to the area of installation*, inclusive of what materials will be needed (including what plant varieties are best) and how to install them. Technical documentation of green infrastructure implementation must be tailored specifically to the area in which it will be installed. What green infrastructure measures work best in the Gentilly area may not work at all Uptown. Getting the technical documentation right is a key element to employing green infrastructure in a sustainable way.

To determine which methods work best in certain areas, New Orleans might make use of its RE.invest Initiative technical assistance to create the needed documentation for the city and private landowners

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129. LEED, or Leadership in Energy and Environmental Design, is a green building program with different green building prerequisites, customizable to any building project, which provides certification at tiered levels that earn credits incrementally. A full description of Groundwork's rain garden installation in participation within the LEED-designed school is available on Groundwork's Web site. *Our Raingardens*, *supra* note 128.

alike. Funded by the Rockefeller Foundation, the RE.invest Initiative is a program that partners with eight cities and provides them with a team of leading technical experts to assist in developing resilient infrastructure.[130] RE.invest pairs each city with engineers and legal and finance firms to design, plan, implement, and finance urban stormwater infrastructure systems.[131] On May 22, 2013, RE.invest Initiative announced that New Orleans had been selected to receive help developing a resilient urban stormwater infrastructure system that uses public resources more efficiently.[132] Using the technical expertise provided by RE.invest to develop technical documentation on how to best implement green infrastructure at the neighborhood and private landowner level will create no new burden on city department budgets or personnel. This work would also create an opportunity for New Orleans and its residents to begin implementing the GNO Plan. By utilizing the GNO Plan as a framework for green infrastructure methods to be used in discrete areas, RE.invest's technical experts could creatively and sustainably incorporate parts of the GNO Plan into each design specification. Utilizing national experts to develop a customized plan for specific localized areas ensures the success of green infrastructure implementation and is in total alignment with the RE.invest Initiative's mission and vision for New Orleans.

VII. CONCLUSION

Although pumping stormwater has been New Orleans' primary and continued mode of stormwater management, the time has come to rethink how New Orleans manages stormwater drainage. The green infrastructure methods discussed above are employable, viable options for the city of New Orleans at a municipal level and for its citizens at a local level. The suggestions made here meet the environmental goals outlined in the New Orleans Master Plan with their sustainable, green modes. These recommendations also serve to meet the S&WB's commitment made in the second modified consent decree to employ green infrastructure in the remediation measures action plans and make it possible for the S&WB to meet its April 24, 2014, goal of submitting a remediation measures action plan that incorporates green infrastructure

130. Press Release, *New Orleans Mayor's Office, RE.invest Initiative Announces Partnership with New Orleans To Build More Resilient Stormwater Systems*, CITY OF NEW ORLEANS (May 23, 2013), http://www.nola.gov/mayor/press-releases/2013/20130523-re-invest-initiative-announces-partnershi/.

131. *Id.*

132. *Id.*

to the EPA. By creating useable developer and private landowner incentives for green infrastructure implementation, the city of New Orleans could position itself to become a model for green infrastructure stormwater management in similar high-flood, low-sea-level areas. Developing eco-minded funding opportunities that promote and support community involvement could serve as a model for green infrastructure implementation, no matter how unique the environment. New Orleans has an opportunity not only to rise as a city rebuilt stronger than before, but also to float to the top as a leader in comprehensive and sustainable stormwater management.